The Manaus industrial hub and the preservation of the standing amazon rainforest

Michele Lins Aracaty e Silva
Doctor in Regional Development (UNISC)
Professor at the Department of Economics (UFAM)
E-mail: michelearacaty@ufam.edu.br

ABSTRACT
The socioeconomic importance of the Manaus Free Trade Zone model and its longevity of 56 uninterrupted years is an unquestionable reality, but the discussion about the contribution of the model in the environmental sphere has long been raised. To this end, we aim to analyze the Manaus Free Trade Zone model as a regional development policy and an instrument of environmental protection. Methodologically, it is a qualitative, exploratory, and descriptive, bibliographic and documental research with content analysis. Amazonas preserves a vast region made up of conservation units, indigenous lands and primary public forests (only 1% of the state's area is under pressure and with deforestation rates). The predominance of an industrial model, the supply of jobs in the manufacturing industry, population concentration, transport logistics, waterway transport, as well as the presence of conservation units and indigenous lands contribute directly and indirectly to the low rates of deforestation in Amazonas. If the main regional development model called the Manaus Free Trade Zone were to be extinguished, we would have a collapse in the entire macroeconomic scenario, which would stimulate a resumption of the process of exploitation of natural resources, mining, cattle ranching, illegal logging, as well as deforestation throughout the region.

Keywords: Manaus Industrial Complex, ZFM model, Forest Preservation, Socioeconomic and Environmental Sustainability, Deforestation.

1 INTRODUCTION

The Manaus Free Trade Zone (ZFM) is considered the most successful regional development model when analyzing the sustainable development indicator. The generation of employment and income implemented after the installation of the Manaus Industrial Pole (PIM) is, for many scholars, a defining factor so that the people of the region did not need to seek their sustenance in the exploitation of natural resources.

The studies that support this thesis have already been carried out by SUFRAMA itself, Fundação Getúlio Vargas (FGV) among other institutions, showing the direct relationship between the maintenance of the model and the preservation of the forest over the last decades.

Given the hypothesis of the organizational structure of the industrial base model that concentrated industrial and logistical activities in Manaus, making the capital of Amazonas attractive to the population and concentrator of income and wealth. On the other hand, the effort to expand areas of environmental conservation and preservation of indigenous lands contribute to Amazonas being the state in the Northern Region of Brazil with the highest percentage of preserved area.

To this end, we aim to analyze the Manaus Free Trade Zone model as a regional development policy and an instrument of environmental protection. Having as The following issue is addressed: what are the possible consequences of a possible extinction of the PIM? If the economic activity of the PIM were to collapse, the immediate effect would be unbridled exploitation of natural resources in search of job and income generation and, consequently, the increase and uncontrolled deforestation.

Methodologically, we have a qualitative, exploratory, descriptive and explanatory research, based on the application of the observational method. As for the media, it is characterized as bibliographic and documentary, with the use of secondary material already published on the subject. As for the instrument of analysis, we will base the observations on the content analysis.

The presence of the Manaus Industrial Pole contributes to curbing deforestation and the preservation of natural resources because it inhibits activities with greater environmental devastating potential, since industrial activities do not require forest resources and boost other sectors of the economy with the same production pattern, such as services.

This text was approved in WG07. Rural, territorial and regional development, in the form of an oral presentation in the full paper modality at the 61st Congress of the Brazilian Society of Rural Economics, Administration and Sociology – SOBER, which took place between July 23 and 27, 2023 in Piracicaba – SP.

Structurally, this article is organized as follows: introduction, development, divided into the following items: The Manaus Free Trade Zone model: historical aspects; The metropolis of Manaus and the Amazon rainforest; Population Attractiveness and Urban Growth and Tax Aspects, Model Performance and Environmental Dynamics. Subsequently, we will have the Methodological Aspects, Conclusion, Final Considerations and finally, the References used for the construction of the text.

2 MANAUS FREE TRADE ZONE MODEL: HISTORICAL ASPECTS

Throughout the process of economic development of the State of Amazonas, two relevant models of regional development have gained prominence: the Rubber Monoculture and the Manaus Free Trade Zone (ZFM).

The Manaus Free Trade Zone duly created by Law No. 3173 of June 6, 1957, the Manaus Free Trade Zone (ZFM) is the result of a national integration policy of the period of the military governments. Having the prerogative to meet the following proposals: to create regions with an infrastructure capable of attracting people to sparsely populated places and to boost the industrialization process that was located more in the southeast region of the country. Therefore, the model would serve as a solvent for these needs in order to promote and stimulate the productive and social association of the Amazon region.

Ten years after its origin, the Federal Government reformulated the proposal, transforming it into a developmentalist model centered on Manaus, and which in its structure comprises three economic poles: commercial, industrial and agricultural, with the industrial pole as a pillar of support. Implemented after this reformulation, the Manaus Industrial Pole (PIM) is the largest industrial hub in the region and one of the largest in Latin America. (SUFRAMA, 2019).

According to the legislation that supports the creation of the Manaus Industrial Pole (Decree-Law 288/67), the Free Trade Zone is presented as an area of free trade of imports and exports, benefiting from tax incentives, in order to strengthen, and generate a foundation for an industrial, commercial and even agricultural pole, with favorable conditions for its permanence and maintenance. Despite being established in Manaus, the model covers other states and municipalities in the northern region of the country, extending to: Acre, Rondônia, Roraima, Amapá and the rest of the Amazon (DECREE-LAW 288/67).

The Manaus Free Trade Zone (ZFM) has the fundamental mission of ensuring the functioning of a relevant system with a geopolitical role of deconcentration of investment and capitalization of income, being public and private, influencing the way of income generation, collaborating for the preservation and reduction of deforestation in the Amazon region, where its investment model moved away from the exploitation of natural resources, such as the extraction of timber and mineral resources. Thus, most of the activities that generate wealth are located in Manaus (FAS, 2022).

The ZFM model presents a system that emphasizes the differential treatment of federal and state taxes, in addition to the exemption from the Tax on Industrialized Products (IPI). The Manaus Free Trade Zone emerged at a time when it presented industrialized products that were not often seen in most Brazilian capitals, in addition to the introduction of multinational companies offering cultural and linguistic enrichment (FAS, 2022).

