The Hong Kong-Mainland China Border: Past, Present and Future

Applying a Global Perspective and Interdisciplinary Research to Identify Key Drivers behind the Complexity of Urban Transformation at the Hong Kong-Mainland China Border on the 25th Anniversary of HKSAR

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Abstract

This paper reviews the first 25 years of how the "One Country, Two Systems" policy, tangibly and intangibly, transformed the Hong Kong-Mainland China border from the Hong Kong side. To address the border's complexity, the author applied interdisciplinary research to obtain a holistic picture of the border, assimilating expertise from urban regeneration, ekistics, economics, geopolitics, and biology. Based on 25 years of data regarding Hong Kong's border region, such as cross-border travel mobility based on economic status and geographical boundaries, demographical changes, and land use fluctuations, it is proven that all social development is subjected to humanity's biological instinct for higher chances of survival, which is embodied by how governments limit cross-border travel freedom. It reveals genuine and engraved difficulties for the "two systems" to overcome, and disruptive institutional innovation is needed for the desired cross-border integration to transpire.

Keywords

Border, Interdisciplinary Research, Urban Regeneration, Urban Economics, Geopolitics, Hong Kong, Mainland China

1. Introduction

1.1 What is Happening to Borders, and Why Look at Them now?

After decades of globalization, this once-heated trend seems to have come to a halt. With the coronavirus disease (COVID-19), global supply chain disruptions, and open hostility toward globalization from prominent figures such as Donald Trump, the "flat world" bolstered by the journalist Thomas Friedman is gone (Immerwahr, 2022). Consequently, borders are being refortified globally to restrict the flow of materials, people, and information. The Hong Kong-Mainland Border (the HKMC border) is also sharing the same fate, as its doors were shut to most visitors due to COVID-19. However, three years later, there is little indication of the border restoring to its prepandemic functions. What could happen next?

1.2 The Past and Present of the HKMC Border

The HKMC border is a derivative of colonization, decolonization, globalization, and the current deglobalization trends. Social turmoil in the late twentieth century in Mainland China prompted citizens to flee to Hong Kong due to its geographical adjacency and social stability (Wills, 2019). Because of the immense refugee influx, the then British Hong Kong government had to respond by establishing the Frontier Closed Area (FCA) in 1951, thereby eliminating illegal immigration. However, even though Hong Kong's sovereignty officially returned in 1997, due to its long colonial rule, Hong Kong's capitalist society is incompatible with Mainland's socialist system, although many believe it to be state capitalism (Lin, & Milhaupt, 2013), and the GDP per capita (GDPPC) of Mainland China is far behind that of Hong Kong, with the gap reaching over 20 times from 1997 to 2003. These factors have led the HKMC border to maintain its original function of physical segregation.

However, political upheavals in Hong Kong in 2019 caused Beijing to introduce the Hong Kong National Security Law to preserve Hong Kong's social stability (The Hong Kong Special Administrative Region Government, 2020a). It simultaneously cements political ties between the governments of the two sides (Vickers & Morris, 2022), which can be proven in the latest Northern Metropolis Development Strategy (NMDS). It further integrates Hong Kong into national planning, particularly the Guangdong-Hong Kong-Macao Greater Bay Area (The Hong Kong Special Administrative Region Government, 2020b), thereby signifying deepened cross-border cooperation conforming with the new political trend. Thus, one may hypothesize that the land border region of Hong Kong will soon transform significantly.

1.3 The Purpose and Significance of this Paper in Terms of Urban Regeneration

Multiple historical milestones occurred for Hong Kong in 2022, such as the 25th anniversary of the sovereignty handover, the 25th year of the "one country, two systems" (OCTS) policy implementation, the midpoint of the 50-year commitment of the Hong Kong system to re-

main unchanged, and the third year of COVID-19. It is essential to re-examine Hong Kong's border region at this time because one can assess how the OCTS policy has changed the urban form based on 25 years of data, thereby laying the ground for inferring the future development trend.

