



II. BETIM & CONTAGEM

ETH Studio Basel
Contemporary City Institute
Deborah Suter, Francesca Wyser

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Autumn Semester 2013

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II.

BETIM & CONTAGEM

PRODUCTION AND LOCATION

BRAZIL AS A GLOBAL PLAYER
Jumping-off Point for Industrialization

CIDADE INDUSTRIAL - THE IDEAL CITY

PLANNED ON THE DRAWING BOARD?

Connectivity and Disconnectivity

Hybridity

Eldorado of Commerce

Housing - An (Un-)solved Matter

Criminality

Green Area Not Only Because of Drainage

FIAT - THE BIG FISH

In & Out: Accessibility and Infrastructure

Conveyor Belt of Production

The Allure of the Big Fish

Formal and Informal Services

Jardim Teresópolis - The Fiat Suburb that Prospers

CINCO - LEGALLY AND ECONOMICALLY ENGINEERED

Infrastructure

Sustainability And Environmental Protection

Legally and Economically Fostered

Shift from Heavy Industry to Supplier Industry

Appropriation and Exchange with the Immediate Surrounding

Informal Infrastructure Supporting Industries

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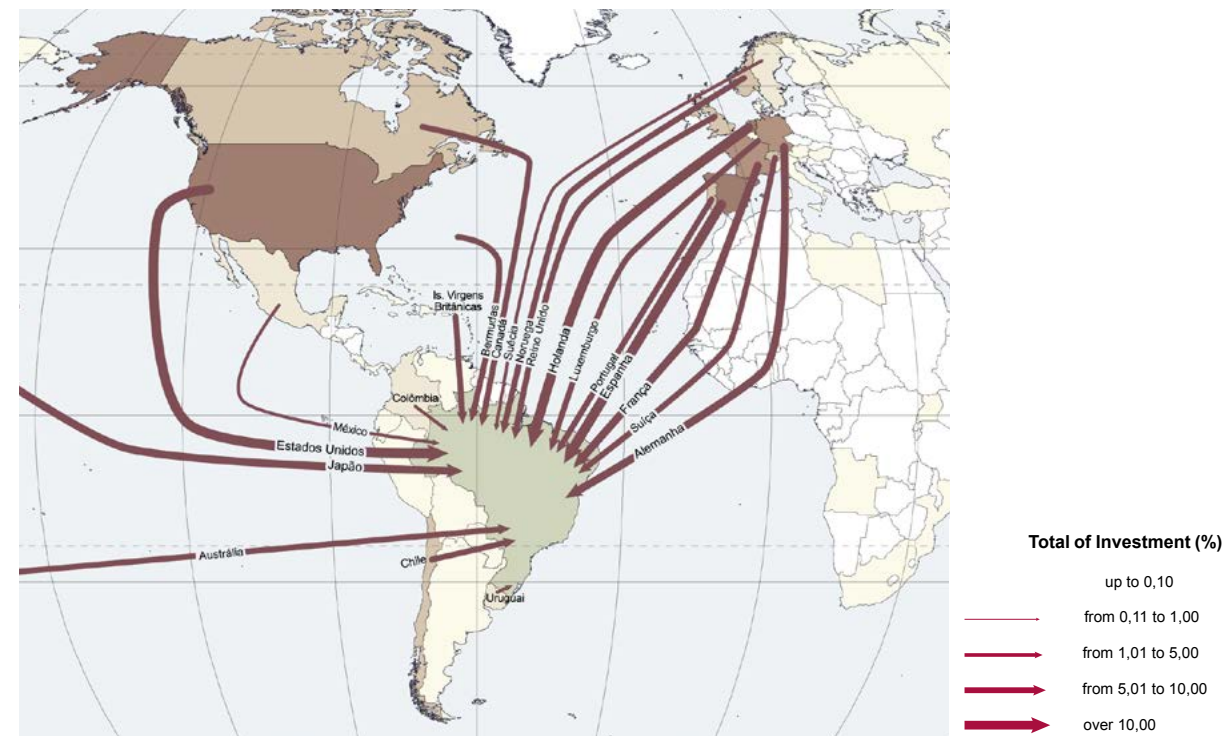


BRAZIL AS A GLOBAL PLAYER

The extraordinary economic growth in Brazil, particularly since the 50s, has made it the sixth largest economy in the world. An agrarian, slaveholding society for centuries, Brazil has made the transition from rural to urban, and agrarian to industrial in the last century, but most dramatically in the past few decades. Brazil was a classic, monocultural, export-oriented economy well into this century. At the turn of the century, coffee generated more than 90 percent of the value of all Brazilian exports and even as late as 1960, 60 percent of the value of all exports still came from coffee. Today, manufactured goods generate more than 75 percent of exports and coffee less than 10 percent. Brazil has thus experienced an enormous industrial development having its major industrial centers in the states of São Paulo, Minas Gerais and Rio de Janeiro, all located in the south of the country.



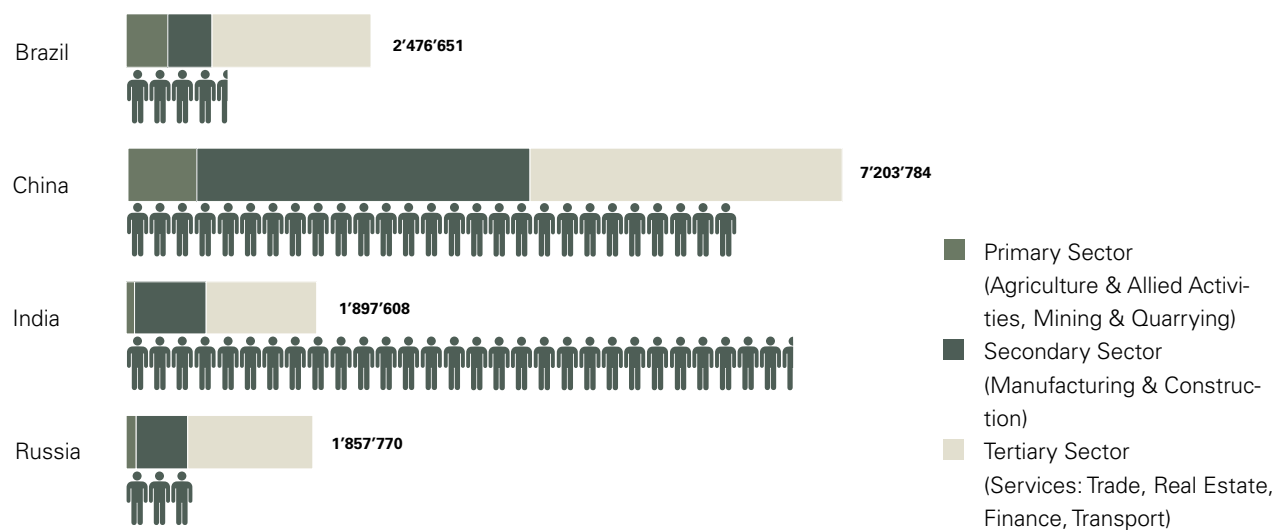
Ingoing investments to Brazil



Outgoing Brazilian capital



GDP Composition by Sector in Trillion US\$, 2012

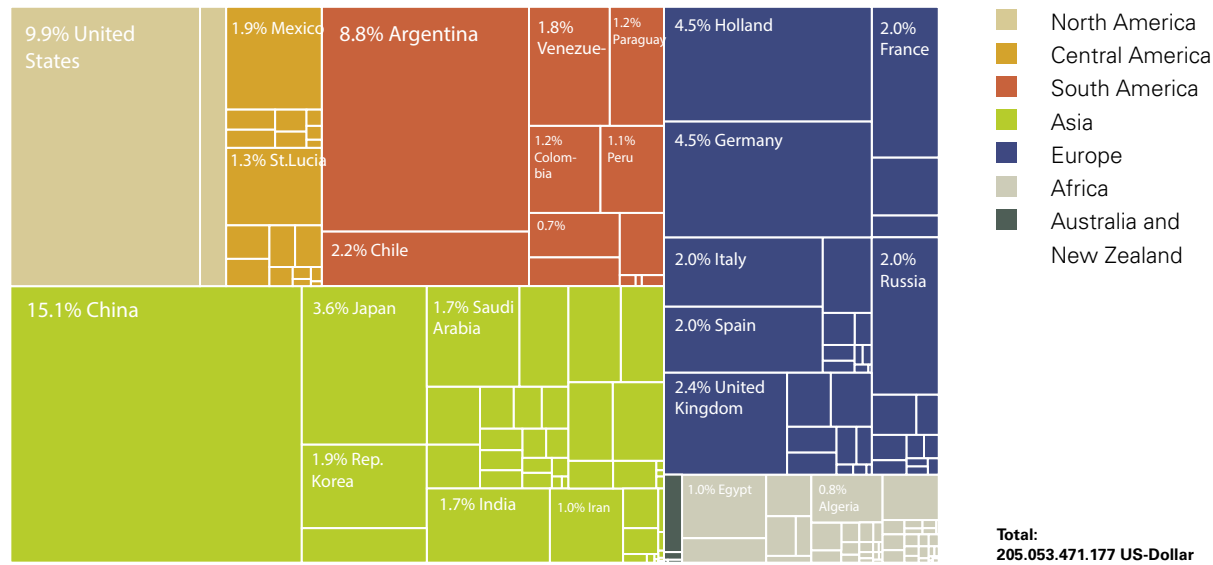


Emerging Economic Tiger: BRIC States

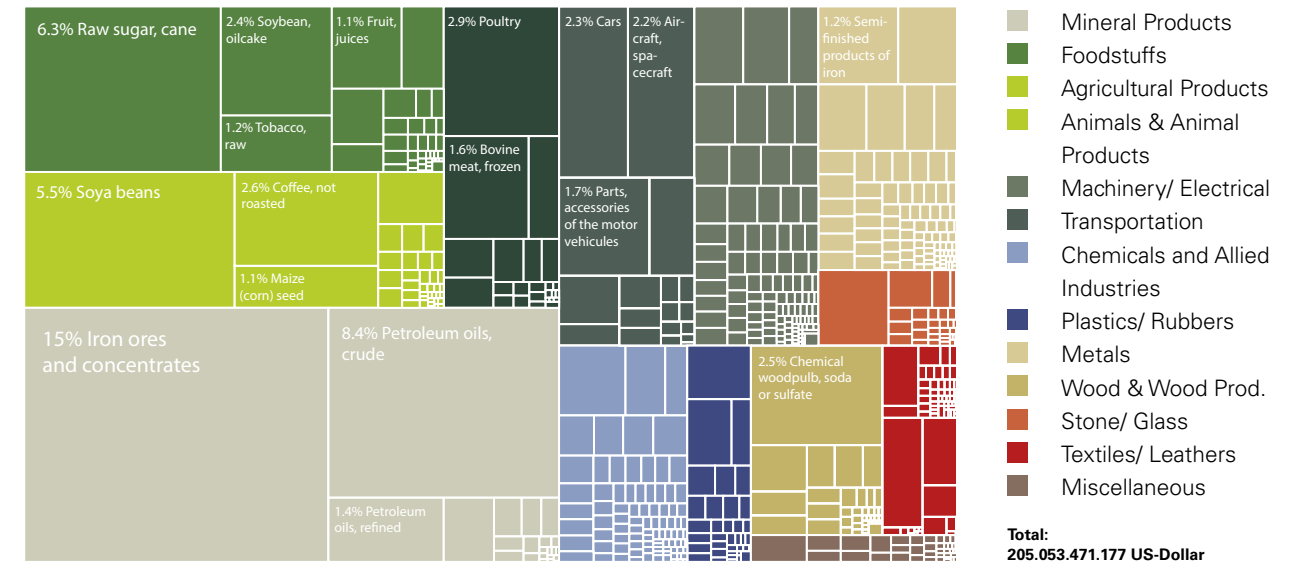
In the decades since World War II, the economic dominance of the United States, Europe, and Japan has been increasingly challenged by the rise of industry in Asia and Latin America. The industrialization of Brazil, China, India and Russia among others has been impressive and clearly sets them apart from much of the rest of the so-called Third World. By the 1980s this industrialization had begun to alter fundamentally the global dominance of the First and Second Worlds.