The Superintendence of the Manaus Free Trade Zone (SUFRAMA) is responsible for managing the model, promoting the development of the municipalities of the Western Amazon through Free Trade Areas (FTAs), covering the states of Rondônia, Roraima, Acre and Amapá and Amazonas) (SUFRAMA, 2019).

Since its inception in 1957, the model has gone through at least five phases in different periods and characteristics within industrial policy. Currently, it is the main public policy put into practice by the Federal Government with a legacy of regional development (SILVA, LUCAS and OLIVEIRA, 2021).

The first phase is configured as the period of a predominant commercial model that goes from 1967 to 1975, initially created to be a free port for the storage and sale of imported products, with its industrial policy aimed at serving the domestic market. Subsequently, until 1990, we have the second phase, where the PIM already competed directly with the large Brazilian industrial centers, through

measures that boosted the country's input industry. It is also during this period that we have the first extension of the model, extending it until 2003 (2021).

The third phase covers the period from 1991 to 1996, when the ZFM began to adapt to the new industrial and foreign trade policy, characterized by economic opening and the reduction of import taxes (II). This phase is also marked by the extensive process of modernization in the PIM due to the implementation of technical quality and standardized standards by the National Institute of Metrology, Standardization and Industrial Quality (INMETRO).

In the fourth phase, from 1996 to 2002, it is marked by a more consolidated industrial policy, capable of adapting to the globalization process, it presents some evident characteristics, such as: the inclusion of imports to boost sales, the creation of criteria for the promotion of regional development, the search for new technologies for industries and the creation of a center for the so-called bioindustries (2021).

The current phase of the model comprises the period from 2003 to the present day (fifth phase), the Productive Development Policy (PDP) is in force, which in short aims to achieve a more efficient production, with more modern industries through technological development, the constant search for the expansion of exports and the expansion of investments for the infrastructure of the municipalities that make up the area covered by the model. It is also in this fifth phase that the extension occurs through Constitutional Amendment n. 83/2014, 05.08.14, expanding tax incentives until the year 2073 (SUFRAMA, 2019).

Even though it has existed for more than half a century, and is valid until 2073, the Manaus Free Trade Zone has been the subject of sometimes heated debates, but little substantiated in in-depth technical studies and one of the most recent concerns is centered on the Tax Reform proposal that would change the tax characteristics of the model. Another group of scholars call for a sustainable tax reform that takes into account regional peculiarities (FAS, 2022).

## 2.1 THE METROPOLIS OF MANAUS AND THE AMAZON RAINFOREST

With approximately 2,255,903 inhabitants (2,063,547), with a population density of 158.06 inhabitants/km², Manaus is the 7th most populous city in Brazil, being the most populous city in Amazonas, in the North Region and in the entire Brazilian Amazon, connecting with numerous municipalities around it, building a hierarchy system with the regions that are under its influence (IBGE, 2020).

According to the study Regions of Influence of Cities (Regic), by IBGE, (2018), Manaus is configured in the category of metropolis where its influence affects several cities around it, generating a process of socioeconomic and political dependence in other regions. In total, according to the study, there are 71 cities that suffer dominance from the capital of Amazonas, where the residents of these

cities carry out their movement in search of job opportunities, basic services and acquisition of goods. As we can see in Figures 1 and 2, below:

Figure 1: Manaus and its influence
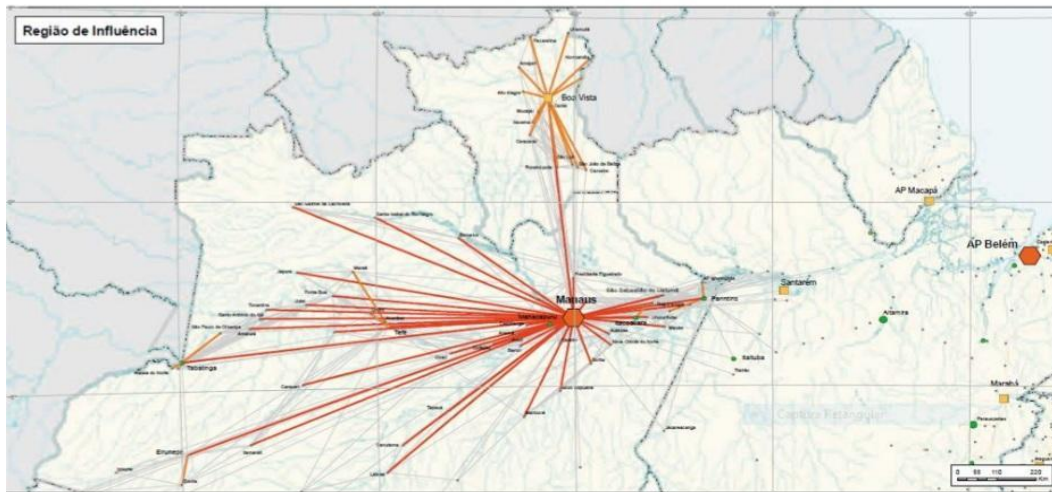
Manaus presents a huge variety of cultures and peoples, who since the Golden Age of Rubber have contributed with architectural structures inspired by cities in Europe, with emphasis on the Teatro Amazonas, located in the majestic Largo São Sebastião, accompanied by materials that were transferred directly from Europe, to satisfy the colonels of the rubber period. However, after the end of this glorious period, a capital emerges with complex problems related to the environment and social inequality, ignoring its natural wealth of resources and not understanding the importance of rivers, streams and native afforestation (IBGE/ REGIC, 2018).