Meanwhile, the literature on urban regeneration on the HKMC border is profoundly limited. Many papers were written directly following the sovereignty handover since this event caused widespread speculation of potential changes in the border control mechanisms. For example, some said the border had been officially referred to as a boundary, notionally differentiating it from the more political term "border" even though there is no actual change (Breitung, 2002; Hasdell & Bolchover, 2016). Some papers targeted the topic of cross-border cooperation, which had become an urgent matter for increasing regional competitiveness in the global economy (Shen, 2003), and some focused on market integration, likening the HKMC border to the Canadian-U.S.A. counterpart (Fan, 2016). Moreover, many have emphasized cross-border population mobility (Breitung, 2002; Shen, 2003; LIN & TSE, 2005), viewing it as an integral part of cross-border economic relations and regional development (LIN & TSE, 2005). Research has also been conducted on the propellent of land use change in the border region, which conjoins with urban regeneration studies, noting that the political, economic, and social perspectives all contribute to the asymmetric landscape (Choi & Ng, 2017). Additionally, interventions from environmental nongovernmental organizations played a crucial role in shaping the Hong Kong side of the border region. However, their study primarily targets environmental management, which deviates from the author's urbanism spectrum.

Thus, on the 25th anniversary, the author intends to provide the timeliest update on urban studies with a specific focus on the HKMC border. To do this, the author investigated the interdisciplinarity of border and assimilated knowledge from related disciplines to welcome unexpected findings. Furthermore, data spanning 25 years are analyzed to re-emphasize that the border is not static but a process of change (Johnson et al., 2011) within the city as a self-organizing living system (Narraway et al., 2019).

2. Research Framework

2.1 Research Aims

As previously mentioned, this paper aims to examine how the HKMC border has changed, tangibly and intangibly, over the last 25 years and identify the driving forces behind those changes. Based on that, the border's future development trajectory can be outlined.

2.2 Research Questions

Table 1 elaborates the aims in three specific steps, where each step narrows in scale and specificity.

2.3 Methodology

The following research is divided into three sections to answer the three questions.

	Research Questions
Question One: **Macro** Perspective	*Based on the brief history of the global border: What triggered the border's form and function to change from the global perspective, and how does it affect people's lives?*
Question Two: **Meso** Perspective	*The economic status of a country/region (entities) is a crucial indicator of the livelihoods, academic performance, and social stability of the residents there. It is reasonable to presume that the economic status of an entity is a key determinant of how other entities view their nationals; thus, respective cross-border travel policies are implemented. Considering that, how does the disparity of GDPPC between two bordering entities impact the border's openness, tangibly and intangibly? Furthermore, does that apply to nonbordering entities as well?*
Question Three: **Micro** Perspective	*As for the HKMC border, where does it stand from the global perspective of borders? What caused it to change? Moreover, what may happen next?*

Table 1. Research questions, constructed by the author.

The first part defines the border's significance to humanity from a macro perspective and investigates how and why borders have transformed with civilization development. Here, diachronic research is conducted by reviewing the literature. The author drew a timeline diagram based on interdisciplinary literature with historical information on the border. Thus, by laying out all related information, such as border formations related to international wars and globalization, one can identify the drivers behind border transformation from a macro perspective, laying the groundwork for a case study later.

The second part utilizes big data analysis to explore the specific reasons behind the openness of borders. The author gathered GDPPC data of 199 entities (Henley & Partners, 2022), the borders' geographical conditions, and their visa-free travel options. Then, network maps are applied to vividly demonstrate the overall relationship between global travel mobility, geographical border conditions and GDPPC. Then, box plots are applied to quantify that relationship.

The third part zooms in on the HKMC border for the case study. An empirical study on cross-border human flow, demographical change, and the FCA's land use change is conducted to determine how this border follows the global border trend and identify its drivers of change. For human flow and demographical change, data between 1997 and 2022 are collected for analysis. For the land use change, data are provided by the Planning Department. Land use size, types, and percentages are analyzed using QGIS software. K-means clustering for grids from the System for Automated Geoscientific Analyses (SAGA GIS) is utilized for calculation, and georeferencing is also implemented, as part of the data is in nongeospatial format.

3. Literature Review

Space is a social product (Lefebvre, H., 1991) and a complex system that is constantly evolving with the synergy of tangible and intangible factors (Flaherty, E., 2018). Therefore, one can suppose that border space is also a product of society and is innately interdisciplinary. Table 2 lists definitions of the term "border" according to different disciplines.