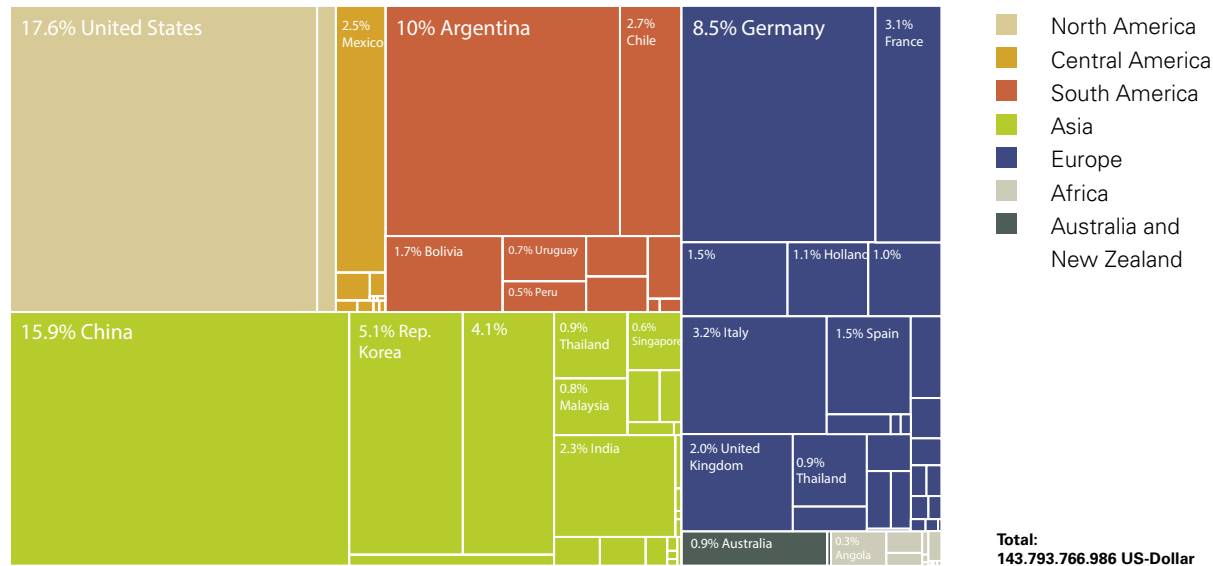
What countries does Brazil export to?



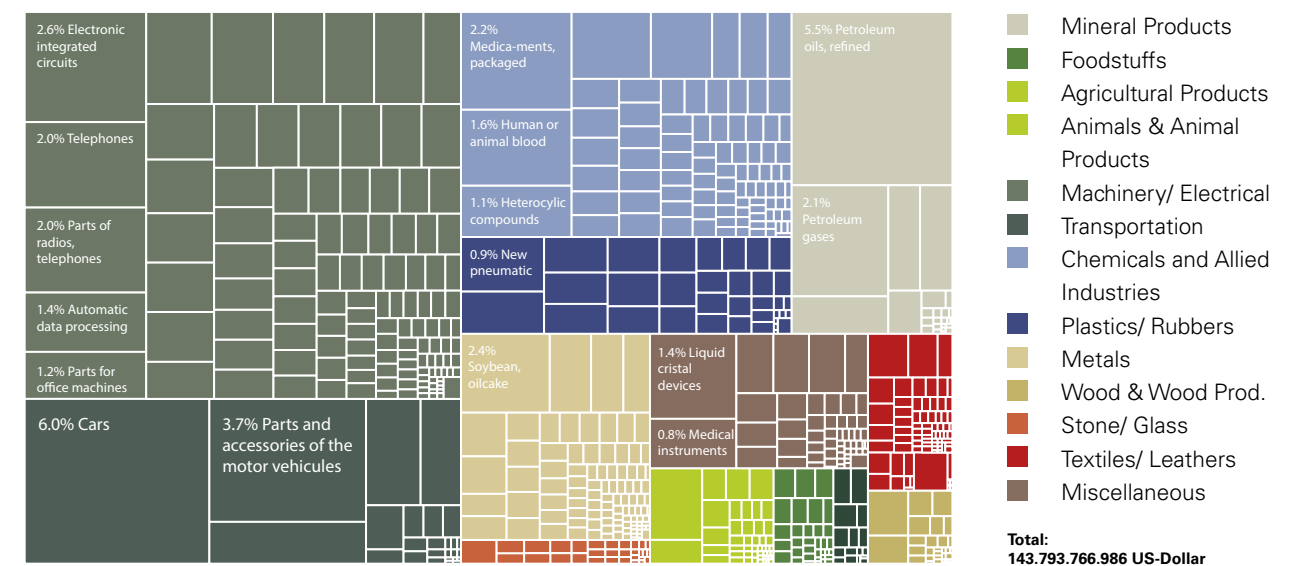
What products does Brazil export?



What countries does Brazil import from?



What products does Brazil import?



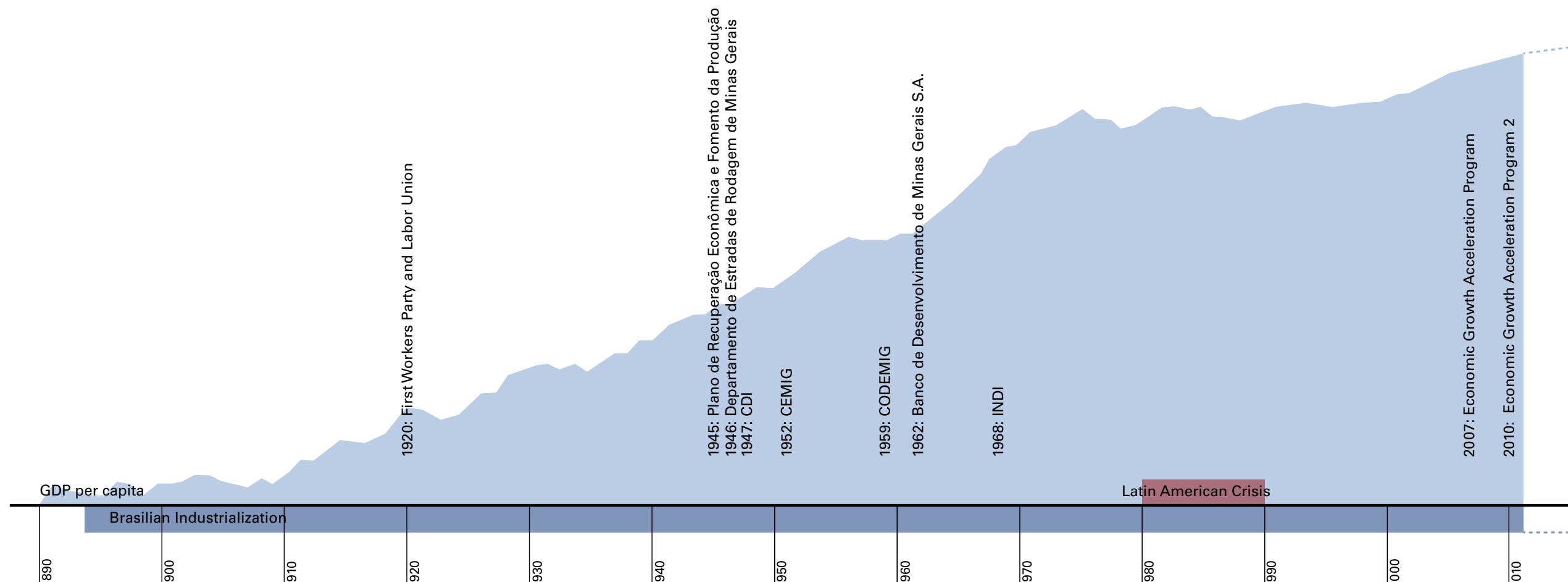
Import and Export Trade Partners

Brazil's major trade partners in exports are China (15%), the United States (10%), Argentina (9%), the Netherlands (4%), Germany (4%) and Japan (4%). In imports the major trade partners are the United States (18%), China (16%), Argentina (10%), Germany (8%), Republic of Korea (5%) and Japan (4%).

Import and Export Products

Brazil's major exports are iron ores and concentrates (15%), petroleum oils, crude (8%), raw sugar cane (6%), soya beans (5%) and poultry (3%). The major import products consist of cars (6%), refined petroleum oils (5%), parts and accessories for motor vehicles (4%), electronic integrated circuits (3%), packaged medicaments (2%).





The Wire-Pullers in the Industrial Development

Brazil's economic development can be described as a case of polygonized development, in which a limited number of new growth poles or regions have captured the lion's share of new economic activities. Especially because the new centers are near São Paulo, the result has been far from a widespread decentralization (according to Diniz). The growth of Brazilian economy after 1930 is strongly connected with state investments, fiscal incentives and infrastructure construction in the industrial sector. In the specific case of Minas Gerais, it was not only the state but also and especially the state government that held the key to industrialization. It is possible to discern three powerful interest groups in shaping the industrialisation process in Minas Gerais: politicians, technocrats and entrepreneurs. Our three case studies, although first selected because of their importance in the region, turned out to be each an excellent example of these three interest groups.



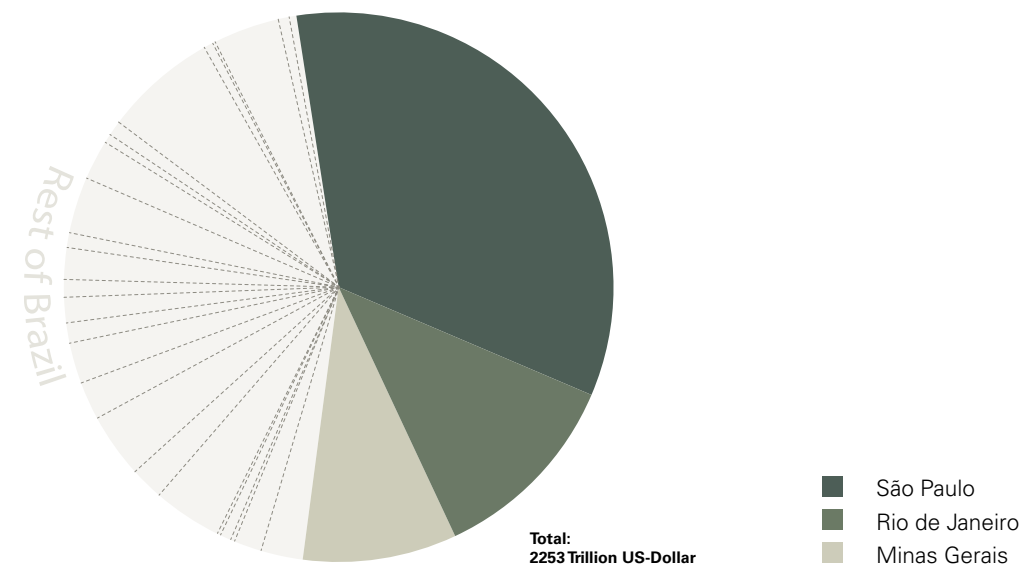
Polygonized Shift

For a long time in Brazil, industrial production was concentrated in the metropolitan area of São Paulo. As time passed the metropolitan region grew so much that it started to suffocate by its sheer size. Traffic arteries congested to the point of immobility. Land prices, rents, relative wages, congestion and infrastructure costs rose sharply. On top of that, two types of costs placed considerable strain on entrepreneurial decisions: the increasing pressure exerted by labor unions (assimilated with strikes) and the legislation on pollution control (CETESB), which forced many plants to relocate.

Why not the North?

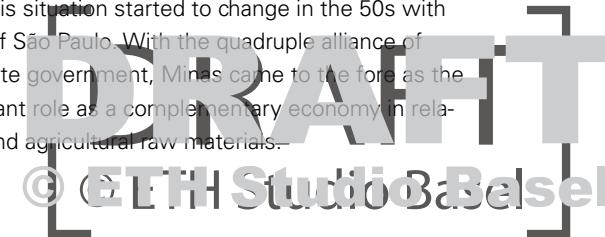
A concentration of industrial complexes is unlikely to be located in less developed or less populated areas, since these areas lack the fundamental requirements for location of technology-based activities. Industrial growth is by and large dependent on the assimilation and absorption of technological innovations. Assimilation tends to take place in more developed areas, thus reinforcing industrial concentration.

