

in which industrial diversification and upgrading have transformed the city into a diverse economic hub with thriving creative and science-based activity. And finally, the case of Shanghai, China is highlighted in which focused interventions have helped to preserve and revitalize the city's time-honoured old brands, which have long served as key businesses, playing a key role in the success of the city's economic development.

Case Studies

Curitiba, Brazil: The Pinhão Valley Innovation Ecosystem – Driving a Creative Economy

Case background

Prior to 1940, the capital of Brazil's southern state of Paraná, Curitiba was a small inland city relying on the wood, coffee and animal husbandry trade. Situated within 100 km of two key ports, Paranaguá and Antonina, it also houses the international airport Afonso Pena in its metropolitan region, and lies in the Southern Common Market which includes Argentina, Brazil, Paraguay and Uruguay, making it a strategic location for the promotion of new businesses.⁴

In the 1970s, Curitiba advanced into an 'industrial city' whereby the emergence of thriving industrial activities attracted an influx of businesses and new residents, contributing to a spurt in local economic growth. Subsequently, Curitiba promoted a vision of smart growth and adopted several smart city concepts driving urban economic development and increasing urban quality through which it positioned itself as a 'reference city' for urban planning and development globally. However, like other rapidly growing cities around the world, Curitiba faces new challenges brought about by the all too rapid economic development and urban expansion, seeking innovative solutions to ensure a sustainable approach to urban development. As a modern and sustainable city, Curitiba leverages innovation and frontier technology to provide solutions

to urban challenges with extensive activity across the mobility and transport, security, infrastructure, health, education and energy sectors. These sectors are thus key in attracting business investment and promoting a creative economy, technological innovation and sustainable urban development. Today, the city is implementing an urban renewal strategy that is supported by sustainability, humanism, enterprise, innovation and entrepreneurship, releasing new legislation to support urban innovation and smart city development.

In 2017, the Curitiba City Hall and the Agência Curitiba jointly launched Vale do Pinhão (Pinhão valley) (Decree No. 857/17), a public policy with a global strategy from which the city promotes smart growth in line with the SDGs, created to boost Curitiba's technological development and connect stakeholders, driving economic growth through the creative economy. With over USD 2.8 million in funding, the programme serves as Curitiba's innovation ecosystem, strengthening ecosystem players and engaging a diverse set of stakeholders to advance innovation in the city. The programme aims to enable ecosystem players to appropriately scale interventions via effective R&D in one of the most tech-savvy cities in the region, stimulating the development of Curitiba's entire technology ecosystem. Curitiba has shifted its development focus towards creating an innovative and entrepreneurial culture engaging children, youth, entrepreneurs, adults and senior members of society to adopt new technologies and prepare for the challenges of the future. Accordingly, it has promoted collaboration across the city network, mobilizing the City Hall, start-ups, universities, economic development entities, investment funds, incubators, accelerators,

⁴ Curitiba City Hall. URL: http://investcuritiba.com.br/wp-content/uploads/2021/05/CuritibaInData_InvestCuritiba_English.pdf (2021) (Accessed: 11/07/2022).

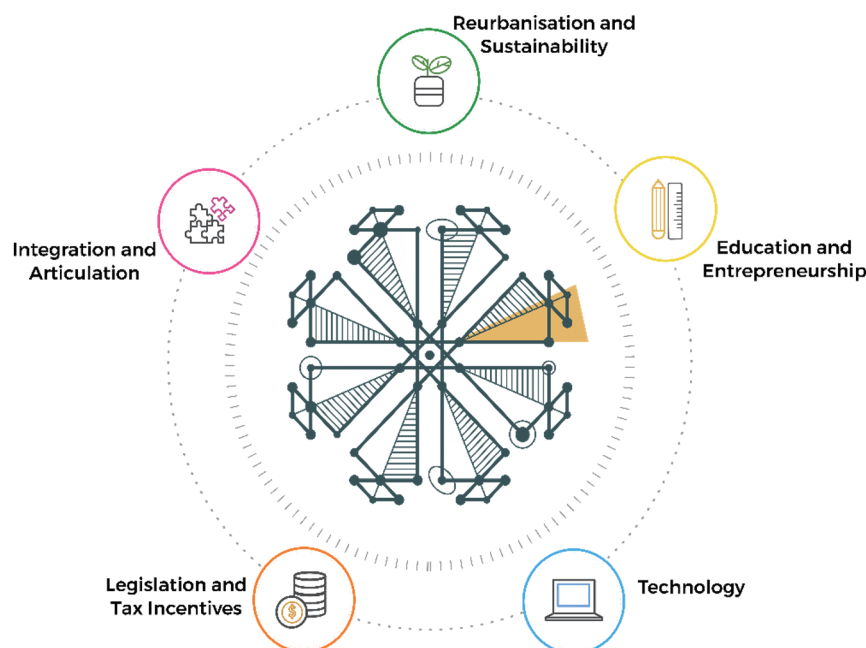
innovations hubs and entrepreneurs via engagement and cooperation.