Figure 2: Size of top-level networks (Metropolises)

Redes de primeiro nível (Metrópoles)	Dimensão									
	Capitais Regionais	Centros Sub-Regionais	Centros de Zona	Cidades	População 2018	Área (km²)	Densidade demográfica (hab./km²)	PIB per capita	PIB total (R$ 1 000)	PIB Metrópole/ região de influência
AP São Paulo/SP	26	77	51	679	49 295 747	688 624,1	71,59	42 373,50	2 088 833 313	52,95
AP Brasília/DF	8	25	24	277	11 649 359	1 753 408,9	6,64	39 251,94	457 259 929	53,89
AP Rio de Janeiro/RJ	5	11	3	63	17 296 239	48 796,4	354,46	37 156,08	642 660 440	75,70
AP Belém/PA	4	10	8	157	9 335 660	1 374 601,9	6,79	16 270,49	151 895 774	25,78
AP Belo Horizonte/MG	12	52	65	752	21 069 799	571 747,7	36,85	25 954,38	546 853 629	31,57
AP Campinas/SP	1	10	1	34	4 396 180	14 073,0	312,39	48 902,34	214 983 509	60,52
AP Curitiba/PR	5	30	32	373	11 654 092	210 851,5	55,27	35 143,78	409 568 832	35,49
AP Florianópolis/SC	10	16	27	265	7 138 738	96 954,4	73,63	36 348,80	259 484 525	14,05
AP Fortaleza/CE	5	34	58	630	20 109 664	764 171,9	26,32	13 561,33	272 713 836	29,93
AP Goiânia/GO	3	21	34	364	8 269 552	964 430,5	8,57	26 706,14	220 847 808	30,39
Manaus	1	4	2	71	4 490 260	1 624 605,2	2,76	21 985,26	98 719 516	71,21
AP Porto Alegre/RS	6	39	37	417	11 293 956	266 877,9	42,32	36 069,72	407 369 834	38,97
AP Recife/PE	10	36	45	720	23 601 254	345 048,8	68,40	16 304,43	384 805 000	26,21
AP Salvador/BA	6	24	39	402	14 471 227	479 065,0	30,21	17 538,67	253 806 046	45,22
AP Vitória/ES	1	8	8	85	4 468 927	67 117,8	66,58	26 307,95	117 568 317	51,83

Also according to the study, Manaus is a capital with economic dynamism, where such growth was not accompanied by its structure, with problems related to housing deficit, invasions of

environmental preservation areas, lack of regular water supply, health, logistics infrastructure and development in education (2018).

2.2 POPULATION ATTRACTIVENESS AND URBAN GROWTH

According to Silva et al., (2022), Manaus since the implementation of the Manaus Free Trade Zone Industrial District has been the capital that most attracts the population in search of employment, education, quality of life, and opportunities, as we can see in Figure 3. This phenomenon is responsible for the disorderly growth and spread of the city to the most peripheral areas. These, in turn, are without adequate infrastructure to receive this population volume, which sometimes has a negative impact on the green areas around the capital and near the sources of rivers and streams.

Figure 3: Population Growth
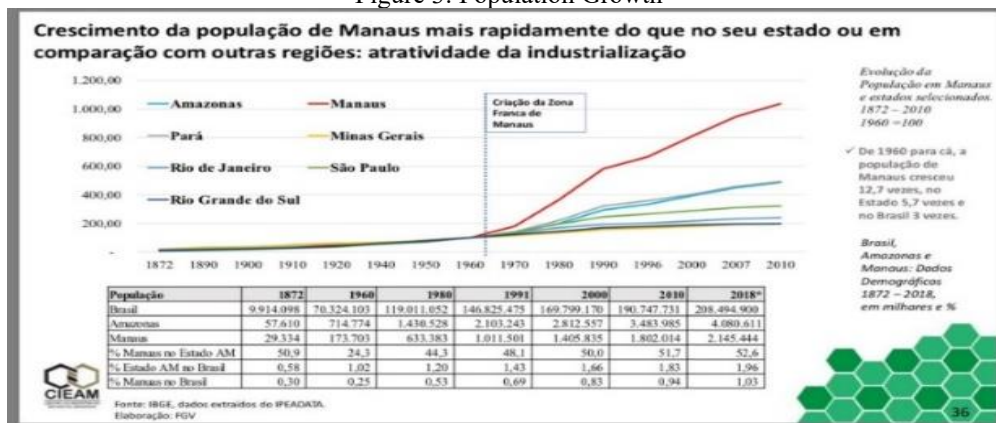
Source: SILVA et al., (2022) adapted from CIEAM, (2021)

Also for the authors (2022), some factors such as migration and vegetative growth (birth x mortality) are determinants for the population increase in cities. The last IBGE census was carried out in 2010, but there are several projections of estimates of this population, both from the IBGE and from the government agencies of the state of Amazonas.

According to the data presented in the Figure above, the city of Manaus, considering the determining factor of population migration, probably encouraged by the Industrial Pole and other opportunities, had an exponential growth of its urban population in recent decades, especially from the 1990s in which the urban population jumped from 633,383 thousand to 1,011,501 million inhabitants. In 2018 to 2,145,444 million and from 2020 onwards, despite the low population caused by the misfortune of the pandemic, IBGE data pointed to 2,219,580 million and in 2021 the estimates were for 2,255,903 million inhabitants in the capital Manaus. The population of the state of Amazonas is estimated by IBGE (2021) at 4,269,995 million inhabitants.

The demographic increase in Manaus is visible mainly after the creation of the ZFM. The attractiveness of industrialization led to a strong migratory flow to the capital of Manaus, as population

growth can be observed after 1960. Urbanization is often a consequence of industrialization, which may explain this increase over time (FGV, 2019).

According to FGV studies (2019), something interesting to point out is that the Gini coefficient of the State of Amazonas, which measures inequality in the region, has exceeded the national average since 2013. The evolution of the GDP of the state of Amazonas in relation to other states in the country, especially those in the North region, is impressive. Finally, tax incentives have proven to be effective in improving the educational system, increasing population and per capita income.

2.3 TAX ASPECTS, MODEL PERFORMANCE AND ENVIRONMENTAL DYNAMICS

The Manaus Free Trade Zone (ZFM) has, as its main economic instrument, federal taxes, which are imposed with differentiation, such as Tax on Industrialized Products - IPI, Import Taxes - II, PIS, Cofins, and, mainly, the state tax of ICMS. It is important to note that there was a national policy in the 1990s, which fostered the IT sector, exempting these products from IPI in the ZFM and partially reducing this tax in the rest of the country. In addition, it established a percentage of 5% of this turnover in Research and Technology (R&D). It is important to note that since colonial times, several attempts have been made to incorporate the Amazon into the Brazilian economic space (MATTOS, 1980).