GDP Composition in Trillion US\$, 2009



The Role of Minas Gerais

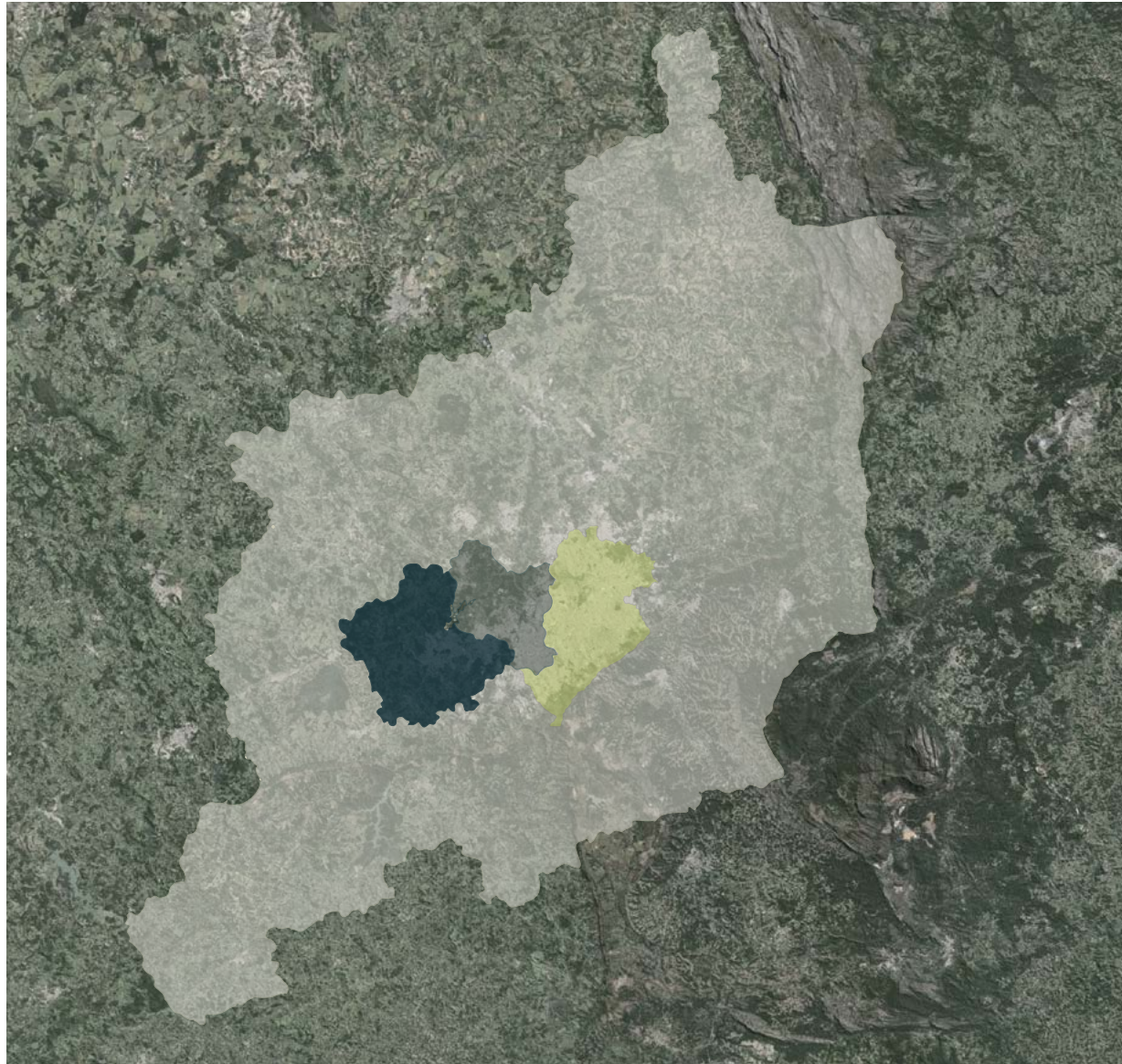
Although Minas Gerais was (and is) very rich in natural resources, industrialisation came to it quite late, especially when compared with the explosive economic growth of the São Paulo-Rio de Janeiro axis. While the gold rush made Minas the richest captaincy in eighteenth-century Brazil, the exhaustion of gold by the 1770s left the region in decline and decadence. Throughout the nineteenth century Minas grew slowly, largely on the basis of the production of beef, dairy products and other types of foodstuff for local and regional consumption. This situation started to change in the 50s with Minas Gerais retaining its relative share during the deconcentration phase of São Paulo. With the quadruple alliance of federal government support, foreign investment, national capital and the state government, Minas came to the fore as the strongest industrialisation in the country during the 70s. It played an important role as a complementary economy in relation to São Paulo, as a supplier of intermediary goods, foodstuffs, mineral and agricultural raw materials.



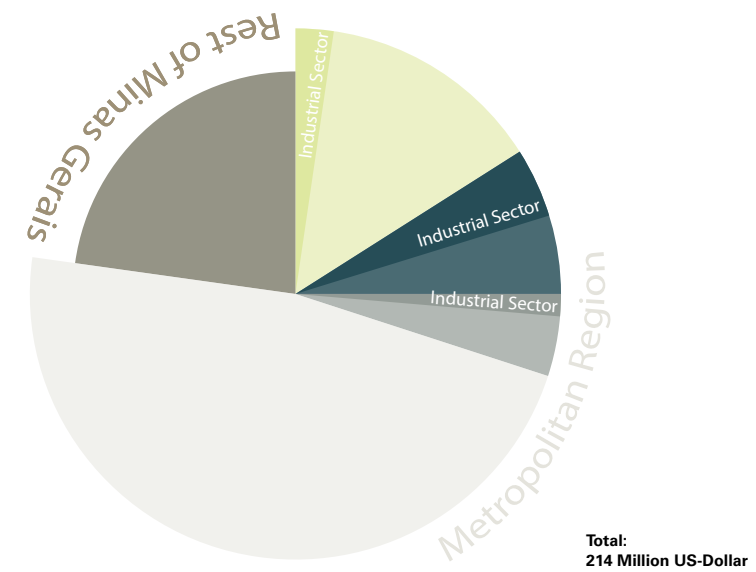


Jumping-off Point for Industrialisation

The starting point for the industrial development of Minas Gerais was the foundation of the Cidade Industrial, situated at a distance of 9 km from Belo Horizonte to protect its urban core. This distance from the city make it possible to escape the concession of the company Força e Luz de Minas Gerais, a subsidiary of Bond and Share, whose power supply was insufficient and very expensive. Other factors that influenced the choice of this emplacement were the proximity to raw material resources and the availability of water supply.



GDP Composition by Sector in Million US\$, 2009



The Importance of the Industries in the Metropolitan Region of Belo Horizonte

Minas Gerais was industrialised with a lot of effort and support from the technocratic government.

- Belo Horizonte
- Betim
- Contagem

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Industrial Districts in the Metropolitan Region of Belo Horizonte

As one can see on this map there has been an urban expansion of Belo Horizonte, the capital of Minas Gerais to the south west along the road leading to São Paulo. This urbanisation process came along with the creation of industrial parks. The biggest industrial areas in the Metropolitan region can be found in this western region, located in Contagem and Betim. One of the great tasks facing politicians, technocrats and entrepreneurs in the coming decades is how to deconcentrate industrial growth in Minas Gerais and to develop other industrial zones in the state.

CIDADE INDUSTRIAL - THE IDEAL CITY PLANNED ON THE DRAWING BOARD?

Cidade Industrial was the first Industrial district in whole Brazil and the starting point for this kind of planned and politically fostered industrial development in Brazil and especially in Minas Gerais.





Connectivity and Disconnectivity

There are many intermunicipal streets allowing easy access to the Industrial District Cidade Industrial. It is a strategic good position as there are transit roads to all the important economic centres like São Paulo, Rio de Janeiro, Brasília, Vitória and Salvador. However to get around in the district itself proves to be more difficult as there is an aisle dividing the city in two, with the only connecting points situated on the edges and in the centre of the district.

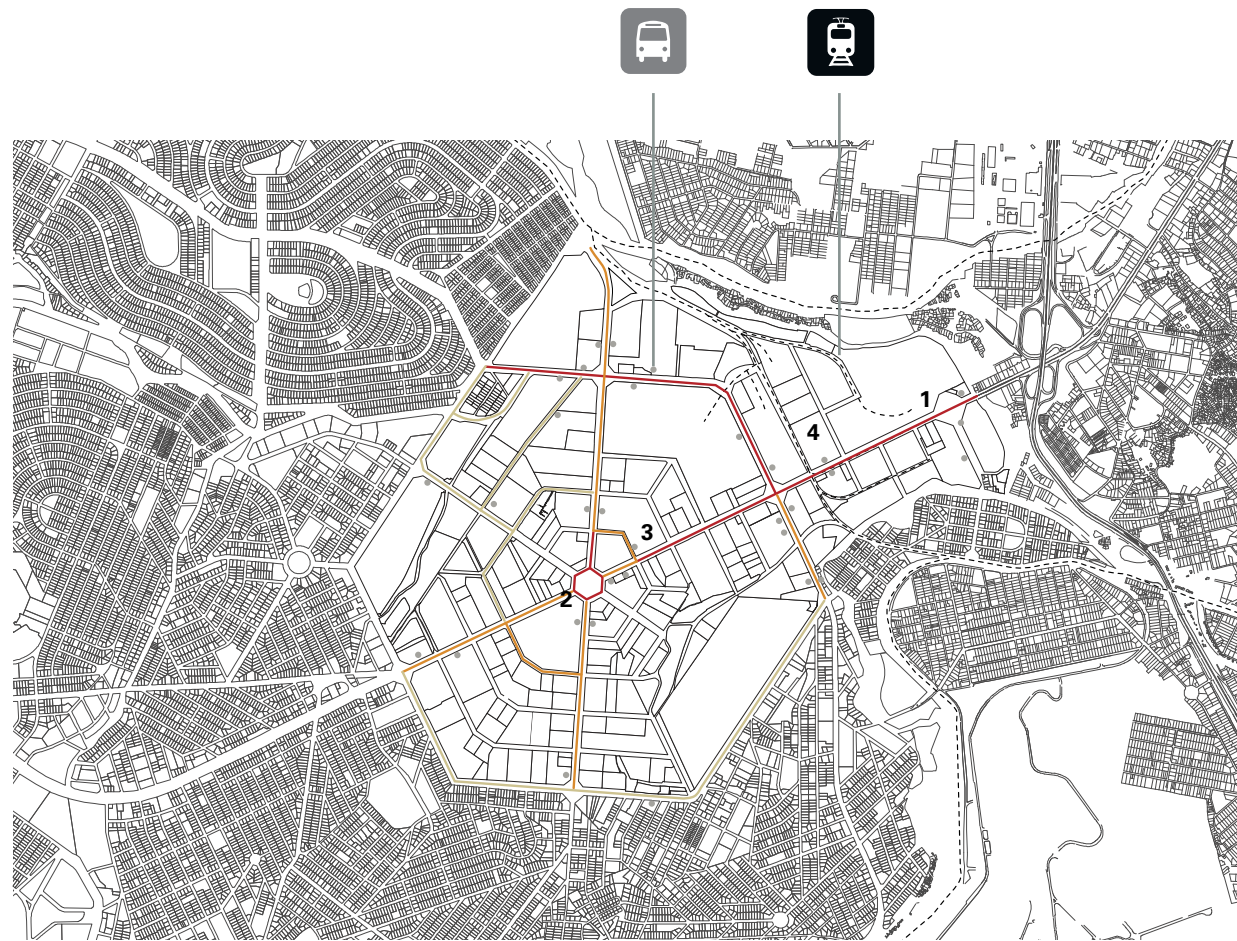


The Hexagon And Its Road System

The Industrial City was planned as a hexagon and its road system consists of radial and concentric streets to the main square "Praça Antônio Mourão Guimarães". Although the axes used to have the same width and importance, one of the axis namely the "Avenida Cardeal Eugênio Pacelli" which connects Belo Horizonte to Contagem and Betim turned out to be at the same time the main connection to São Paulo and to the "Triângulo Mineiro" and its large economical centres Uberlândia and Uberaba. Avenida Cardeal Eugênio Pacelli has therefore an immense traffic volume.

Enhancing the Traffic Flow

To improve traffic flow some modifications were made to the road system. The Avenida Cardeal Eugênio Pacelli was changed into a highway passing below the main square Praça Antônio Mourão Guimarães and the second of the three axes was closed for cars and turned into a pedestrian zone in order to reduce to some extent the traffic volume passing through the square. But these measures created an imbalance in the usage of the streets: Some streets have an increased traffic volume whereas others are almost not used at all.



Public Transportation

There are a metropolitan train and buses of the three main transport enterprises, namely TRANSCON, BHTRANS and DER, which connect Contagem and particularly Cidade Industrial to Belo Horizonte. Furthermore there are other bus enterprises, which connect the district with the larger metropolitan area. The traffic situation is complicated even more by the fact that some street sections are served by over hundred collective bus lines. Coordination among the different bus enterprises to avoid buses using the same routes would be paramount to decreasing the traffic volume.

- 1 to 15 Buslines
- 20 to 55 Buslines
- 60 to 100 Buslines



1



3



2



4

Left Over Spaces

Some of the former public spaces have lost their meaning with the increase of traffic. Praça Papa João XXIII (1), for example, which used to be quite a nice square with green spaces, is now partly covered by the recently built viaduct and completely cut off. There is no crosswalk, making it inaccessible to pedestrians. Praça Antônio Mourão Guimarães (2) though enhanced by water fountains, nice pavement and palm trees is mainly used for circulation and not for leisure as the noise of the cars and the exhaust gases do not make it a very agreeable place.

Pedestrian

Pedestrians were certainly not an included parameter in the former planning of the industrial district but they are a reality nowadays, even more so with the appearance of schools and commerce in the industrial district. For pedestrians Avenida Cardeal Eugênio Pacelli acts like a barrier (3). The only possibilities to cross from one side to the other are two footbridges, situated 2 kilometres apart from each other (4).





