PEAK Urban

Evolving existing cities towards sustainability: urban form and productivity

This briefing looks at research into urban productivity and suggests interventions policy makers can make to increase productivity in their contexts.

Dense cities are usually more productive as density facilitates knowledge sharing, lowers commuting costs, increases access to skills, and reduces time to retail and amenity destinations. But where cities are not dense, policy makers can make targeted interventions to boost city productivity and ensure sustainable growth.

Urban sustainability in existing cities

Latin America and the Caribbean (LAC) is the second most urbanised region in the world, with 80% of its population living in cities.[1]

But urban population growth in the region is now declining and is expected to grow below the world average over the next decades – limiting the need for development of new urban areas.[2] Many existing cities are characterised by informal settlements, fragile, disaster-prone locations, and poorly planned development. How then can LAC cities become more sustainable?

Research and analysis by EAFIT University's Research in Spatial Economics (RISE) group explores a range of evidence and possible interventions which could evolve infrastructure and services to improve life for citizens and protect the environment in existing cities.

The 'Urban Sustainability' project is supported by the PEAK Urban Programme and informed by a research framework which seeks to predict, plan, and adopt new approaches, to address current and future urban challenges – drawing on expertise from across the disciplines and engaging with policy makers and practitioners at every stage.

This series of policy briefs captures key findings and insights for policy and practice – showing that working with what is there (even where it is not ideal), and making evidence-based interventions can transform cities.

Whilst based on research from Latin America, the briefing will also be of interest to policy makers in other parts of the world as urban redevelopment, improvement, and renovation become the most significant ways that cities change.

1 https://www.worldbank.org/en/topic/urbandevelopment/overview#1 (Accessed Jan 2022)
2 https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf (Accessed Jan 2022)

The challenge

SDG 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.

With more than 80% of global GDP generated in cities, urbanisation can contribute to sustainable growth if it is well managed.

The importance of urban form to productivity has already been explored in urban economics, where 'dense' cities are usually thought to be more productive. Density facilitates knowledge sharing, lowers commuting costs, increases the availability of workers, and reduces time to retail and amenity destinations.

Whilst over 80% of the population of Latin America and the Caribbean (LAC) live in cities, GDP per capita is below what we would expect from the level of urbanisation so cities in the region may not be realising their potential. Rapid urbanisation, limited infrastructure investment, piecemeal planning, and a challenging topography suggest there may be many barriers to productivity.

How therefore should policy makers in Latin America approach urban productivity? What factors other than density might affect economic development? And what can planners do to boost productivity if their city is not dense?

Research and findings

Wanting to go deeper than the traditional 'density' dimension of urban form used by economists, researchers in the RISE group, working in partnership with The World Bank, developed a set of indicators adapted from the **planning** literature.

These look at three dimensions of urban form: **shape of the border** (whether the city is elongated, rounded or irregular), **urban texture** (road layout and connectedness, which indicates whether it is planned or organic) and **land use patterns** (which indicate land use, and sprawl versus density).

The team then used OpenStreetMap to access data on street networks, and information from the NOAA National Centers for Environmental Information open access night-time light imagery (a reliable proxy for productivity), to analyse the form of nearly one thousand cities in Latin American and Caribbean.

Research finding 1. Dense cities are more productive; but less dense cities can boost their productivity.

The research showed that compact, dense, and well-connected cities are likely to be highly productive, as previously thought. However, by going further to consider shape, texture and land-use, the research suggests that a non-compact city can reach high levels of productivity using specific interventions. A non-compact city can improve productivity by guaranteeing a high level of inner-city connectedness or through land use regulations.

Research finding 2. Most cities have not changed much over time.

Looking at 919 LAC cities in 1996, 2000 and 2010 the researchers noted the tendency of certain cities to grow on steeper slopes, urban growth occurring in protected areas, and a trend towards sprawl. They also noted that the cities had not changed much over time.

Research finding 3. Metropolitan authorities are not helping to boost productivity

The researchers found that administration by multiple district-level local authorities in large cities reduced productivity, but that higher-level metropolitan authorities (operating over many local authorities) did not provide a mitigating effect as had been observed elsewhere – indicating that metropolitan governance institutions are not effective in LAC.

Implications for policy and practice

"The fact that city form is strongly related to productivity brings very good news for city mayors and their administrations, who can boost employment and economic activity with the planning and infrastructure decisions they make."