Based on the preliminary understanding of the term border, the author further investigated its

primary functionality and influence on people's lives. For this purpose, the author conducted the following three phases of research: shift of research focus; border evolution throughout the Anthropocene; and an interdisciplinary literature review.

3.1 How the Focus of the Border Studies Shifted Over Time

As Figure 1 shows, from 1995 onward, a substantial increase in border studies appeared due to the wave of discourses on the "borderless" world (Johnson et al., 2011). Additionally, border research peaked in approximately 2009, parallel with the globalization trend plateauing in approximately 2008 (Sonya, 2022; Immerwahr, 2022). The author also categorized the literature into the following three ranges: from 1975 to 2006, which primarily focused on economic development; from 1988 to 2013, which focused on citizenship and immigration; and from 2009 to 2022, which focused on cross-border cooperation.

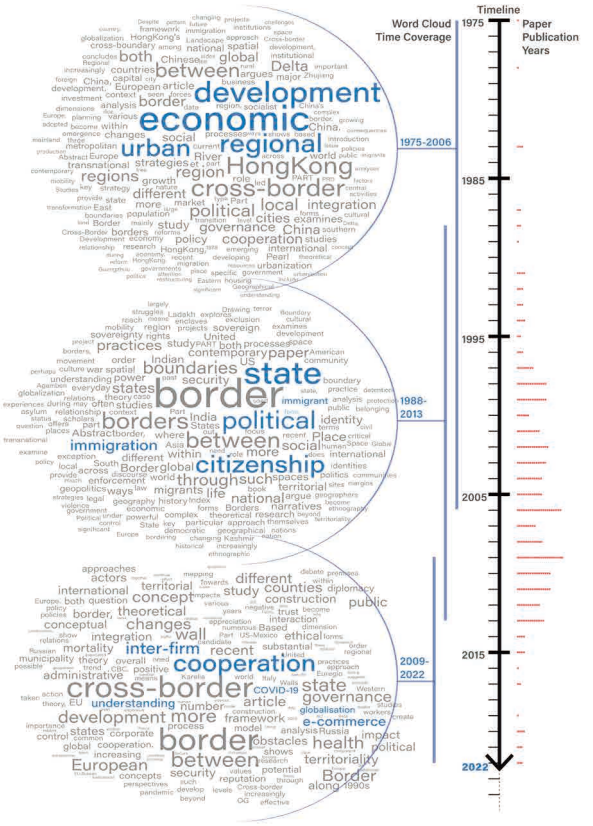

Figure 1. Change of focus of border studies, drawn by the author, 2022, based on Newman, D., Winders, J., Sidaway, J. D., Paasi, A., Brown, W., etc. For a detailed list of literature used for this figure, please see Appendix 1.

3.2 Border Evolution Throughout the Anthropocene

Disciplines	Descriptions of Border
Geography	*The junction zone between adjacent heterogeneous regions (including geology, terrain, and other natural attributes) and the difference between the land-use, ownership, and other social attributes (Xing, Z., 2007).*
Ecology	*The junction of two or more different biogeographic communities (Xing, Z., 2007).*
Urban Planning/Regional Planning	*A frontier of interaction between neighboring regions, a nexus of ecological links and spatial integration (Xing, Z., 2007); the city has five elements, i.e., nodes, paths, districts, landmarks, and edges, where the edges are the borders.*
Politics	*Politically important borders are not necessarily directly related to local geographic factors but are imposed on the world through human agency (Robinson, E. H., 2012). It is one of the key elements through which states exercise territoriality, sovereignty, and control (Johnson et al., 2011).*
Political Geography	*A boundary is a separation and order, a selective filter, a resource and bridge, an identity symbol, and a conflict and potential threat (Liao, K. et al., 2020).*

Table 2. Descriptions from different disciplines directly related to the term "border", compiled by the author.