In 1954, there was an attempt at global planning for Amazonian development, with the creation of the "Emergency Program" of the SPVEA, which became SUDAM. SUFRAMA was also created, aimed at attracting investments, representing a geopolitical device to accelerate the process of internalization. In the 1970s, the National Integration Plan (PIN) was implemented, inserting the Theory of Development Poles (PERROUX, 1955).

The Tax Reform is the Federal Government's proposal to simplify the Brazilian tax system by extinguishing taxes such as PIS, Cofins, IPI, ICMS and ISS by a Tax on Transactions with Goods and Services, IBS. (PL 3887/2020).

The reform seeks to modernize tax collection in order to favor the competitiveness of companies. However, whatever the reform needs to be consciously engendered in the regional needs of environmental preservation, fostering sustainable and intelligent development (FAS, 2022).

Also according to the Foundation (2022), the changes in the tax system need to consider the Manaus Free Trade Zone (ZFM) with a renewing economic perspective. In view of this need, scholars from various fields, with in-depth knowledge of the ZFM, came together to present proposals for a new tax regime to be presented to governments, companies, decision-makers and society in general.

> "The Brazilian economy is crying out for the modernization of the tax regime, and this process needs to better understand the historical contribution of the ZFM to the Amazon and to Brazil, so that it can be improved and have the positive effects enhanced" (FAS, 2022, p. 21).

The State of Amazonas has a different tax policy in relation to ICMS, as products manufactured within its limits are taxed in different percentages, according to their nature. Such tax action will be in effect until 2023. Thus, this needs to be reviewed in order to adopt a vision that takes into account the dynamism of economic, social and environmental demands, providing a harmonious adaptation to changes, seeking to achieve the optimization of tax incentives, in addition to reevaluating sectors to which federal incentives are exceeded to make local production competitive with international products (FAS, 2022).

The proposals presented hope to consolidate a model that will increase competitiveness and diversification, including the internalization of development. Developing and conserving the ZFM is essential to conserve the forest and use it for sustainable development (FAS, 2022).

The creation of a Sustainable Development Fund for Amazonas is also foreseen in the proposals, which would be managed by resources from a new private foundation, in a clear and efficient manner. In addition, investments and new economic matrices, and in environmental conservation, are based on two main tax sources: amounts transferred by ZFM companies (an example would be a fraction of the tax of the current Information Technology Law); and changes in state ICMS incentives, mentioned above, which would reinforce the government budget in health, environment, and education infrastructure investments (FAS, 2022).

The economic, social and environmental importance of the ZFM, to which it has contributed for decades to the reduction of deforestation, attracting populations in search of better living conditions. Social benefits are also expanded throughout Brazil, improving rainfall regimes, which are essential for agriculture, hydroelectric plants and water supply in urban centers. In this way, the tax reform processed in the National Congress is addressed with due importance, in the issues related to ZFM and the environmental impacts they may cause. The contemporary conflict of climate change on the planet provides the valorization of the Amazon, inserting new opportunities to the region, bringing social, environmental and business investments, in an intelligent and modern perspective (FAS, 2022).

For Araújo and Paula (2009), despite the favorable figures, the ZFM model, as well as any other model of regional development, is not totally perfect and has deficiencies or weaknesses: inefficient leasing of factors of production;   distortion of markets and production chains;   absence of conditionalities and targets and constitutes a model that generates dependence, and presents an urgent need for a productivity and competitiveness agenda given industry 4.0, integration of production chains, as well as adjustment in the fiscal and tax context, in addition to reducing production subsidies.

Also for the authors (2019), in relation to the environmental aspect, the studies that support the hypothesis that the ZFM contributes to preservation, in general, bring the perception that the PIM does not harm the local environment and that the industrial activities of the ZFM do not require the intensive use of natural resources (such as land and wood). unlike other primary activities (mineral extraction,

logging, extensive agriculture, which are associated with land grabbing and real estate speculation), which occur recurrently and constantly in the Amazon in general.

Rivas, Mota and Machado (2009) state that the growth process of the Pole was detached from the significant use of existing natural resources, while in the state of Pará the development took place through the exploitation of natural resources.

Teixeira (2013), Pereira Junior (2015), Costa and Biderman (2014) and Galinari et al., (2007) also discuss the benefits that industrial development and concentration can bring to the region of the Manaus Industrial Pole, reducing the attention given to activities intensive in natural resources.

For FGV (2019), results of the computable general equilibrium model indicate that the Free Trade Zone has an inhibiting effect on activities that involve areas that are not within the PIM, putting pressure on them. That is why the attractiveness of intense activities is lower, since most of the opportunities come from industries. Thus, the ZFM contributes to the reduction of deforestation.

A simple demographic analysis, based on the 1960 Census, can demonstrate that economic dynamics had an impact on demography and was decisive in the environmental aspect. If we compare the population evolution of Brazil and with the two largest states in the region and their capitals, we can see that the dynamics of deforestation is related to the spatial distribution and nature of economic activities (FAS, 2022).

Few studies have empirically analyzed the effect of the ZFM on deforestation within the Amazon Region where the PIM is located. Carvalho and Domingues (2016) say that, between 1960 and 1980, the Amazon had the highest rates of urban growth in the country. However, with the exploitation of natural resources in a disorderly manner, inappropriate predatory activities in most of the occupied areas, and high rates of deforestation for agricultural enterprises and the opening of roads and infrastructure and mining projects in the region.

On the other hand, Nogueira, Sanson and Pessoa (2007) state that the urban area of Manaus is going through a process of unsustainability, aggravated by demographic growth, urban expansion and modernization of interurban spaces, generating predatory and environmentally harmful environmental practices.

As for the perspective of the environmental development of the Manaus Free Trade Zone (ZFM), a pioneering study organized by SUFRAMA stands out, in which it confirmed the indispensability of the PIM for the preservation of the green cover of the Amazon. The research resulted in the work "Virtuous Impact of the Manaus Industrial Pole on the protection of the Amazon Forest", developed by researchers from UFAM, UFPA, the Piatam Institute and IPEA. According to the research, the Manaus industrial park contributed to a 70% reduction in deforestation in Amazonas between 2000 and 2006 and, until 1997, by approximately 85%. This contribution resulted in the preservation of 98% of the state's vegetation cover (RIVAS, MOTA and MACHADO, 2009).