Anchored in Curitiba's Rebouças neighbourhood, Pinhão Valley has been a pioneering movement, flooding the city with public and private shares, technology, smart city functionality, start-ups and entrepreneurship, driving a creative economy. Gathering momentum since its establishment, it has had positive reverberations across local business generation, job creation and revenue generation. The city now sits in first place in the Brazilian ranking for productivity and efficiency in the technology sector, whilst the current market for start-ups places Curitiba in first place regarding the number of enterprises in Paraná state – 422 companies as mapped by Brazilian Micro and Small Business Support Service (SEBRAE) in 2020.⁴ The city is also the leader in the creation of information technology jobs in Paraná state,⁵ and was included among the top 13 cities globally for its favourability to fintech. Curitiba was ranked fourth place in Brazil for the quantity and quality of start-ups according to

mapping from StartupBlink. It has since been primed as a hub city for technological advancement and creative activity with significant focus on promoting start-ups and entrepreneurship.

Implementation process

As a synergistic creation, the Pinhão Valley programme was inspired by Curitiba's Mayor, Rafael Greca, in 2017 and has been operating as a movement to recover innovative traditions in the city. The programme is organized into five pillars aligned with the SDGs: ① Education and entrepreneurship; ② Technology; ③ Re-urbanization and sustainability; ④ Articulation and integration; and ⑤ Legislation and tax incentives, as shown in Figure 3.1. Education and entrepreneurship have helped generate economic and social development solutions in Curitiba, whilst technology intertwines all pillars to promote technological development as a foundation for smart city development, for example via digital infrastructure. Articulation and integration has ensured



Source: Curitiba Development Agency. URL: <http://www.valedopinheiro.com.br/en/index.html> (Accessed: 13/07/2022)

Figure 3.1 The five pillars of the Pinhão Valley innovative ecosystem

5 European Network of Research and Innovation Centres and Hubs. URL: https://lac.enrichcentres.eu/wp-content/uploads/2020/11/ENRICH_Monthly_November19_Vol10.pdf (2019) (Accessed: 17/05/2022).

that the innovation ecosystem remains active and motivated whilst legislation and tax incentives have bolstered development activities concerned with innovation and technology offering legal support to reduce bureaucratization. In combination, these focus areas have cultivated a comprehensive innovation ecosystem, pioneering a modern city with a dynamic, innovative and creative economy.

1. Creating a business-friendly city: promoting entrepreneurship

Making business easier has been a central priority within the Pinhão Valley movement. The creation of an innovation ecosystem has helped to reduce bureaucracy and increase the agility of business development processes in Curitiba. Since August 2018, the process to open a business was transitioned online via the Empresa Fácil website to enable a more streamlined approach. This has had a visible impact in shortening the time needed to establish a company in the city, 64 percent faster than the Brazilian average (from 2 months to 22 hours).⁶ Consequently, it has encouraged more entrepreneurs to formalize their businesses and created a more favourable urban business environment. In November 2019, the Fundo de Inovação do Vale do Pinhão approved a financial budget of USD 2 million to be used for innovative services, attracting further attention from new enterprises.⁷ Legal measures such as the consolidation of the innovation law in 2018 have also attracted businesses with an initiative budget of BRL 10 million to help resource creative projects.