Borders have played an indispensable role throughout the development of society, even though it has only been in recent decades that border research began receiving wider attention. A holistic understanding of the border evolution trajectory might bring solutions for today's border issues. Based on Constantinos A. Doxiadis's work "Ekistics: an introduction to the science of human settlements," (1968) the author illustrated five key phases of civilization development appended with border transformation processes as small diagrams interspersed along the timeline in Figure 2. Moreover, the globalization trends (blue pins) and international wars (red lines or curves) were also included to exemplify the role of borders in civilization development. From Figure 2, one may understand the HKMC border from a macro perspective.

This figure illustrates some intriguing facts. First, 76.4% of today's borders were established from the mid-19th to mid-20th century, when international wars were most frequent and deadly, implying a causal relationship between international wars and border formation. Second, exacerbated by the pandemic, global society has been witnessing the deterioration of globalization and a rise of extreme nationalism (Su, R., & Shen, W., 2021). Consequently, borders around the world were refortified. The HKMC border follows this trend, as illustrated in the figure.

It is evident that borders and their built forms are direct products of geopolitics and are subject to the globalization trend. At the same time, the gap in economic status also helps to speculate on how the two societies might approach the border issue next because societies, as collections of individuals, tend to avoid harm, and border region planning reflects their perception of an economically optimal solution. Therefore, border research requires the integrated application of natural-ecological and socioeconomic laws to confront challenges in border region development (Xing, Z., 2007).

3.3 A Deeper Look at the Complexity and Interdisciplinarity of Borders

As stated earlier, ekistics has enormous potential for use in border studies because it deals with human settlements holistically and helps to grasp the complexity of borders by synthesizing knowledge from urban science, anthropology, geography, biology, and the like. It must welcome every possible contribution and incorporate them into a whole body of knowledge to produce optimal results (Doxiadēs, K. A., 1968, p. 57). For academic research, this broad scope may make conclusions less credible. However, akin to the view of humans as a complex adaptive system, borders evolve constantly and are unpredictable and open-ended (Batty, M., & Marshall, S., 2009). It would still be constructive to observe that even though numerous factors are being investigated at once, they cannot be related to any specific border but are viewed as lines that surround spatial entities and are crossed by all types of connections (Johnson et al., 2011). By examining the synergy of the five elements of ekistics, nature, man, society, shells, and networks (Doxiadēs, K. A., 1970), one may identify the reason behind the transformation of settlements (Doxiadēs, K. A., 1968),