According to Silva (2015), there are numerous social and environmental conditions to be observed by industries to take advantage of PIM tax incentives, not to mention the need to pay attention to the principle of reciprocity, so that a percentage of their revenues is reverted through the payment of contributions, funds related to the internalization of development, scientific and technological research, and tourism. In this sense, the ZFM presents itself as a model capable of sustainably developing the western Amazon region and, consequently, Brazil.

However, one cannot forget the urban impacts generated by the concentration of industrial activity in Manaus. The capital of Amazonas attracted a large contingent of population from the interior and other states in search of opportunities, but without greater qualification – which occurred on a significant scale and speed, over time. This has prevented the planning of urban infrastructure in a way that is compatible with the challenge, with the continuous expansion of irregular occupations and deficiencies in the supply of water, energy, and basic sanitation, among other degradation factors (FAS, 2022).

For FAS (2022), the ZFM contributed objectively to the reduction of deforestation in Amazonas. Although this was not an explicit objective of the Public Policy instruments that created it, this was one of the main justifications for a vote that obtained a large majority in the National Congress to approve the constitutional amendment that extended the validity of the ZFM until 2073. The environmental benefits of ZFM are clearly recognised.

The existence of the Manaus Industrial Pole (PIM) proved to be a successful experience, since it was key in controlling deforestation in the Amazon, which brings great benefits to all of Brazil, by maintaining the rainfall regime, essential to agricultural production, hydroelectric power generation and urban water supply. The indirect environmental benefits of the PIM, although not initially foreseen, represent the fundamental reason for maintaining its differentiated tax regime. However, additional mechanisms need to be put in place to ensure direct environmental benefits (FAS, 2022, p.3).

It should be recognized that the preservation of the Manaus Industrial Pole is beneficial and strategic for Brazil as a whole, as it generates positive results from an economic, social and environmental point of view, generating strong tax collection for the Union, functioning as an axis of dynamization of the economy of the entire Western Amazon and providing the conservation of the forest. In addition, recognizing that there is a tendency for industrial activity to shrink in the country, especially that with higher technological content, the loss of the PIM may further accentuate the external dependence on these products. In this sense, the involvement of its companies in conservation activities of the largest tropical forest on the planet generates benefits for Brazil that outweigh the arguments to the contrary (FAS, 2022).

It was the industrial concentration in Manaus, with the offer of formal employment, whether in manufacturing or related services, that boosted the migratory movement from the interior to the capital

and – although unintentionally foreseen – inhibited the pressure of predatory economic activities in the interior, favoring a scenario of less deforestation and degradation. In addition to physical concentration, the production processes applied in the ZFM, based on the incorporation of technologies for higher value-added products and not on primary commodities, which do not require the intensive use of natural resources, end up protecting the forest, unlike what occurs in neighboring states (2022).

For FGV (2019), while the ZFM is strongly recognized and defended by both public managers and regional political representatives, for whom the ZFM is seen as a successful regional development dynamic from an economic, social, and environmental point of view. With regard to the environmental impacts of the ZFM, does its creation contribute to containing or accelerating deforestation in the State of Amazonas? Or has it not had or does not have any relevant influence on the environment? The causes of deforestation are diverse, and they can be correlated both to the industrial development of the city (via population increase, urbanization process, migration, infrastructure and logistics improvements, among others) and to the development of the primary sector (through agricultural, mining and cattle ranching activities).

There is no consensus in the literature on these issues. On the one hand, it is possible to argue that the expansion of the industry, by increasing income in the region, has contributed to accelerating deforestation, since the demand for agribusiness products and the need to improve the region's infrastructure and logistics must have increased. However, it is also possible to argue that deforestation would have been even greater if the local population had to seek their income from agricultural and extractive activities (FGV, 2019, p. 42).

Costa (2016) states that the existence of the PIM could inhibit activities that would have a greater impact on the environment, such as cattle ranching or logging. In the same sense, according to Brianezi (2013), the ZFM incentives do not include industrial production with local natural resources, in addition to concentrating investments and the population of workers in the state capital.

In the studies by Rivas, Mota and Machado (2009), based on mathematical and econometric models for this purpose, identifying causality between deforestation and variables such as: agricultural area; adults enrolled in primary and secondary education; rural credit; cattle herd. In addition, they identified that deforestation is more concentrated in the municipalities in the south of the state of Amazonas, due to the expansion of the agricultural frontier coming from the border states. Regarding the effect of the PIM on deforestation, they conclude that it inhibits the activities with the greatest environmental devastating potential, since the economic activities of the PIM do not require forest resources and boost other sectors of the economy with the same production pattern, such as services.

According to the conclusion of FGV's studies (2019), the ZFM has an inhibiting effect on activities that put pressure on the opening of new areas and, consequently, deforestation. Thus, it does not allow us to refute the hypothesis that the ZFM contributes to the reduction of deforestation. The

explanation for this result can be based on the discussion presented in the literature review, present in other studies, that the industrial activity of the ZFM and PIM reduces the attractiveness of intensive land use activities. In this way, investments and labor in the region find better opportunities in industrial activities, thus reducing the pressure on deforestation. However, if the attractiveness of the ZFM's industrial activities is reduced, part of the labor and capital of the State of Amazonas would be allocated to agricultural and extractive activities

In addition, the economic modeling exercise suggests that the effect of the ZFM on activities that pressure deforestation contributes to mitigate deforestation and promote conservation, but in a mild and indirect way, and it is possible to reverse this effect under some conditions.

In view of these results found in the analysis of the environmental effects of the ZFM, it is recommended that explicit actions to encourage environmental preservation and discourage deforestation be implemented by agents and companies interested in the continuous development of the ZFM, in order to consolidate the role of the ZFM for the preservation of the Amazon biome and the State of Amazonas. Such actions would allow the direct and unequivocal attribution of the ZFM to environmental conservation and the strengthening of the discourse of its relevant role for the sustainable development of Amazonas and the country.

Also for FGV (2019), in a cross-sectional balance of the studies, it seems fair to conclude that the program of tax incentives aimed at the PIM has been successful. Some indicators allow this finding: the evolution of per capita income in both the metropolitan region of Manaus and the state of Amazonas, the performance of some education indicators, access to services such as water and sanitation, and income inequality indexes. It is also worth considering that the constitution of an industrial pole seems to be an inhibiting element of deforestation in the Amazon forest, both according to panel data analysis techniques and through synthetic control analyses.