1



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4



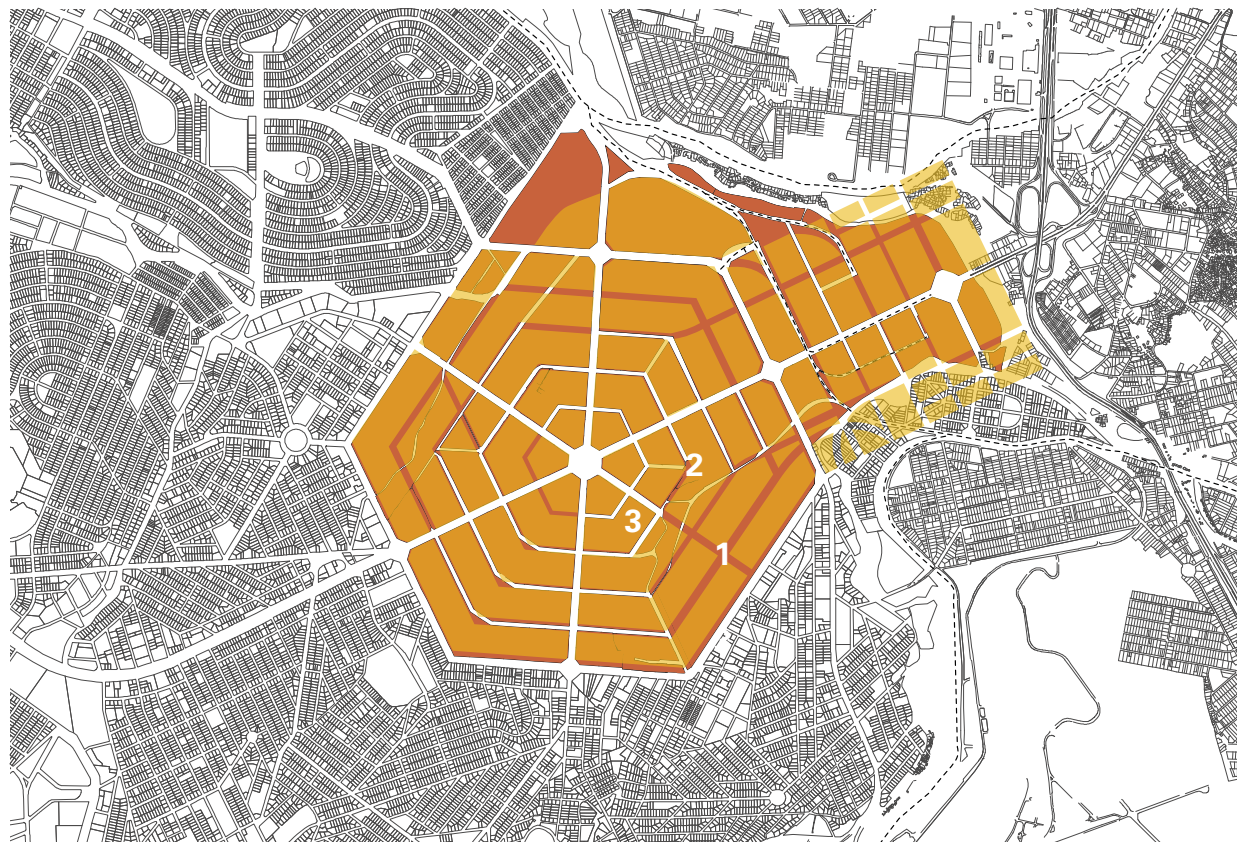
5



6

Hybridity

Cidade Industrial has turned out to be the most heterogeneous of the three industrial districts we studied. One finds various scenarios in the district: public buses drive through heavy-industry zones with difficulty, they pass by big trucks parked all along both sides of the streets (1), then boulevard-like streets (2), informal housing next to industry (3,4) and even commerce and restaurants (5,6). The industrial district itself has become a city within the city.



1



2



3

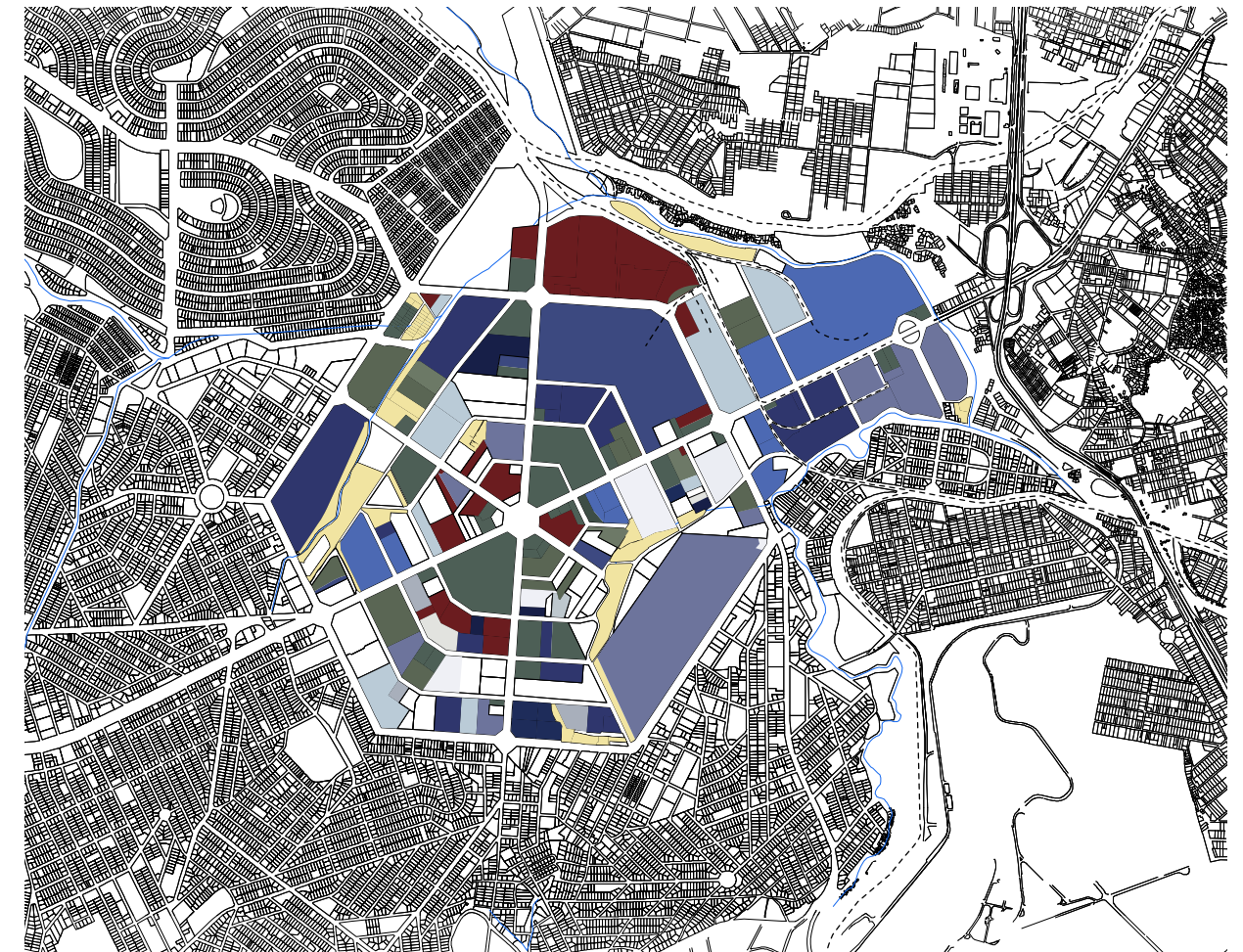


The Plan Amended

Besides the governmental interventions many additional alterations were made to the original plan of the symmetrical hexagon. Enterprises expanded and merged allotments and sometimes embedded streets into them (1) or informal settlements occupied vacant allotments, in some cases even expanding into the streets (2). Many allotments disused and occupied by inactive industries, but on the unused space a new service infrastructure is eventually emerging. One of the now closed main axes is being used as a parking lot and there is even a nursery school in the street, making good use of its broadness (3).

■ Original plan
■ Current situation



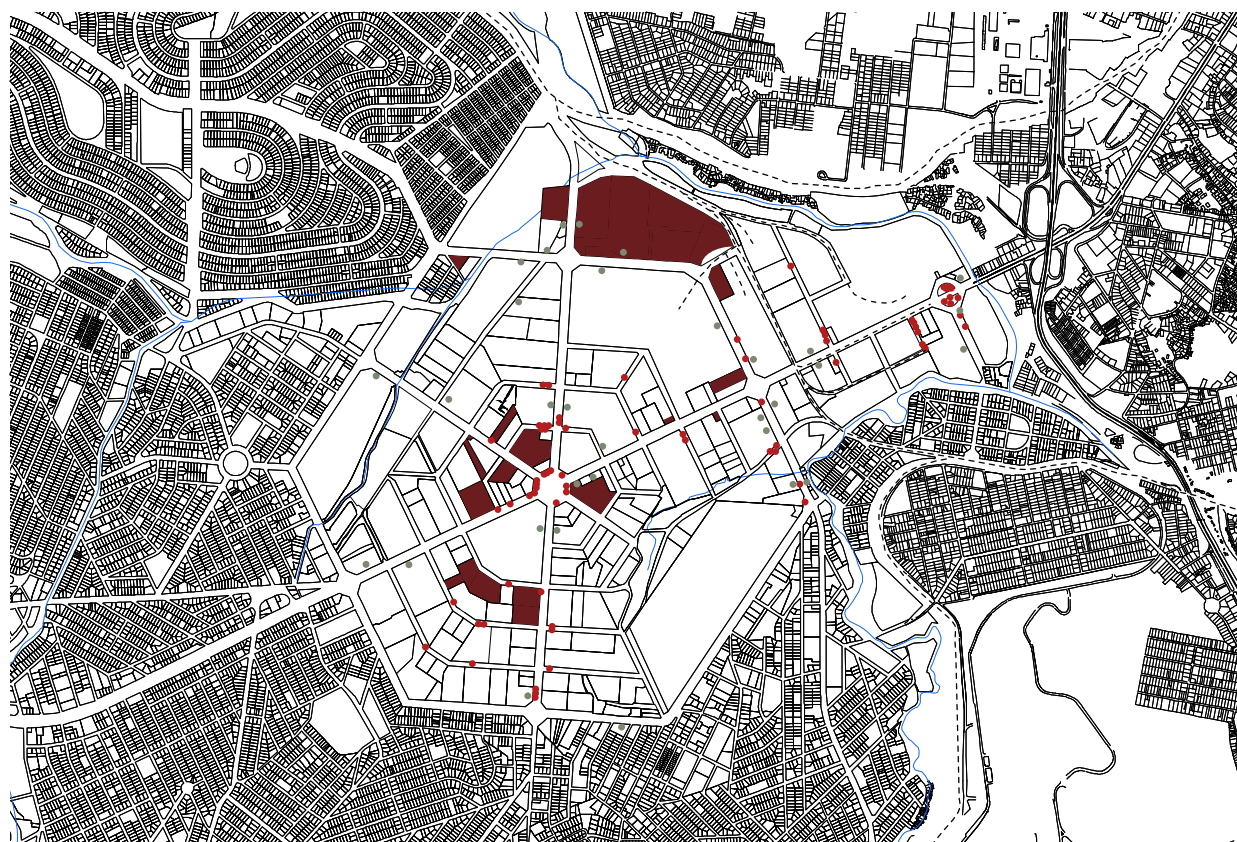


The Modernist Plan Overruled

Although the basic idea is to separate industries in order to avoid any incompatible proximity between industries of different activity, they finally mixed all the same. The plan didn't work out, simply because there weren't enough industries matching the exigencies to fill up the provided allotments. Nevertheless there is still a predominance of industries of the metallurgic and the mechanic-electrical material branch.

Industries	Services	Comerce	Housing
■ Metallurgy	■ Institutions	■ Formal commerce	■ Informal housing
■ Foodstuffs	■ Logistics	■ Informal commerce	
■ Mineral	■ Other		
■ Electronics / Mechanics			
■ Chemical			
■ Plastic and Rubber			
■ Textil			
■ Furniture			





- Formal commerce
- Informal commerce
- Bus stations

Eldorado of Commerce

Cidade Industrial, formerly planned to house only industries is quickly becoming an Eldorado of commerce. The increase in the buying power of the new middle-class is partially responsible for this development but, most of all, what makes it so attractive for commerce is the high flow of people passing daily through the Cidade Industrial on their way to work. A look at the map above confirms this: most of the informal food stalls are located near bus stops. The new Itaú Power Shopping (1) is a good example of what takes place in the region. What once was one of the largest cement plants in the State of Minas Gerais and one of the main suppliers of raw material to the construction site of Brasília now gave way to the Shopping Center Itaú Power. The chimneys of the former plant remain as a remembrance of the past.



1

Ceasa and the Itaú Power Center

Contagem started to attract people from the entire metropolitan region of Belo Horizonte following the creation of the Itaú Power Center (1) as well as the CEASA, founded in 1974, the second largest wholesale supply center in Brazil and the most diversified one in the world. This in turn attracted even more shopkeepers.



2

Informal Services

Shopkeepers were not the only ones to benefit from the large commercial centers: a whole range of informal services appeared such as this informal car wash station on the sidewalk at the main street leading to Itaú Power Center.





1

Sudden Population Growth

Workforce demand in industry attracted an enormous amount of people from rural areas to Contagem. Between 1950 -1960, at the time of the consolidation phase of the Cidade Industrial the population quadruplicated. As no housing was provided the workers themselves began to build their houses in the vicinity of the industries. The same happened with the allotments which sprung up in that region, lacking all basic infrastructure, simply to meet the demand but also without regard to the quality of life of future residents. In fact one still see some informal shacks in the mids of formal houses in the neighbourhood Industrial (1). This seems to be remains of its former history.

Housing - An (Un-) solved Matter

Although the Cidade Industrial had been planned beforehand, it was not prepared for the enormous exponential growth of the population. There was a small working class area allotted in the original plan but for unknown reasons it was never realized. Thus it was left to the industries to house their workers on their own lots. Another fact that aggravated the housing situation was the absence of a regular collective transport at that time, which made it difficult to get there, which encouraged the emergence of informal housing even more.