The innovation ecosystem offers various programmes to encourage entrepreneurship, creating appropriate conditions and supporting the development of students, start-ups and citizens to make Curitiba a city of business. As a unique initiative, the Curitiba Entrepreneurship programme was developed to provide financial autonomy to women in the city offering networking, training and mentoring events held by recognized leaders to help boost female

participation. Curitiba has also established nine entrepreneurial spaces throughout the district via a partnership with SEBRAE as shown in Figure 3.2. These act as public offices, providing guidance and consultation to local citizens interested in starting new businesses, including training and qualification programmes. In 2018, they hosted nearly 60,000 citizens on 2,500 qualification courses.⁸ Similarly, the Worktiba programme launched in 2017 by the council of Curitiba and the Curitiba Agency for Development and Innovation, opened the first public co-working spaces in Brazil to incentivize entrepreneurship and promote the exchange of innovative ideas to emerging challenges within the city (see Figure 3.3). The programme stimulates entrepreneurship, helps form and develop innovative ideas, and improves job, income and investment opportunities through development opportunities for start-ups and offering a platform to identify partners, receive investment and better integrate into the innovative ecosystem of the Pinhão Valley Plan through seed programmes.

The first space Worktiba Barigui focused on social entrepreneurship, and the second Worktiba Cine Passeio was geared towards the creative and cultural economy. As unique spaces, they have helped solidify



Source: Curitiba Development Agency. URL: <http://www.valedopinhao.com.br/en/index.html#education> (Accessed: 13/07/2022)

Figure 3.2 Public offices in partnership with SEBRAE support the development of new enterprises

6 Curitiba City Hall. URL: <https://www.curitiba.pr.gov.br/noticias/curitiba-e-a-capital-mais-rapida-para-abertura-de-empresas-no-pais/57880> (2021) (Accessed: 23/05/2022).

7 Curitiba City Hall. URL: <http://www.valedopinhao.com.br/vale-do-pinhao-contribui-com-ideias-e-geracao-de-empregos/> (Accessed: 21/07/2022).

8 The Intelligent Community Forum. URL: https://www.intelligentcommunity.org/curitiba_parana (Accessed: 21/07/2021).



Source: Curitiba de Graça. URL: <https://curitibadegraca.com.br/worktibas-coworkings-publicos-de-curitiba-tem-inscricoes-prorrogadas-ate-10-de-fevereiro/> (2020) (Accessed: 22/07/2022)

Figure 3.3 Co-working spaces provided through the Worktiba project

social entrepreneurship and stimulate innovative ideas that translate into income generation, job creation and new investments in the city. Offering flexible, hybrid modes of operation with a digital platform (which was leveraged during the COVID-19 pandemic) they provide a shared space for entrepreneurs with businesses in their initiative phase to learn, collaborate, network, gain mentoring and training, and promote seed projects that require development before being commercialized, helping them integrate within the Pinhão Valley innovation ecosystem. The spaces are used widely by individuals, start-ups and formalized companies that have business ideas, and who research and develop products related to incremental or disruptive technological innovation, socio-environmental impact and/or the creative and collaborative economy.

In another unique intervention, Curitiba's first Fab Lab was opened in March 2019 at Rua da Cidadania do Cajuru – a Massachusetts Institute of Technology (MIT) accredited digital fabrication and prototyping manufacturing laboratory where students, companies and communities can exchange knowledge and transform innovative ideas into practical outputs. To date, Fab Lab has supported 75 projects through consultancies to encourage a maker culture (for example digital manufacturing infrastructure such as 3D printers and scanners, laser cutters, computerized numerical control routes, plotters, bench milling machines and electronic equipment). The Fab Lab also provides free professional qualification courses



Source: Curitiba City Hall. URL: <https://www.curitiba.pr.gov.br/noticias/fab-lab-ultrapassa-limites-de-curitiba-e-apoia-projeto-de-moda-sustentavel/59983> (2021) (Accessed: 22/07/2022)

Figure 3.4 Fab Lab workspace and equipment

for those aged 14 and over with priority for those in vulnerable situations, enhancing their employability conditions and income generation (see Figure 3.4).

The city also remodelled the Lighthouses of Knowledge project inaugurated in 1994 into the Lighthouses of Knowledge and Innovation, transforming public space with free internet access into a makerspace – innovative educational spaces providing students with information and literature, and allowing them to explore new areas of learning supported through the integration of technologies such as 3D printers for design prototyping. Under the Lighthouses of Knowledge and Innovation, the former public library has been transformed into a makerspace. These spaces promote and encourage innovation in the city enriching the creation, collaboration, critical thinking and autonomy of students.