It is very difficult to estimate the impacts of the eventual destructuring of the Manaus Industrial Pole (PIM); However, it can be inferred, from the studies presented here, that, among others, there would be a strong drop in the employment generated, currently around 500 thousand, an intense emigration flow, a consequent relevant reduction in the level of per capita income, disincentive to improve education, among others.

Interestingly, the Federal Government's fiscal efforts to sustain a minimum of urban activity and income can be very similar to the net expenditure (incentives received from the Federal Government minus federal revenue in the region), without the positive consequences in terms of education and labor income.

It is worth emphasizing, once again, that the Manaus Free Trade Zone is a regional development program aimed at consolidating productive activities in a region considered remote from the

perspective of the Brazilian consumer market. Since its creation in 1967, the ZFM has fulfilled the role of ensuring the integrity of the national territory, and being a national security imperative.

The industrial activity in the Manaus Free Trade Zone is composed of large international companies, with the best competitive practices. There have been great advances in the region due to the program, with the establishment of a strong regional consumer market, a broad and diversified labor market, universities and applied research institutes, among others.

It is a region rich in natural resources, many of which are highly valuable, and of great biodiversity. This provides a solid basis for the development of a broader regional development programme.

These studies derive directly and indirectly from public policy recommendations for the region. In a vision of the future, it seems fundamental to us to maintain the constitutional precepts so as not to put at risk the existing industrial park, which generates about 500 thousand direct and indirect jobs.

Likewise, there seems to be no doubt about the importance of strengthening the development of the North region, and particularly of the state of Amazonas, based on the following. It is necessary to increase the region's contribution to Brazilian exports. Investments in road and port infrastructure are essential for this. It is necessary to make strong investments in the port structure, allowing modernization in customs clearance, in the same way as in central highways in the region, such as the BR-31925 and BR-230 highways (known as the "Trans-Amazonian").

Investments in infrastructure in the region should extend to the rail, road, river and telecommunications networks. These investments should generate, over time, stimuli for the productive diversification of the region, attracting new investments in new economic sectors beyond manufacturing activity.

Second, it is very important to allocate RD&I resources to activities based on the region's natural resources and to excellent technical-professional training. Associated with this, it is necessary to develop productive activities in the interior of the state, stimulating projects based on mineral resources (potash, gas, bauxite, niobium, etc.), important for the promotion of new economic poles (fertilizers, metallurgical, chemical) and on natural resources aimed at the development of food, personal hygiene, perfumery and cosmetics poles.

Last but not least, the region lacks a structured program for the development of tourism activity, whether business or not. The immense tourism potential of the region, comparable to the most attractive places on the planet, has been economically exploited far below its potential. It is necessary and urgent to design a structured program in a joint act with the three federative entities (Union, State and municipalities of Amazonas) for the development of a sustainable business chain aimed at attracting national and foreign tourists. This program has the function not only of generating employment and income in the region, but also of preserving the environment.

3 METHODOLOGICAL ASPECTS

According to Alves (2003), the methodology is considered a necessary tool of the researcher, because it is in it that the paths to be adopted are specified and creativity is allowed to be delineated and to define the how, where, with whom, with what, when and in what way it is intended to capture reality and its phenomena.

According to Galliano (1986), all the meanings of the word "method" recorded in dictionaries are linked to the Greek origin methodos - which means "path to reach an end".

The methodological procedures of this work have a qualitative approach with the objective of analyzing the Manaus Free Trade Zone model as a regional development policy and an instrument of environmental protection. To this end, this research is characterized as bibliographic and documentary, since it was based on material already elaborated, consisting mainly of books, scientific articles and documents, reports and technical studies.

We can also classify it as descriptive, whose main function is the analysis of the object, seeking to describe the state of the art in the chosen themes: The Manaus Free Trade Zone model: historical aspects, The Manaus metropolis and the Amazon forest, Population attractiveness and urban growth and Tax aspects, model performance and environmental dynamics. Descriptive research, according to Mattar (1993), serves to discover and observe phenomena, seeking to describe, classify and interpret them. This assertion is endorsed by Vergara (1997), when he points out that descriptive research studies the characteristics of a specific phenomenon or population.

In a complementary way, it is possible to classify the present research also as exploratory, because the knowledge about the themes raised. As for the analysis of data and results, a content analysis based on observations of the facts and understanding of the texts used in the construction of the text prevails.

4 CONCLUSION

We begin this discussion with the objective of analyzing the Manaus Free Trade Zone model as a regional development policy and an instrument of environmental protection. Taking into account that the ZFM model is relevant to the state, regional and national economy and that its configuration focused on industrial activity discourages the predatory activity of exploitation of natural resources.

Undeniably, the preservation of the Amazon rainforest guarantees numerous benefits for Brazil and the world. In addition, only the State of Amazonas, even after more than five decades of intense industrial activities, maintains approximately 98% of its vegetation cover, an unparalleled mark that proves that it is possible to harmonize a high degree of technological advancement and respect for the environment.

Amazonas preserves a vast region made up of conservation units, indigenous lands and primary public forests, second only to the state of Amapá in this regard (considering the states that make up the

northern region). In the State of Tocantins, only 37% of the territory is made up of conserved areas (MapBiomas).

Only 1% of the territory of the state of Amazonas represents areas that are under pressure, in which deforestation rates are concentrated compared to the state of Maranhão, this same rate is 24%.

The ecological footprint of Amazonas in 2014 was 1.16 km² per unit of GDP, while that of Pará was 11.84 – a value about ten times higher. The direct and indirect environmental benefits of the ZFM include: (i) reduction of deforestation and (ii) reduction of fires, associated with favorable conditions for the implementation of public policies aimed at (iii) the creation of conservation units, (iv) a low density of the road network and (iv) the promotion of sustainable development (VIANA, 2014).

In the past, we raised a question that often arises in regional and national debates. It is considered a ghost that threatens us, we are referring to the possible extinction of the PIM and its probable consequences.