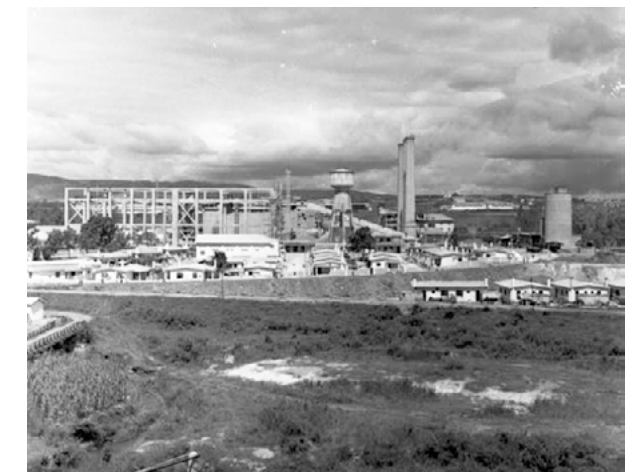


2

Housing Provided by Government

The construction of the JK housing estate (2) in 1958, near Cidade Industrial, was an attempt of the government to solve the problem but it was just a drop of water on a hot stone. It was part of the Housing Plan President Kubitschek, a scheme to improve the housing problem and to bring workers nearer to the industries concentrated in that region. The Fundação da Casa Popular (Popular Housing Foundation), an organ of the federal government, delivered in all 400 brick houses, their form, architecture, size and rooms exactly alike.

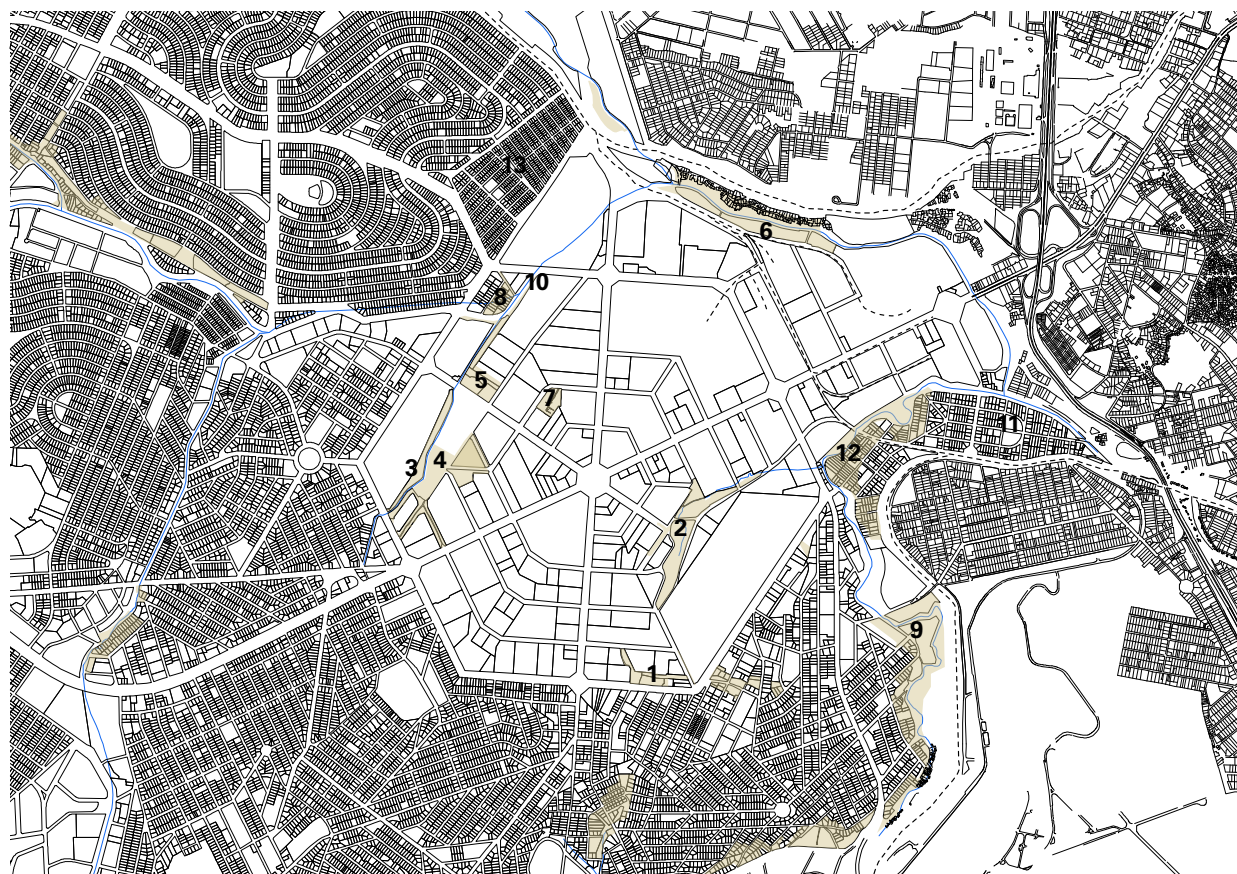
The JK suburb provided a model, during the 1960s and 1970s, for the development of other local neighborhoods such as Eldorado. This increase in the number of inhabitants of the newly developed region brought about a growing demand for services and products. It also ensured the presence of workforce for the industries and a trade expansion that is a characteristic of the Eldorado suburb. The houses were repaid through monthly amortizations to the federal government.



3

Housing Provided by Industries

Only two enterprises provided housing for their workers, namely Magnesita and Portland Cement factory Itaú. The Vila Operária (3) was created on the compound of the factory and it consisted of up to 240 houses and offered the complete service sector of cinemas, pharmacies, small shops, a chapel and even a small medical post. There was an ambulance and a bus to bring the workers' children to the schools located at that time only in Belo Horizonte. After the closure of the plant in 1998 the village was demolished to make place for the Shopping Itaú Power Center.



■ Informal housing

Residential areas

- | | | |
|-----------------|-------------------|-------------------|
| 1 Aparecida | 6 Itaú | 11 Vila São Paulo |
| 2 Barraginha | 7 Vaquinha | 12 Vila São José |
| 3 São Vicente | 8 Do Canal | 13 JK |
| 4 São Nicodemos | 9 Dom Bosco | |
| 5 Santo Antônio | 10 Firmo de Matos | |



1



2

Earth Slide in Vila Barraginha

Vila Barraginha was created at the end of the 60s, and consisted of 20 houses built in a thalweg formerly used as a rubbish dump. The name Barraginha refers to an ancient artificial dam located there whose waters were used by industries close by. Since Vila Barraginha was built near a creek, on soil unsuitable for edification, there were numerous landslides. A serious landslide occurred in 1992, caused by earthworks of an industry located nearby. There were 37 deaths, hundreds of injured and 1700 people lost their homes. The location of Vila Barraginha presents geological risks because of the presence in its subsoil of low-resistance clay. The small chapel that remained standing after the natural disaster now serves as a community center (1). The place formerly occupied by houses is now used as a football ground (2). Some inhabitants nearby said that there are plans for creating a jogging route there.



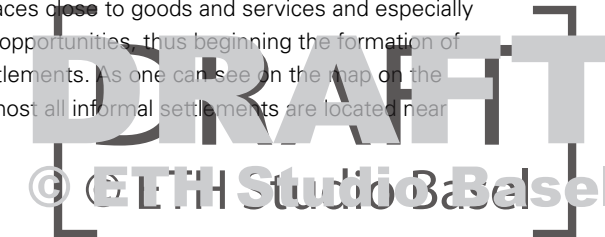
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4

The Rejected Plots

Enterprises occupied those lands offering the best conditions of accessibility and adequate sanitary infrastructures, and kept away from less favoured areas and those not suitable for buildings such as the banks of streams (2). Those spaces were then later occupied by families trying to stay in places close to goods and services and especially close to job opportunities, thus beginning the formation of informal settlements. As one can see on the map on the left page almost all informal settlements are located near creeks.





1



3



2



4

Resettlement: An Imperative or an Excuse?

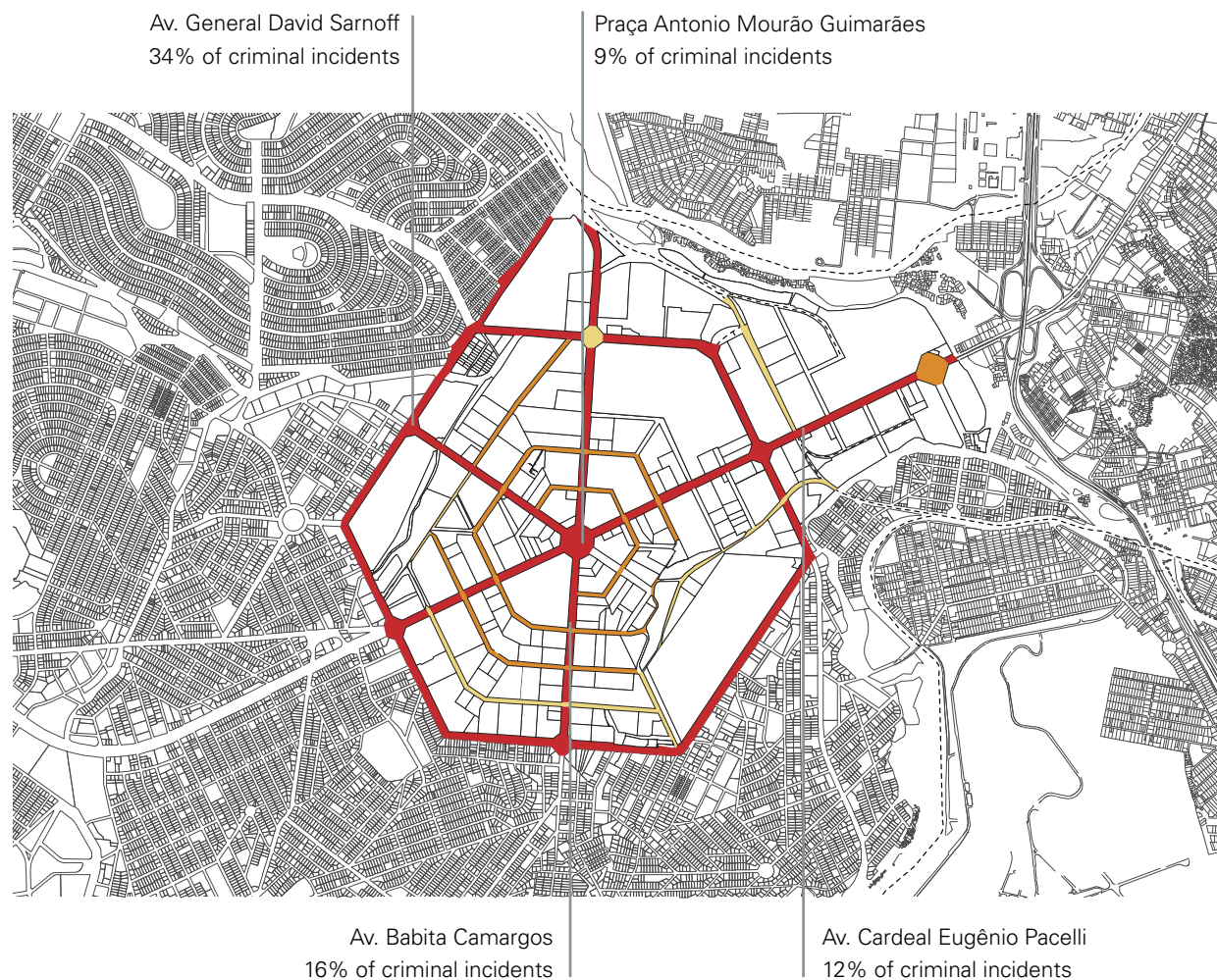
Water is being polluted with wastewater and garbage coming from informal settlements located near rivers. Floodings during rain season and landslides are an imminent danger for these settlements. Until now, the policy of local councils is to transfer the settlements but the question is, is this really the only viable solution?

Expropriation

The informal settlement Vila Itaú (1) in Cidade Industrial is now being expropriated due to the construction of a containment dam (2) as part of a governmental program of urban and environmental requalification of the Ferrugem river. This program aims at tackling the problem of flooding and pollution of the river. For that reason five containment dams will be constructed in the near future necessitating the expropriation of two more informal settlements. The inhabitants will be relocated to a settlement built by the city council. Marina Almeida who has lived there for over 20 years complains that her family is being forced to accept 80'000 Reais for a house worth 300'000 Reais nowadays. Like many others she doesn't want to leave the town. Vinícius Marcus Nonato da Silva, a member of the committee of Human Rights of Minas Gerais, questions if it is really necessary to expropriate so many families as there are other places where the dams could be built.

Minha Casa, Minha Vida

My House, My Life is a programme of the Brazilian federal government aimed at fulfilling the dream of many Brazilian families of having an own house. In general, the programme is carried out in partnership with the states, municipalities, enterprises and non-profit organizations. For those with an annual gross income of up to R\$5.000,00, the programme offers certain facilities such as discounts, subsidies and a reduction in the costs of home insurance. Families are vetted by the council authorities of the place where the house will be built, upon free registration of the interested families. The selected families receive information about the date of the draw of the housing units and the date for signing the purchase agreement. The programme provides quotas for elderly people, people with disabilities or reduced mobility. In the case of expropriation as in the case of Vila Itaú these families will have priority in being allocated new houses.