2. Promoting innovative technology industry and strengthening economic resilience through employment creation

In 2018, the City Hall and Agência Curitiba re-launched the Curitiba Tecnoparque (see Figure 3.5), a city development programme that offers a discount on municipal service tax (from 5 percent to 2 percent) to companies that invest in technology and innovation in the city. As a hub which connects innovation stakeholders to modern infrastructure, the park is helping to drive sustainable economic development and has increased productivity, international



Source: Curitiba Development Agency. URL: <https://www.curitiba.pr.gov.br/noticias/apenas-em-2021-tecnoparque-garante-r-304-milhoes-em-investimentos-para-empresas/59534> (2021) (Accessed: 08/09/2022)

Figure 3.5 Curitiba's Tecnoparque

competition, income and job creation. It now accommodates 113 registered companies dedicated to the development of new technology. In combination, these companies generate 16,000 jobs and turnover BRL 5.7 billion. It has also secured BRL 124 million in investments for registered companies since its launch.⁹ In 2018, the Bom Negócios programme was also resumed offering free, impactful entrepreneurial education courses in line with the Pinhão Valley concept. Cooperative partnerships with educational institutions, professional and development agencies, and management specialists have prepared 4,440 people for modern business management, focusing on the digital world. During the COVID-19 pandemic, 1°Empregotech was also established, a partnership between Agência Curitiba and Curitiba Social Action Foundation, offering free computer programming courses to youths, encouraging graduate students to

enter local technology focused enterprises.

To meet the demands of the automotive and auto parts sector, Curitiba will establish a Technological Park 4.0 for the car industry, the result of work by the Automotive Industry Sectorial Council. The council consists of representatives from industry, teaching and research institutions, the government and the Federation of Industries of the State of Paraná (Fiep) system with roughly 90 professionals working across research, development and innovation, articulation and infrastructure, and market and employee training. Located in the Fiep System Industry Campus in the Jardim Botânico neighbourhood, the park will aim to help identify innovative solutions and provoke competition in the sector, supported by the council and the diversity of all Pinhão Valley actors. Partnerships are currently being finalized, helping transform the

⁹ Curitiba Development Agency (2022).

innovation space into a global reference through, for example, cutting-edge technological processes which will enable the recycling of electric car batteries – an unprecedented process being developed between BMW do Brasil and the Senai Institute for Innovation in Electrochemistry.

Through the mobilization of Pinhão Valley, Curitiba has made strides in increasing job opportunities, maintaining investment and minimizing the impact of the COVID-19 pandemic. In 2021, the city started with the second highest positive balance in regard to the generation of formal jobs among capitals with 5,264 hires in January 2021 according to the Ministry of Economy's General Register of Employed and Unemployed.¹⁰ Engaging in Curitiba's post-pandemic economic recovery, the programme has enabled the city to maintain a sustainable and efficient economy and social structure whereby measures such as the Guarantor Guarantee Fund allowed entrepreneurs and companies to take a break and prepare for a new post-COVID economy. Launched in October 2020, the fund provided over BRL 6 million in loans to Curitiba's small businesses with resources fluctuating from BRL 5,000 to BRL 150,000, reaching a range of recipients such as restaurants, beauty salons and coffee shops, among others.

Partnerships between the City Hall, Agência Curitiba, SEBRAE PR and the Municipal Tourism Institute have helped to strengthen the economy in local neighbourhoods through focused action on the sustainability of micro and small companies. Training courses have been offered including 2,222 hours of consulting focused on the digital world for 3,534 tourism companies and artisans, as well as 25,000 services providing guidance business formalization and credit in Ruas da Cidadania. A total of 1,446 entrepreneurs also benefited from a digital retail course and 278 companies attended the Accelera Digital course.¹⁰ With substantial impact on investment and job creation, the tech-based start-ups Ebanx and MadeiraMadeira became the first unicorns¹¹ in the south. These two companies have been pivotal in

driving economic growth. Ebanx (focused on tackling international payments) hired 200 new employees in 2020 after receiving major funding from FTV Capital (an investment fund in Silicon Valley, United States of America) and MadeiraMadeira (the largest platform for home products in Latin America) secured USD 190 million from the Softbank Latin America Fund and guaranteed BRL 124.1 million in investments for companies benefiting from the municipal service tax reduction.

In terms of geographic space, the development centre of the Pinhão Valley Plan is in the Rebouças neighbourhood where in 2019, the government established a multifunctional zone for the reconstruction and development of the neighbourhood and the surrounding areas. Today, new factories serve as public buildings for innovation, interaction and collaboration between different contributors in the innovation ecosystem. In terms of implementation, the Pinhão Valley Plan integrates participants and entrepreneurs into an innovative environment by promoting forums, symposiums, events, lectures and conferences such as Smart City Expo Curitiba, Paiol Digital, Innovation Expo and Curitiba Movement which make the entire innovation ecosystem dynamic and positive.