The literature that supports the relationship between the PIM and its contribution to environmental preservation is little explored, especially with regard to scientific works that make use of quantitative methods, but we highlight the pioneering spirit of the work: Economic Instruments for the Protection of the Amazon: the experience of the Industrial Pole of Manaus (RIVAS, MOTA and MACHADO, 2009) which elucidated in its analysis that the presence of the PIM in Manaus, and the fact that it develops economic activities with absence or low use of forest resources, in its inputs and by boosting other sectors of the economy with the base and production pattern such as services, it boosted and collaborated for the reduction of 85 to 86% in deforestation in the Manaus region.

In a scenario where PIM were to lose If it were to play a leading role, SUFRAMA would inevitably lose investment power, which would increase its ability to avoid deforestation. Still on SUFRAMA's investments, they contribute on two main fronts: the first is an income-generating factor and a contribution to the improvement of local purchasing power. Increased purchasing power makes it possible for consumers to purchase manufactured products manufactured at regional and national level, which helps to reduce pressure on local natural resources. The second, on the other hand, occurs through the improvement of infrastructure of material resources and human capital.

From the two forms of contribution of the effects of investments, their reduction would lead to a drop in the level of income and direct changes in the expectations of individuals and their families, who would seek income from the exploitation of natural resources, increasing deforestation and environmental degradation in an unbridled way.

Firms would also be affected and we would have unemployment and migration of a large population contingent to the border regions or to cattle ranching and soybean exploitation.

Another point that deserves to be highlighted is the phenomenon of globalization that makes it possible for a company to settle anywhere in the world and certainly a company that decides to leave

the PIM would be destined for any country in Latin America or Asia and not another Brazilian state. In this way, the Manaus Free Trade Zone and Brazil lose, which once the migration process occurs, this company will generate employment and income in another nation.

The weight of the collection from the activities related to the PIM, which make up a significant part of the state revenue, would cause a hole in the public coffers and cause a significant impact on the Federal Government, states and municipalities.

Despite the limitations of the research, the authors who have focused on the theme are unanimous in establishing that the PIM contributes to the population concentration and the attractiveness of labor in the capital and that its absence would increase the pressure on the exploitation of natural resources.

5 FINAL THOUGHTS

According to the discussion raised here, there are numerous factors that combined contributed directly and indirectly to the permanence of forest cover in the State of Amazonas, with emphasis on: industrial concentration in Manaus and manufacturing with the offer of formal employment (direct, indirect and temporary), the migratory flow from the interior to the capital, which inhibited the pressure of activities related to extractivism, mining and timber activity.

The population concentration in Manaus, as well as the production processes applied in the ZFM, which is based on the incorporation of technologies for higher value-added products *and not primary commodities*, do not require the use of natural resources and do not cause damage to the forest. This is different from what happened in the neighboring state (Pará), where economic activity was concentrated in the primary sector and the exploitation of natural resources (agriculture and mining), reflecting more positive results for Amazonas in the environmental aspect.

Given the structure of the ZFM model, we can affirm that the PIM contributes to the control of deforestation, generates benefits for the maintenance of the rainfall regime that supplies a large part of Brazil, with positive influences for agricultural production, hydroelectric power generation and urban water supply. In addition, by reducing fires, it reduces air pollution and, therefore, brings enormous benefits to public health, for the urban and rural population.

According to Imazon (2005), the population concentration in Manaus reduces the human presence in the forest and inhibits the pressure on natural resources, considering that the PIM acts as a buffer of this pressure.

Another relevant characteristic in this scenario is the predominant modal in the region, the logistics infrastructure developed as a local solution, almost entirely waterway and without road connection, causes less damage to the environment. In this case, the isolation and river roads are

favorable to the preservation of the forest and cause lower greenhouse gas emissions per unit of product transported.

As it was possible to observe, several factors together contribute directly and indirectly to low deforestation indicators in Amazonas in relation to neighboring states and added to these we have the presence of Conservation Units and Indigenous Lands.

The commitments based on Agenda 2030 has strengthened the involvement of ZFM companies more directly in environmental conservation, with a positive effect against future risks to the economy. Given the commitments made so that together we can seek solutions for the preservation of the forest and the lessons learned from facing the Covid-19 pandemic and its social and economic impacts, associated with the evidence on the origin of the virus in the forest, it brings the alert and the collective obligation so that we can know, preserve and conserve so that we can avoid the emergence of new pandemics originating in the Amazon.

Maintaining the ZFM is essential to protect the Amazon and use it sustainably. Thus, two current movements need reflection: the Tax Reform and the role of forests for environmental balance and any path of economic and social recovery of the country must necessarily pass through the protection and sustainable use of the biodiversity of the Amazon.

Finally, to look, research, dialogue, discuss and reflect on the Amazon is to invest in its future, it is to think about conditions that enable paths that can contribute to the Economy of the Amazon (Economy of the Forest), and thus face the dilemmas and challenges that are projected on the region in the face of the challenges of the globalized world that impact on biodiversity, forest culture and peoples (SILVA, 2022).

REFERENCES

ALVES, R. Metodologia da Pesquisa. São Paulo: Editora Social, 2003.

ARAÚJO, J. J. C. do N. PAULA, E. A. de. Novas formas de desenvolvimento do Amazonas: Uma leitura as ações do Programa Zona Franca Verde. 2009. Disponível em: http://www.rbgdr.net. Acesso em: 26 mar 2023.

BENCHIMOL, Samuel. Navegação e transporte na Amazônia. Manaus: Edição Reprográfica, 1995.

BRIANEZI, T. O deslocamento do discurso sobre a Zona Franca de Manaus: do progresso à modernização ecológica. 2013. Tese de Doutorado em Ciência Ambiental - Ciência Ambiental, Universidade de São Paulo. 2013.

COSTA, J. B. O Polo Industrial da Zona Franca de Manaus e a preservação da floresta amazônica: caminhos independentes. Dissertação de Mestrado. Instituto de Ciências Humanas e Letras, Universidade Federal do Amazonas. 2016. Disponível em: https://tede.ufam.edu.br/handle/tede/5602, Acesso em: 26 mar 2023.