Criminality

Cidade Industrial has the highest crime rate in the region of Contagem. A look at the plan above shows that practically all the crimes are committed on the main circulation streets. The majority of the crimes committed are thefts on pedestrians. The high flow of people passing daily through the Cidade Industrial on their way to work attract this kind of street robbers.



1



2

armed assault on pedestrian	1008
theft on pedestrian	723
armed assault on cars	235
armed assault on gas station	227
armed assault in shops	205
attempted murder	170



3

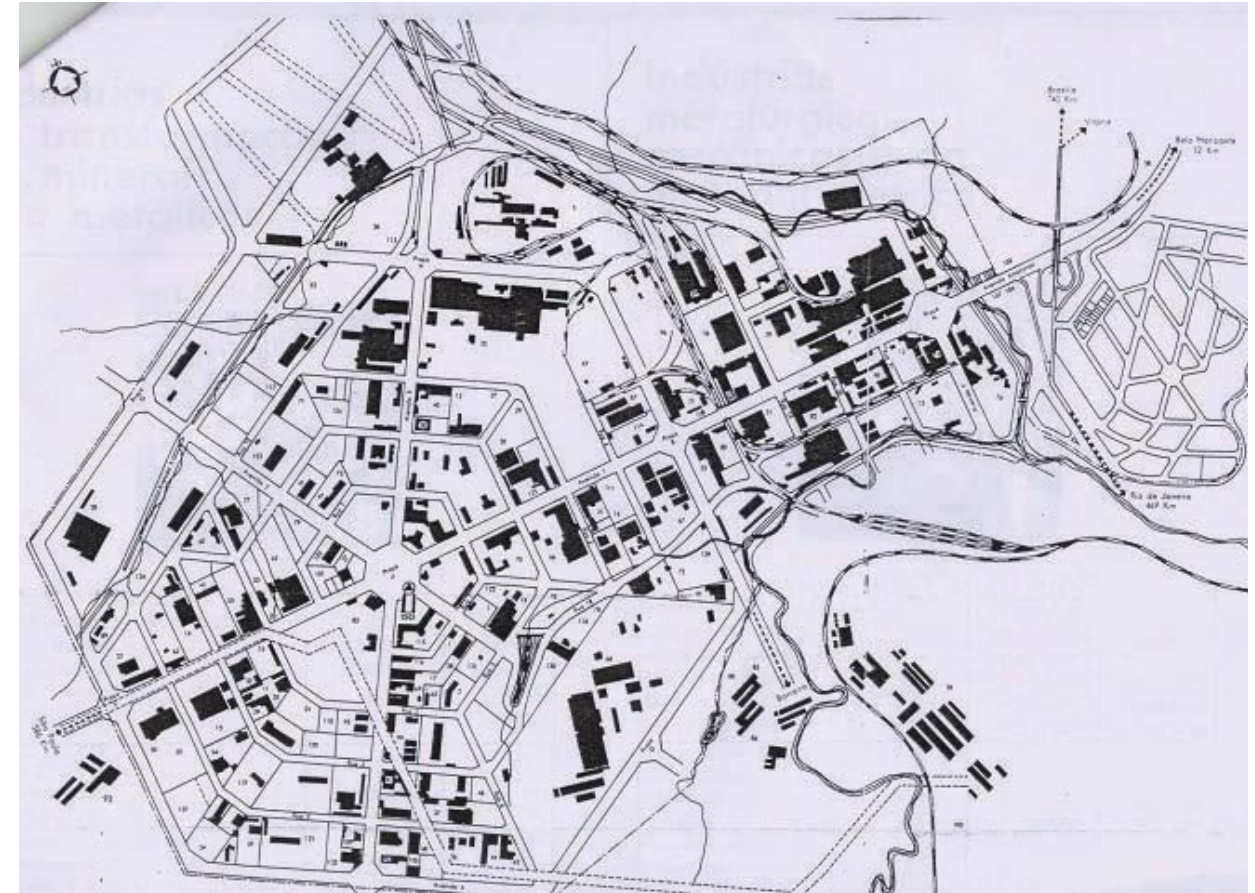
Industries Feel Threatened By Informal Settlements

For many years the uncontrolled urban sprawl was a reason for concern to a large number of the enterprises located in the Cidade Industrial. Many informal settlements were cheek by jowl with industries (1). Many enterprises attribute the lack of security in the district to the presence of a great number of informal settlements.

A Park Instead Of Settlements

Complying with the requests of many enterprises the county cleared away some of the informal settlements and built parks in order to avoid further resettlement (2,3). Although these parks actually create a very nice atmosphere in the dry landscape of industry, our survey showed that the inhabitants of that neighbourhood do not make any use of this space.





Green Area Not Only Because of Drainage

By law, industries can only build on up to 55% of the area of their lots. The remaining area is to be kept as a green space that will serve as natural drainage during the rainy season as a protection from the relatively high flooding risk in Brazil during this season. Taking this into account, there still remains an unusually large green area in the Cidade Industrial. On one hand this is due to the fact that many deactivated/unused plants are simply abandoned and on the other hand to the fact that certain industries are not using their lots to full capacity. The problem is that lots are sold with certain attachments, including a deadline for the construction of the plant. However there is no regulation concerning what should be done when a plant is deactivated.

Reallocation Necessary

On the map it is possible to see that most industries do not use their parcels of land to full capacity. At the time of the foundation of Cidade Industrial traditional industries used much more space but this has changed since the modernisation and restructuring of the production. Outsourcing production parts and the implementation of new technologies led to a reduction of the occupied space. It would be necessary to reallocate plots so that they are used more efficiently. Moreover many enterprises would be willing to sell unused parts of their plots.

FIAT - THE BIG FISH

The installment of the Fiat plant in Minas Gerais was a big stepping stone in industrial and economic development. But it was not without an enormous fiscal incentive from the state government: The state offered an area of 200ha for a symbolic price to be payed back in 45 years and provided the necessary infrastructure free of charge in the area where the plant was to be built. The state government also purchased 46% of the stocks of the new company. Fiat received tax exemptions for 10 years and capital loans from public banks. Although Brazil has not been very successful in generating local technological innovation Fiat is an excellent example for Brazil's ability not only to copy the latest technological innovations, but also to generate their own versions and improvements on this technology transfer.





- | | | | |
|--|----------------------------|--|---|
| | Visitors and customers | | Collection of finished cars by logistics firm |
| | Office workers | | Supplier of restaurants inside Fiat Factory |
| | 'Recycling Island' workers | | Supplier of informal commerce and restaurants |
| | Factory workers | | Suppliers of car parts and other materials |

In & Out: Accessibility and Infrastructure

The Fiat plant is situated on highway BR-381 which is a continuation of the Avenida Cardeal Eugênio Pacelli which passes through Cidade Industrial. The dynamic of access to the factory is well organized. There are five different access gates, each of which has its specific function and access authorization. On the western side of the factory are the gates for the suppliers and the factory workers and on the eastern side are the gates for visitors, business partners and white-collar workers.



1



2



3



4

West Side

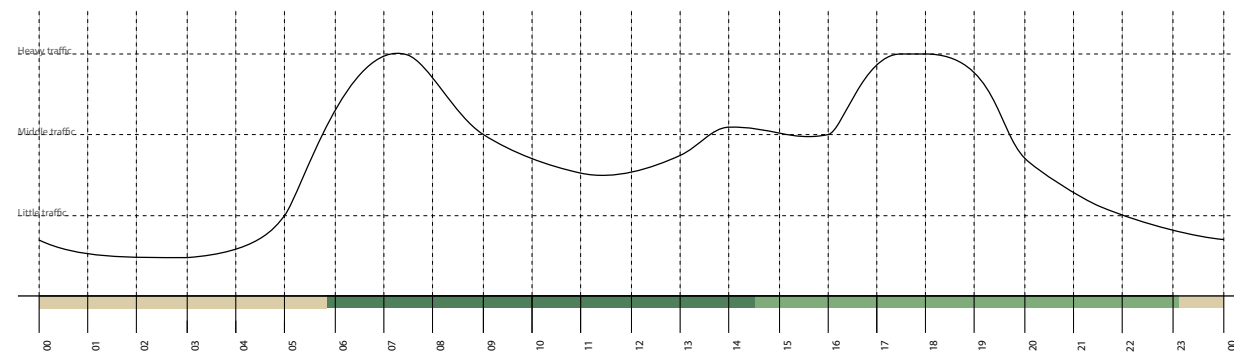
The west side is alive and full of movement. There are informal car washers, food stalls and vendors. It seems as though the streets are not as well maintained as the east side as they are full of bumps.

East Side

The east side of the compound is kept clean and tidy in order to create a good impression on customers and visitors. There are taxis and formal car parking with lots for people with disabilities and a proper street signalling system.



Relationship between traffic and working hours



1

Informal Collective Transport

The public transportation system was quite bad at the time when the first industrial parks in Contagem were created. Workers then decided to address that issue, got organized and created a form of collective transport so they could reach more easily their place of work. Their initiative was so successful that private enterprises started to offer the same type of collective transport to companies (1). Nowadays, in spite of a significant improvement in the public system of transportation, the great majority of the industries make use of this service as most of the workers work in shifts, with the first shift starting at about 5.30 in the morning. Fiat has three shifts. The change of shift is arranged in a way so that the schedule of collective private buses doesn't coincide with traffic peak hours (2).



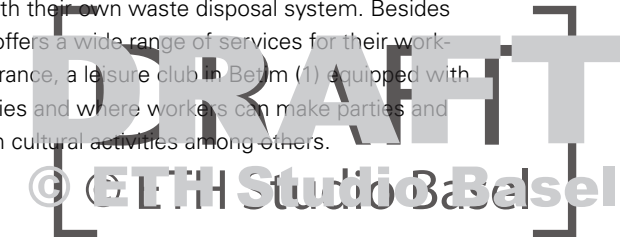
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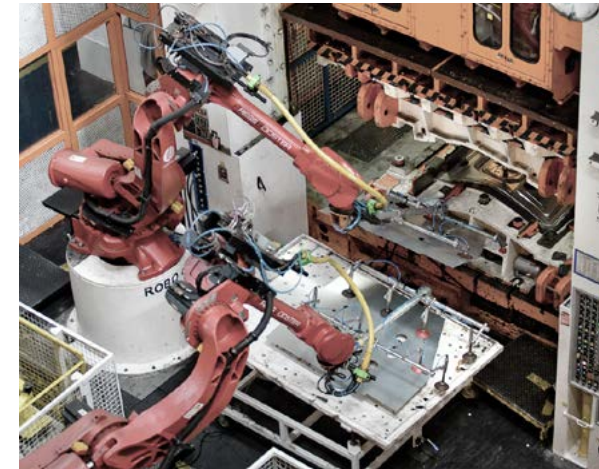
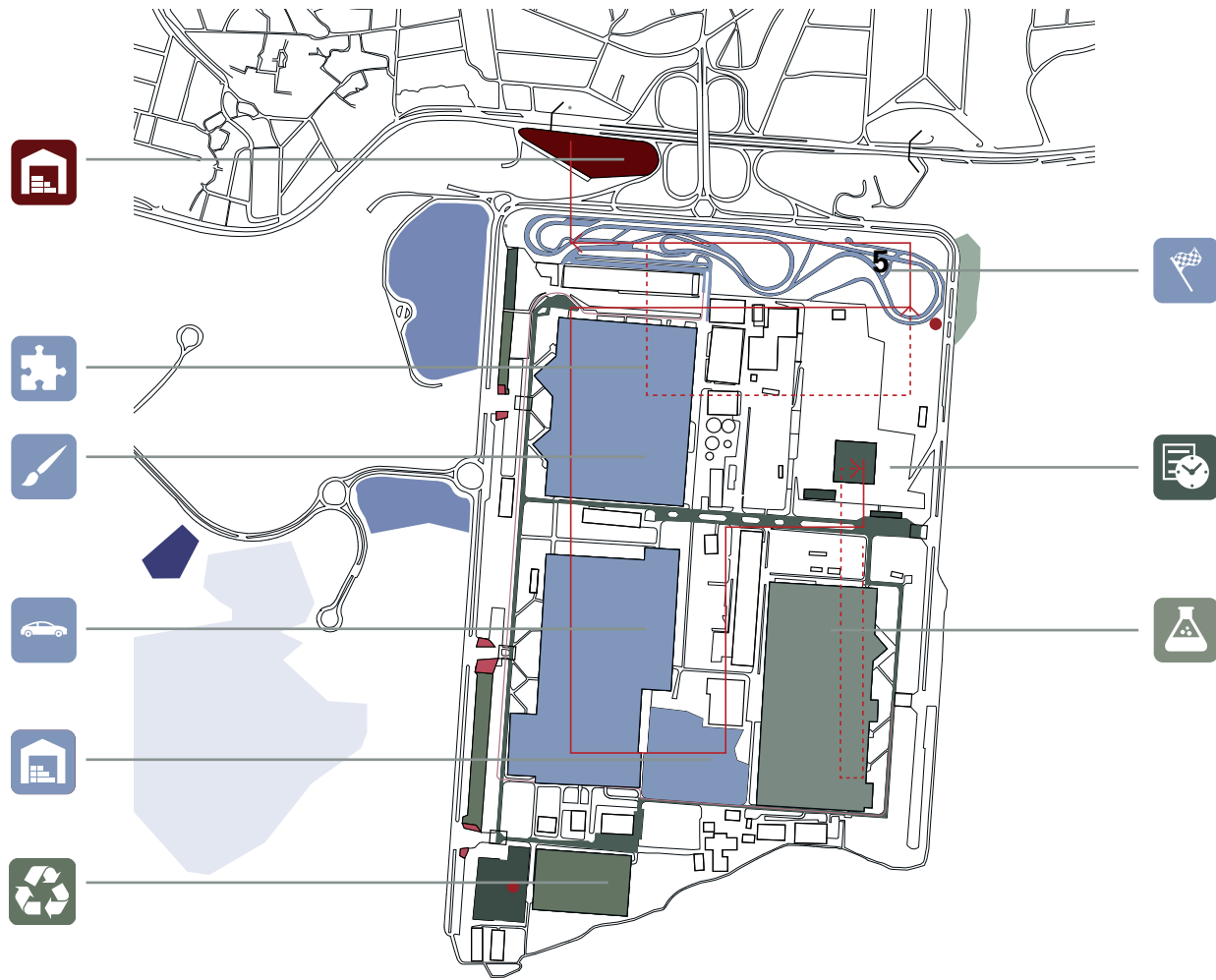


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Fiat Plant - A City By Itself

The Fiat assembly plant can be compared to a city as it possesses all the infrastructure such as firefighters and a police force also acting as traffic agents and issuing parking tickets for parking violations. There is also a small medical center equipped with a ward for heart surgery, some shops and four different restaurants, one of them catering for people on a diet or with food allergy. They are also equipped with their own waste disposal system. Besides all that Fiat offers a wide range of services for their workers: life insurance, a leisure club in Betim (1) equipped with sports facilities and where workers can make parties and participate in cultural activities among others.