Reference experiences

1. Cultivate urban environments that enable new enterprises to flourish

Where cities are becoming increasingly central to business activity, they are also becoming more interdependent, reinforcing the need to cultivate urban environments in which businesses can grow and prosper to drive long-term economic growth. Within Curitiba, business founders and entrepreneurs are fortunate to have access to an abundance of resources for their development through the Pinhão Valley Plan innovation ecosystem. Within the city, local start-ups can gain access to the market and connect with companies providing them with clients and knowledge,

10 Vale do Pinhão. URL: <http://www.valedopinheiro.com.br/vale-do-pinhao-contribui-com-ideias-e-geracao-de-empregos/> (Accessed: 24/05/2022).

11 Unicorn: a term to symbolize start-ups that have reached a valuation of USD 1 billion.

inspiring them to develop and commercialize new technologies. In addition, the introduction of pro-business legislation and regulation mechanisms has eased the process of business formalization, resulting in a greater influx of new start-ups and businesses, investment and financial capital. To enable prosperous economic development, municipal governments should integrate processes that foster an ease of doing business, nurturing entrepreneurs and businesses through the development process by minimizing red tape, ensuring consistent policymaking, and offering accessible and approachable government agencies.

2. Promote innovation-based entrepreneurship

Curitiba's focus on entrepreneurship has helped catalyze a shift towards an innovative, creative urban economy. Driving the smart city shift, entrepreneurship helps to locate and exploit opportunities in the market; generating innovative solutions to emerging challenges whilst boosting capital formation and investments as well as per capita income. Where technological interventions and innovations are largely driven by entrepreneurs in the city, they also help cities to undergo economic and socio-technical transitions, changing the relationship between workers and the workplace, and realizing new modes of economic development. Converting latent and idle resources into ideas, and goods and services, entrepreneurs and start-ups spark collaboration and cooperation, and open up diverse employment opportunities which help to produce a more productive workforce and improved economy. Cities therefore contain untapped potential to actively encourage entrepreneurs and start-ups as a means to foster growth.

3. Understand the role of urban innovation ecosystems in driving economic growth

Innovation-based start-up ecosystems are emerging in urban areas across the world with cities best placed to meet the needs of entrepreneurs via their high concentrations of capital, diversity and interaction. As exemplified by the Pinhão Valley Plan, urban ecosystems can unlock new jobs and economic opportunities emerging from new business models propelled by start-ups and innovation. In addition, they help pool resources for local innovation in areas such as R&D and out-of-city 'innovation leaders' which serve to further diversify local economies and

boost competitiveness between cities and regions. They therefore play a vital role in facilitating new urban business environments, altering the economic dynamics of the city and stimulating greater levels of innovation compared to traditional industry, driving economic growth. Understanding the benefits of local innovation ecosystems is thus of great significance through which cities can foster entrepreneurship that creates new sectors and businesses, and which strengthens local and regional economies.

Monterrey, Mexico: Sparking the Potential of Universities to Drive Innovation and Entrepreneurship via Industry and Community Partnerships

Case background

Globally, cities and universities are cooperating to create new dynamic economies and rejuvenate societies. Mexico has long valued the development of its internal education, and in the early 1990s initiated educational reforms and established a new educational model –Modelo Pedagógico. The model not only focused on school teaching reform but also the relationship between school and society, and the education of society which has since led to an initial modern educational concept. Mexico is at the core of the technological revolution in Latin America and embraces new technological achievements. And as an emerging economy, the country possesses a rapidly growing education centre and a soaring entrepreneurial ecosystem that cooperates with regions across the Gulf of Mexico.

Situated in northern Mexico, Monterrey is one of the major cities in the Gulf of Mexico bordering the United States of America, affording it advantages in terms of an entrepreneurial ecosystem. It is one of the wealthiest cities and the third largest metropolitan area in the country, ranking first in per capita income and offering many convenient facilities. The revitalization of areas such as Barrio Antiguo in recent years has created a thriving and safe atmosphere in the city with a vibrant culture and educational system, which along with its dynamic academic facilities and enriched academic capacity, promotes an influx of