FAS. Reforma Tributária, Zona Franca de Manaus e Sustentabilidade: é hora de revolução. 2020. Disponível em: https://fas-amazonia.org/publicacao/estudo-reforma-tributaria-zona-franca-de-manaus-e-sustentabilidade-e-hora-da-evolucao/. Acesso em: 25 mar 2023.

FEARNSIDE, P.M. Destruição e Conservação da Floresta Amazônica, Vol. 1. Editora do INPA, Manaus. 368 p. 2021. (no prelo). ISBN: 978-85-211-0193-2. Disponível em: philip.inpa.gov.br/publ_livres/2019/Destruicao-v1/Destruicao_e_Conservacao_da_Floresta_Amazonica-Miolo-prova.pdf. Acesso em: 25 mar 2023.

FGV. Zona Franca de Manaus: Impactos, Efetividade e Oportunidades. Estudos FGV Zona Franca de Manaus, 2019. Disponível em: https://eesp.fgv.br/sites/eesp.fgv.br/files/estudos_fgv_zonafranca_manaus_abril_2019v2.pdf. Acesso em: 20 mar 2023.

GALLIANO, A. O Método Científico: Teoria e Prática. São Paulo: Harbra, 2006.

IBGE. Instituto Brasileiro de Geografia e Estatística. Estatísticas do Estado do Amazonas. Disponível em: https:// https://www.ibge.gov.br. Acesso em: 30 mar 2023.

IBGE. Estudo sobre as Regiões *de* Influência das Cidades – REGIC. 2018. Disponível em: https://www.ibge.gov.br/geociencias/organizacao-do-territorio/redes-e-fluxos-geograficos/15798-regioes-de-influencia-das-cidades.html?=&t=acesso-ao-produto. Acesso em: 20 fev 2022.

MARGULIS, S. Causas do desmatamento na Amazônia brasileira. 2003. The World Bank, Brasília. Disponível em: http://www.finefrint.com. Acesso em: 20 abr 2023.

MATTAR, F. Pesquisa de marketing: metodologia, planejamento. 5. ed. São Paulo: Atlas, 1993.

MATTOS, C. Uma Geopolítica Pan-Amazônica, 1ºEdição, Rio de Janeiro, Bibliex, 1980.

PEREIRA, M. S. Navegar é preciso: a lógica e a simbólica dos usos socioambientais do rio. Manaus: UFAM, 2015. (tese de doutorado).

PERROUX, F. Considerações em torno da noção de polo de crescimento. Revista Brasileira de Estudos Políticos, Belo Horizonte, 1977.

QUEIROZ, H. BUSTAMANTE, M. Os desafios para um modelo realmente sustentável e inovador de desenvolvimento da Amazônia. Com ciência revista eletrônica de jornalismo científico. 2020. disponível em: https://www.comciencia.br. acesso em: 02 mar 2023.

RIVAS, A.; MOTA, J. A.; MACHADO, J. A. C. (org.). Instrumentos Econômicos para a Proteção da Amazônia: a experiência do Polo Industrial de Manaus. Curitiba: Editora CRV, 2009.

SILVA, L. O. da. Desenvolvimento Sustentável e a Zona Franca de Manaus. Constituição, Economia e Desenvolvimento: Revista da Academia Brasileira de Direito Constitucional. Curitiba, 2015, vol. 7, n. 13, jul-dez. p. 423-440. Disponível em: http://www.abdconst.com.br. Acesso em: 21 mar 2023.

SILVA, M. L A e. Floresta rica, população pobre e vulnerável. Colunista. Portal Único. Disponível em: https://portalunico.com/floresta-rica-populacao-pobre-e-vulneravel/?fbclid=iwar32qqleob_zhjsz7m5h2spjzfgy6wcc6ajmwb-8u5ugxpw8afoke-7ohtk. Acesso em: 02 mar 2023.

SILVA, M. L. A. e. et al. De cidade na floresta a cidade sustentável: tradição, urbanização, competitividade e inovação na capital do Amazonas, Manaus. In: Anais do 60º Congresso da SOBER. Anais. Natal (RN) UFRN, 2022. Disponível em: <https//www.even3.com.br/anais/sober2022/481875-de-cidade-na-floresta-a-cidade-sustentavel--tradicao-urbanizacao-competitividade-e-inovacao-na-capital-do-amazo>. Acesso em: 20 mar 2023.

SILVA, M. L. A. e; LUCAS, M. M. B.; OLIVEIRA, M. L. de. Teorias do desenvolvimento regional: o modelo zona franca de manaus e a 4ª revolução industrial / Theories of regional development: the Manaus free zone model and the 4th industrial revolution. Informe GEPEC, *[S. l.]*, v. 25, n. 2, p. 107–124, 2021. DOI: 10.48075/igepec.v.25i2.26512. Disponível em: https://e-revista.unioeste.br/index.php/gepec/article/view/26512. Acesso em: 30 jan 2023.

SILVA, M. L. A. e; OLIVEIRA, M. L. de. A bioeconomia como alternativa complementar ao modelo de desenvolvimento do amazonas Bioeconomy as a complementary alternative to the Amazon development model. Informe GEPEC, *[S. l.]*, v. 25, p. 46–65, 2021. DOI: 10.48075/igepec.v 25i0.26297. Disponível em: https://e-revista.unioeste.br/index.php/gepec/article/view/26297. Acesso em: 25 fev 2023.

SUFRAMA. Indicadores Industriais. Disponível em: http://site.suframa.gov.br.Acesso em: 26 mar 2023.

SUFRAMA. Audiência pública sobre a ação da União Europeia contra a política tributária da Zona de Manaus (WT/DS472/1), 2014. Disponível em: http://www.suframa.gov.br. Acesso em: 05 fev 2023.

SUFRAMA. Modelo Zona Franca de Manaus. O que é o Projeto ZFM? 2019. Disponível em: http://www.suframa.gov.br. Acesso em: 05 mar 2023.

VERGARA, S. Métodos de pesquisa em administração. São Paulo: Atlas, 1997.

VIANA, V. M. Qual é a contribuição da Zona Franca de Manaus para a Amazônia? Disponível em: https://pagina22.com.br. 2018. Acesso em: 26 fev 2023.

VIANA, V. M. Sustainable Development in Practice: Lessons Learned from Amazonas. International Institute for Environment and Development – IIED. 3. ed. 2010. London, 2010.