Juan Carlos Duque, Director of the RISE group, EAFIT University

Policy implication 1: cities can boost productivity by considering each dimension of form and implementing appropriate strategies.

If topography makes it difficult to guarantee compactness for instance, the authorities have other options. These include: improving inner-city connectedness (with better roads or secure and efficient public transport); or designing land use plans that strategically distribute land use activities within the city.

Policy implication 2: strengthening local governance structures could boost productivity.

Decentralisation at the local (district) level can enhance economic growth, as local authorities are more aware of, and responsive to, local needs and cannot extract extortionate rents as businesses will simply go elsewhere. However, although larger metropolitan authorities, should provide a coordinating function, mitigating the transaction costs of numerous fragmented local authorities within urban areas, but this does not seem to be the case in Latin America as it is elsewhere. Strengthening metropolitan authorities to provide more effective coordination across larger urban areas could boost productivity in Latin America.

Policy implication 3: Think carefully about city development. It is likely to be there a long time.

The finding that cities are not changing much over time, in terms of urban shape, texture and other land-use variables, is also useful for urban planners. Any development is likely to last a long time, so plan carefully for sustainability. Evidence that cities in LAC are encroaching on protected land and expanding into fragile and marginal areas should also act as a warning. Active planning and effective management are needed to protect fragile environments and provide sustainable living spaces for people.

Support from the RISE group

Planners and policy makers interested in support for exposure risk assessment should contact Juan Carlos Duque and the RISE group at EAFIT University. Contact: **juanca.duque@eafit.edu.co**

Policy engagement and impact:

Findings from the models have been shared with policy and practice stakeholders, including the World Bank and UN Habitat. The RISE group is now developing a proposal for public risk management bodies, looking at how the model could support their ongoing risk assessment and resilience work.

Further information

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About us

The PEAK Urban programme aims to aid decision-making on urban futures by:

1. Generating new research grounded in the logic of urban complexity;

2. Fostering the next generation of leaders that draw on different perspectives and backgrounds to address the greatest urban challenges of the 21st century;

3. Growing the capacity of cities to understand and plan their own futures.

In PEAK Urban, cities are recognised as complex, evolving systems that are characterised by their propensity for innovation and change. Big data and mathematical models will be combined with insights from the social sciences and humanities to analyse three key arenas of metropolitan intervention: city morphologies (built forms and infrastructures) and resilience; city flux (mobility and dynamics) and technological change; as well as health and wellbeing.

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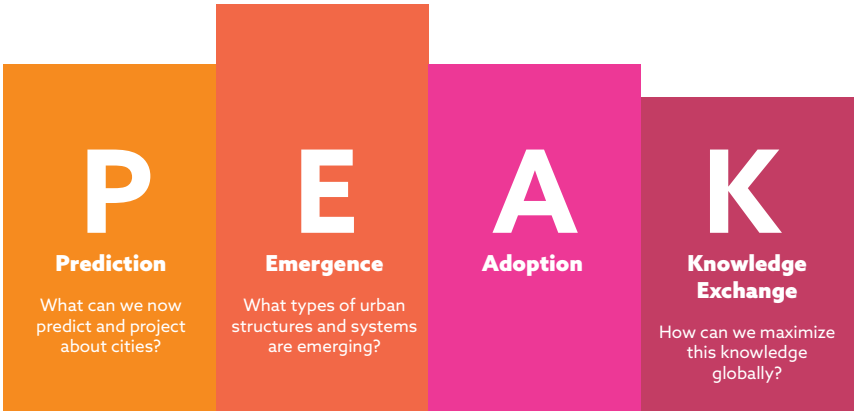
Our framework



The PEAK Urban programme uses a framework with four inter-related components to guide its work.

First, the sciences of **Prediction** are employed to understand how cities evolve using data from often unconventional sources.

Second, **Emergence** captures the essence of the outcome from the confluence of dynamics, peoples, interests and tools that characterise cities, which lead to change.

Third, **Adoption** signals to the choices made by states, citizens and companies, given the specificities of their places, their resources and the interplay of urban dynamics, resulting in changing local power and influencing dynamics.

Finally, the **Knowledge** component accounts for the way in which knowledge is exchanged or shared and how it shapes the future of the city.

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