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4


 **Organization**
Assignment and management


 **Fiat Powertrain Technologies**
Research and technology


 **Car Parts Storage**
Momentary storage


 **Press and Bodywork**
Car body press and production (1 & 2)

 **Paintwork**
Painting the chassis (3)

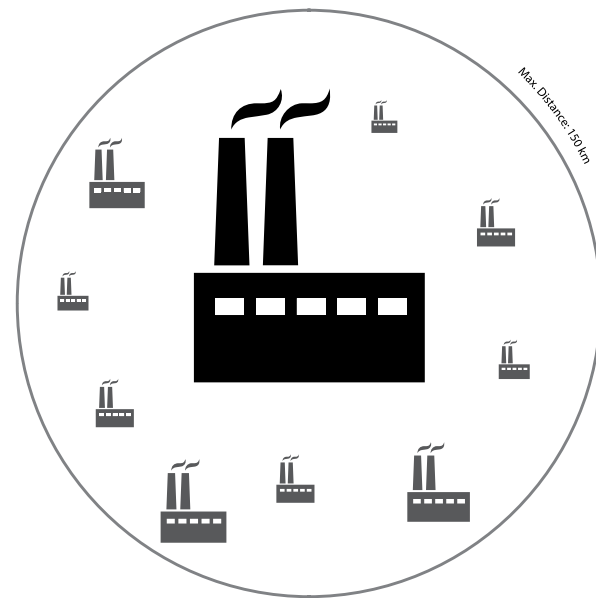
 **Car Assembly**
(4, 5 & 6)

 **Testing track**
Cars are tested on this track or are sent to the streets, but not without a 'costume' to maintain the design secret. If problems are recognized it goes back to car assembly.

 **Fiat Transfer Patio**
Storage of finished cars for 3 days before pickup

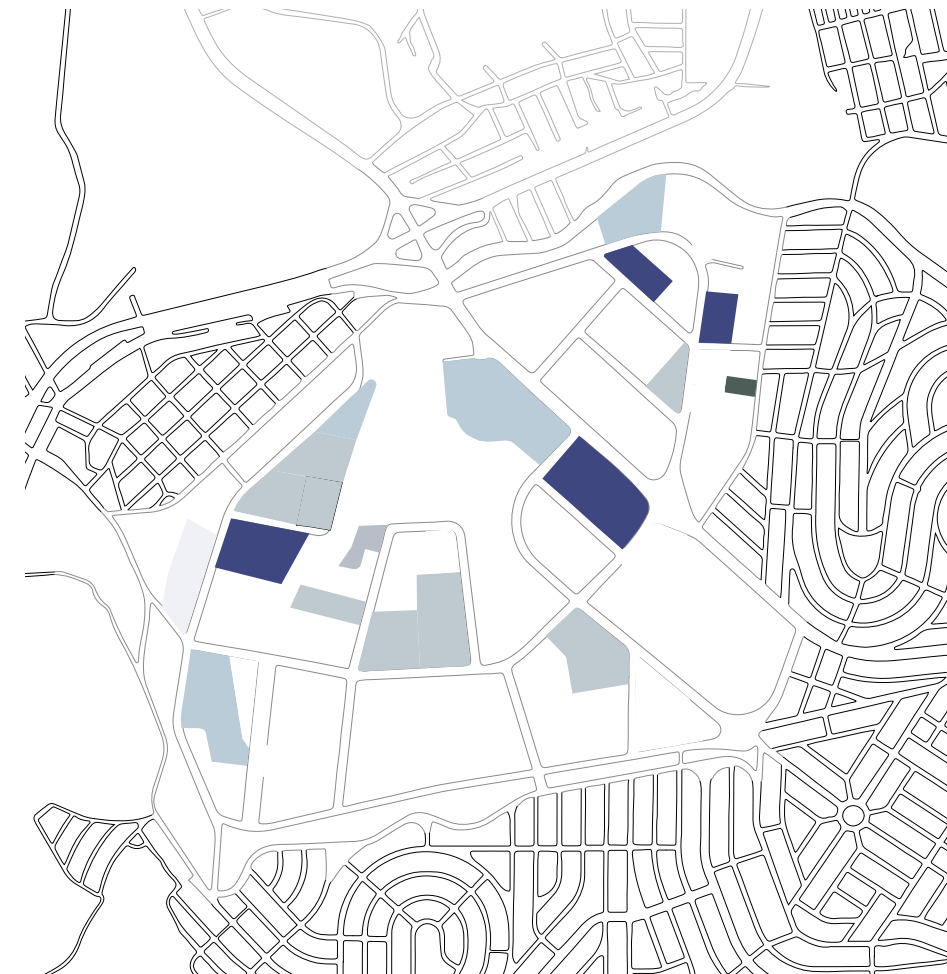
 **Ecologic Island**
Package styrofoam and 99% of water used in production are recycled and cleaned here

Conveyor Belt of Production
Work process inside Fiat.



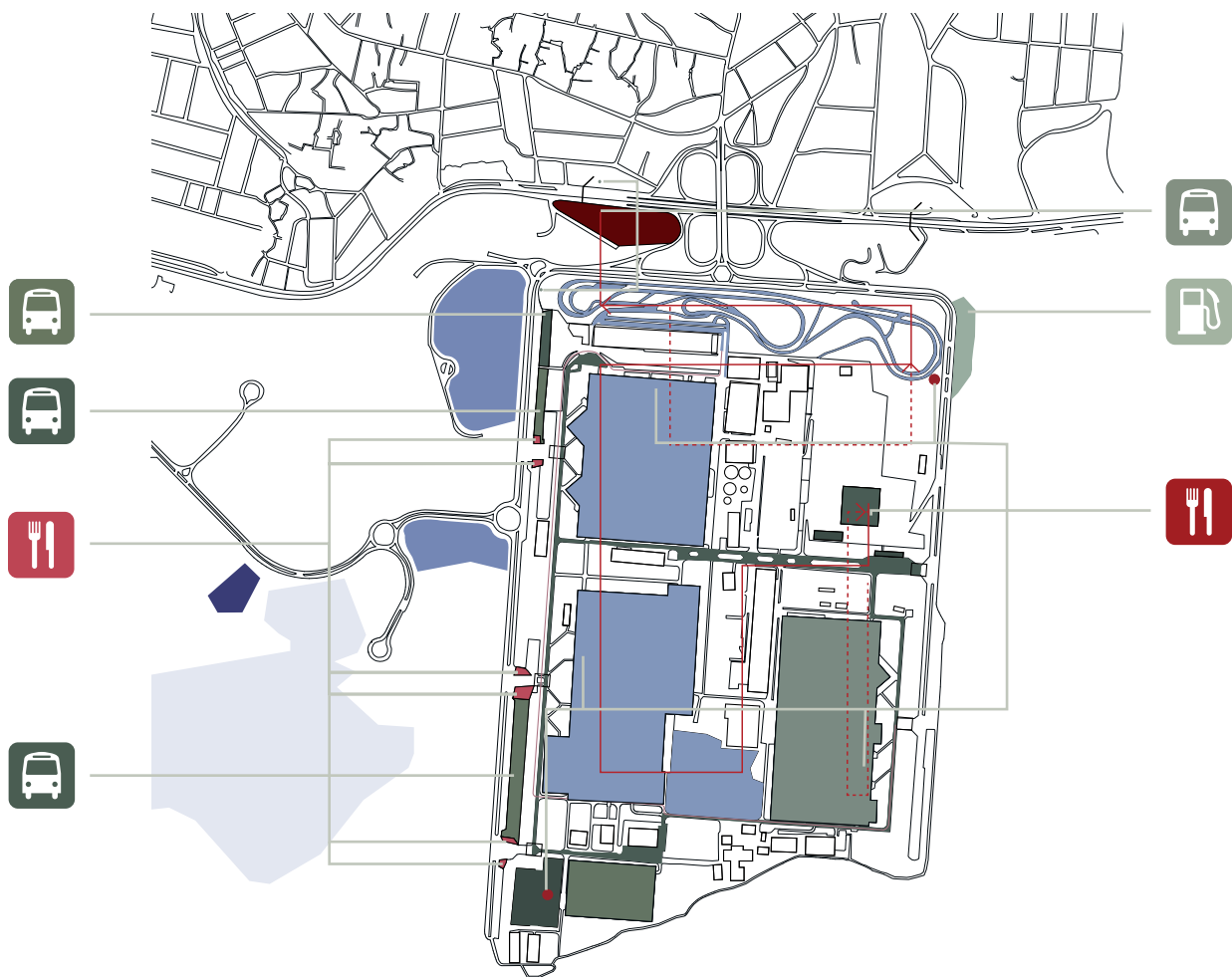
The Allure of the Big Fish







When Fiat installed its plant in Betim it attracted a whole range of suppliers to the region. Fiat imposed the “Just-in-Time” networking which means that their suppliers have to be located within 150 km from the Fiat plant. This enables the suppliers to react faster to changes in demand from customers and prevents Fiat and their suppliers to waste money on storage as well as reducing transportation costs.



Fiat Suppliers

Getting around in Betim and Contagem, you can see everywhere Fiat suppliers, as for example in the industrial park Cinco (see map above).



-  Public transportation
-  Fiats internal transportation
Praking and tracks inside the factory
-  Fiat transport system for workers, bus stops
-  Informal restaurants and commerce
Regular Menu: 15 Reais
-  Restaurant for workers inside the Fiat factory
Regular Menu: 0.54 RS; Special Menu: 2.17 RS
-  Petrobras gas station

Formal and Informal Services

Development through need: due to the continuous movement of supplier deliveries around Fiat, an informal type of commerce made an appearance more than 20 years ago around the perimeter of the factory. If compared with prices in shops located in other industrial parks, the prices of products sold here are in a higher price segment. The offer is diversified ranging from car washers to food stands, jewellery shops and electric toy sellers.



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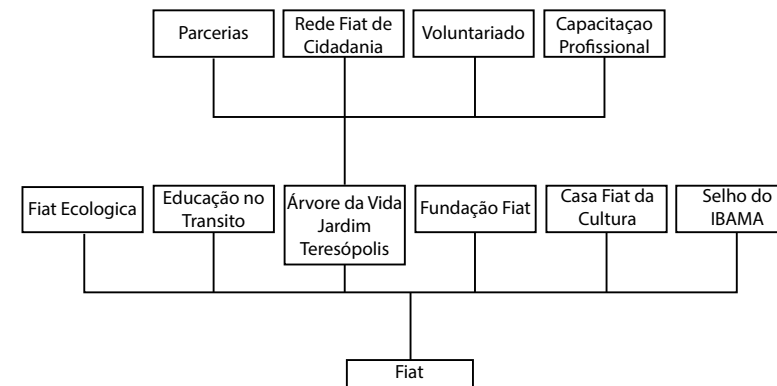


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Jardim Teresópolis - the Fiat Suburb that Prospers

The suburb Jardim Teresópolis, a neighborhood opposite the Fiat factory on the other side of the highway, was initially planned as a housing development, during the 40s, by a real estate company called COMITECO. It was initially advertised as an idyllic and restful place with large lots full of trees intended for middle-class families. However, as sales were negligible the company decided to make the whole approach more popular and started to sell the lots cheaper but without the planned infrastructure that would have been the responsibility of the Betim and Belo Horizonte councils. Thus, at the beginning of the 50s, the first residents arrived at Jardim Teresópolis. When the car manufacturer Fiat set up a factory in Betim in 1976, many migrants arrived from the countryside hoping to get jobs but could only do unqualified work because of their lack of education. So it was that people started living around the industries and that is how Jardim Teresópolis grew into an informal settlement lacking all infrastructure and particularly basic sanitation. However there are nowadays many programmes aimed at improving the infrastructure and regularizing the settlements.

Árvore da Vida - The Social Programm of an Industry

In Brazil, Fiat has a policy of relationship with the community called Arvore da Vida (Tree of Life) guided by values such as valuing life, transformation, prosperity, the autonomy of human beings and sustainability. It was developed by Fiat in partnership with the NGOs Fundação AVSI and CDM, since 2004. In seven years, this policy has helped more than 14.000 people and 109 local institutions. Besides educational and recreational activities (1) aimed at helping children and young adults to believe in their future and to get better results at school, there are also apprenticeships (2), courses preparing students to find a place in the labour market, programmes for strengthening the community and family counseling. These initiatives foster the autonomy of the human being and the empowerment of communities so that they become the protagonists of their own history. Furthermore there is a programme which at the same time generates income and respects the environment by using waste material from the Fiat factory. Materials that remain from the industrial production and that would be normally thrown away are used by craftsmen to create innovative pieces. Rests of safety belts and automotive textiles are thus transformed into bags, backpacks and other types of accessories.



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CINCO - A CASE OF LEGAL AND ECONOMIC ENGINEERING

In 1970, after the lots of Cidade Industrial were all used up, the Industrial Centre of Contagem CINCO was founded by an initiative of the public sector, as the second biggest project for industrial expansion in Minas Gerais. Hundred new factories were planned, along with 20'000 jobs. The focus stayed once again in Contagem.





Infrastructure

Considering the mistakes made in the foundation of Cidade Industrial it became clear that for the industrial district to prosper the implementation of infrastructure was crucial. Within 18 months the entire infrastructure was finished, subsidised by the Brazilian Development Bank, which financed 40% of the resources for CINCO. The remaining 60% were offered by the county of Contagem, which for the first time took up an active role in the support of the industrialisation process. Up to that time this had been the role of the State of Minas Gerais.

Providing the Industries With Infrastructure

Cinco was planned thoroughly beforehand. Its location was not arbitrarily chosen but decided upon after a survey of the conditions of the whole region taking into consideration the proximity of the supplier and consumer market. It also took into account the reserves of manganese of the “Quadrilátero Ferrífero” and the Refinaria Gabriel Passos in Betim. Cinco was provided with all the infrastructure that Cidade Industrial lacked so bitterly. Within 18 months all the services were concluded as well as the implementation of water, sewerage and drainage system, street lighting, asphalted streets, sidewalks and the planting of trees in the streets (1). A telephone network was also integrated into the existing system of Belo Horizonte. In the past, the telephone network in the Cidade Industrial was so precarious that if you had to speak to someone in Belo Horizonte, it was quicker to drive all the way up to the capital and talk to the person directly rather than wait for the telephone connection to be made. Furthermore a power substation was built to address the critical situation of power supply. A railway station for freight trains between the capital and the new industrial district was implemented (2).



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Sustainability And Environmental Protection

Sustainability and environmental protection are concepts which Brazilian politicians had neglected for a long time. According to Jander Filaretti, the principal of the council for environmental protection, it was only in the past ten years that an important change in the way of thinking of the population was brought about. More recently numerous pro-green movements gained strength and different programs were created proposing to increase public awareness about environmental matters. In contrast to Cidade Industrial Coronel Juventino Dias the conceptualisation of CINCO respected the integration in the urban fabric without neglecting the environmental aspect.

Helping the Industries to Be Sustainable

When CINCO was founded 20,5% of the area in the industrial district was reserved for green space. In this open space a tree nursery can be found (1) since by law industries have to replace every tree that is cut on their ground. These trees are replanted in the city after they have reached a certain height. It is striking how green and clean the area is (2). This is kept up by regular maintenance and cleaning services (3). The waste separation is stipulated by law for companies. Contagem has facilities in partnership with ASMAC, an association of waste collectors of Contagem for treatment of recyclable materials (4).





SESI - Serviço Social da Indústria



Labour Unions

- Fundação Iochpe
- Fundação Abrinq
- Fundação Orsa
- Fundação Arcelor Mittal
- Fundação Sidertube - V&M do Brasil
- Fundação Vale do rio Doce
- Instituto C & A
- Itaú Cultural
- Prominp - Programa de Mobilização da Indústria Nacional de Petróleo e Gás Natural



- CAIMA - Centro de Assistência Industrial para o Meio Ambiente
- IBAMA - Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis



CEMIG - Power Station of Minas Gerais



DNER - Departamento Nacional de Estradas e Rodagens

- SEST/SENAT - Serviço Social do Transporte e Serviço Nacional de Aprendizagem do Transporte



BDGM - Banco de Desenvolvimento do Estado de Minas Gerais

BNDES - Banco Nacional de Desenvolvimento

- FINEP - Financiadora de Estudos e Projetos



- PUC Minas Contagem
- Centro Universitário UNA Contagem
- NOVA Faculdade



- UNIPAC - Faculdade Presidente Antônio Carlos de Contagem
- CEFET - Unidade Contagem

- SENAC - Serviço Nacional de Aprendizagem Comercial
- SENAI - Serviço Nacional de Aprendizagem Industrial

FIEMG - Federação das Indústrias do Estado de Minas Gerais

- ABC - Agência Brasileira de Cooperação
- ACIC - Associação Comercial e Industrial de Contagem



CINCO - Centro Industrial de Contagem

- CRDI-RM Conselho Regional de Desenvolvimento Industrial
- CIEMG - Centro Industrial e Empresarial de Minas Gerais

CODEMIG - Conselho Estadual de Economia e Administração

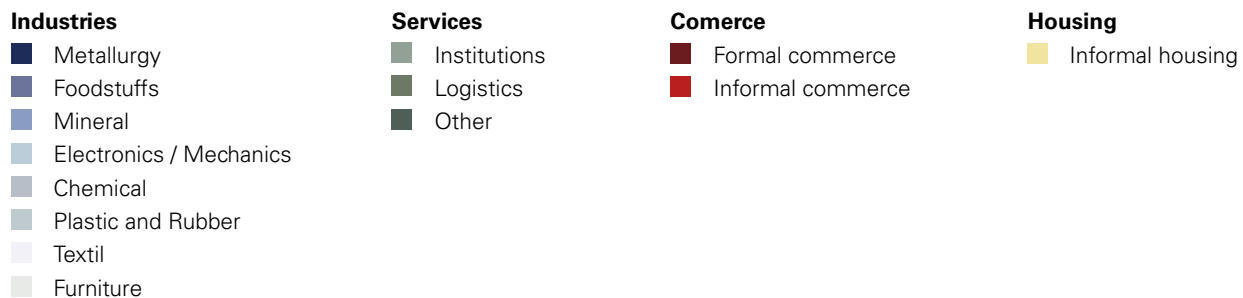
- INDI - Instituto de Desenvolvimento Industrial
- CDI - Companhia de Distritos Industriais

- CNP - Conselho Nacional de Desenvolvimento Científico e Tecnológico
- FAPEMIG - Fundação de Amparo à Pesquisa do Estado de Minas Gerais
- Ministério da Ciência e Tecnologia

Legally and Economically Fostered

During the time of consolidation of the industrial parks many organisations were founded to create a support structure fostering industrial development. By the end of the 60's, at a time when the economy of the State of Minas Gerais had outrun the national economy in terms of its mining and transformation industry, three important institutions were established: the Development Bank of Minas Gerais (BDMG), the Institute of Industrial Development (INDI) and the Company of Industrial Districts (CDI). Banks played an important role in the industrial development as they helped to appropriate all the lots which were needed to build the industrial district and provided valuable financial resources for infrastructure.





Shift from Heavy Industry to Supplier Industry

The period following the implementation of the Cidade Industrial can be divided into two distinct phases. In the first phase there was a predominance of the processing industry i.e. the conversion of raw materials with traditional industrial branches such as metal-mechanic and non-metallic minerals. In the second phase, which took place after 1966, there was a diversification of the industrial structure with the creation of the autarchy CINCO. There was then a discernible shift from the production of final goods to the production of intermediate and investment goods. This was intensified from 1994 to 1998 when traditional industries were adversely affected by the trade opening of Brazil as well as the fall in government procurement due to the fiscal crisis. In the metal industry however there was a drop in the number of employees, but at the same time an increase in the number of establishments, which could indicate an increase in the output of this sector.



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Subdynamics of the Supplier Industry

After the industries in Contagem became specialized in intermediate goods, logistics gained an enormous importance. This could also explain the amount of logistic enterprises which have settled in the industrial park Cinco (see plan on the left page). There are also driving schools for truck drivers (1). Since truck drivers are often on the road for many days, their trucks are well equipped and have even a small cooking station at the side of the truck (2). With the high flow of traffic on the roads between the industrial parks many sex motels (3) appeared along these road stretches. Attendance reaches peak time at 5 o'clock after work is over.



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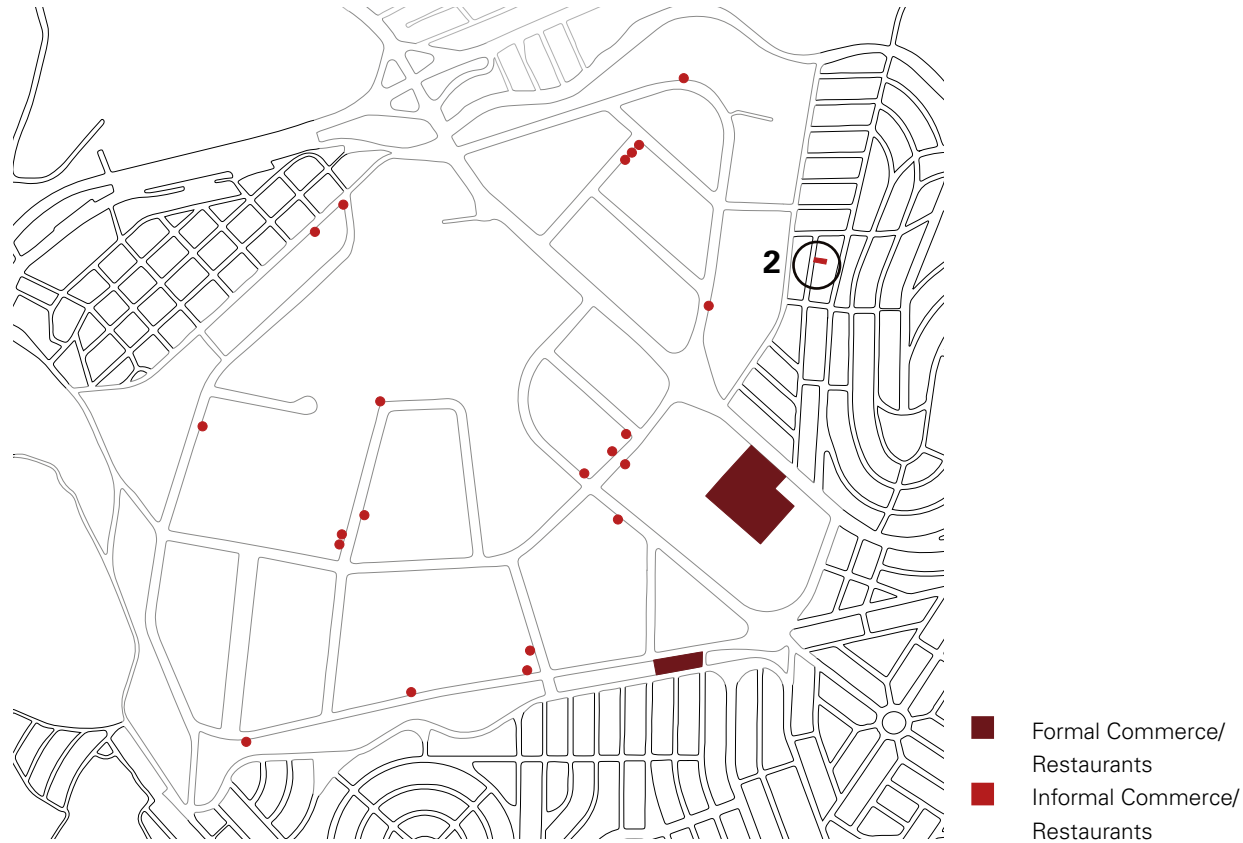
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Appropriation and Exchange with the Immediate Surrounding

Only large and important industries are able to pass the evaluation test of CINCO. Since small-scale industries are not interesting enough no place was assigned to them in the industrial parks. Many are now established in the residential area around the industrial district of CINCO. One of them is Usi-cam Usinagem, which produces different metal parts for machines (1,2).

Creative Appropriation

Sometimes the exchange between industries and residential areas can create unexpected things. After the installation of electric cables at a nearby industry, the inhabitants used the remaining cable reels to make tables and create a small leisure place in the shade. It is still being used every Sunday for barbecues.



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Informal Infrastructure Supporting Industries

Some street vendors, living in the immediate vicinity of the industrial district, have set up stalls offering two different meals a day to truck drivers and operatives (3). At the same time with the establishment of the small industries in the residential zone other types of services also appeared. Some residential houses were converted to function as restaurants with a small kitchen in the backyard to meet the demand of serving meals to the workers (1,2).

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IMAGE CREDITS

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