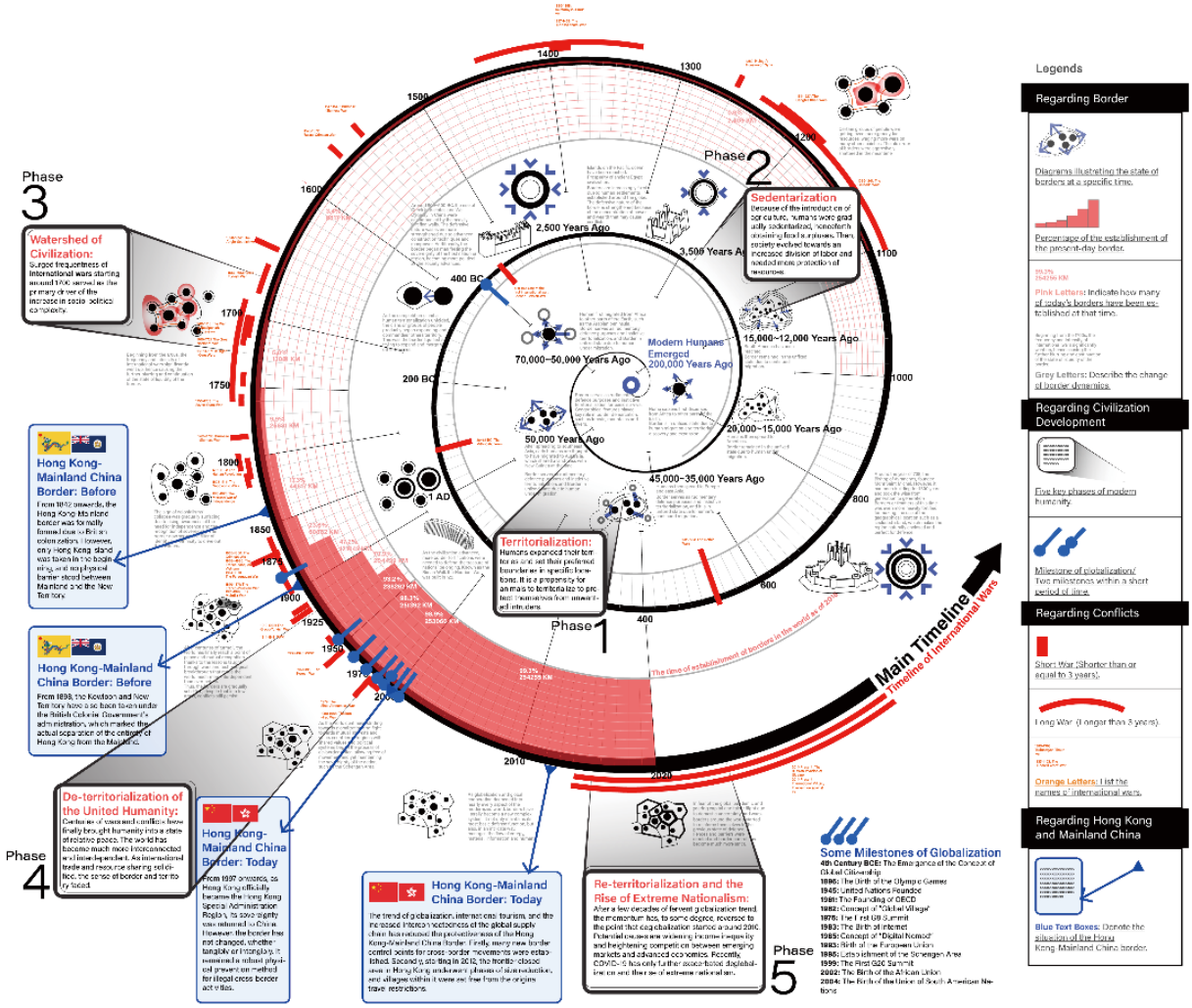

Figure 2. The civilization development spiral along with border evolution, drawn by the author, 2022. To see a high-resolution version of this figure, please see Appendix 1.

Viewing the Border from the Perspective of Urban Regeneration Factors	Specific Elements for Investigation
Physical Form	*Building types, street types, urban tissues, and regional patterns (Sanchez, T. W., 2018, p. 170).*
Socioeconomic Implications	*Land ownership, land regulations, land use, local industrial, and employment structure.*
Functionalities	*Cross-border human mobility.*
Natural Environment	*Water features and local communities of flora and fauna (Kropfl, 2017, p. 20-27).*

Table 3. Specific elements to look at the border from the perspective of urban regeneration, sorted by the author.

including that of borders.

Other disciplines directly related to ekistics are urban regeneration and urban morphology. These two disciplines may allow urban designers to lay the foundation for border research because they emphasize both the dynamic process of spatial transformation (Kropfl, 2017) and the static built form, which centers on urban design practices. While the term "regeneration"does not fit the HKMC border because there has not yet been any massive urban development, it can refer to the extension of inner-city regeneration. Table 3 lists specific elements to investigate the border from the perspective of urban regeneration.

For Hong Kong, examining socioeconomic implications such as land ownership, land use, and relevant policies is most beneficial. Urban regeneration is complicated in Hong Kong due to the extraordinarily diverse ownership within the tiny piece of land. Therefore, massive effort had to be invested in stakeholder negotiations (Lin, T., 2007, p. 422) so that the optimal land use decisions could be made to avoid conflicting interests (Chan, E. H. W. et al., 2016). However, due to the impracticability of gathering and analyzing all land ownership data, there is no such database available for the public, not even a simplified and privacy-protecting edition using basic taxonomic units such as "private-owned or government-owned." While this situation complicates urban study and decision-making, land use could help to circumvent the lack of a detailed ownership map. It denotes land cover characteristics produced by human activities (Chan, E. H. W. et al., 2016), thus providing insight into macrolevel land ownership and the impact of this type of land use. In later chapters, the paper presents an FCA land use study to reveal its transformation process.

Finally, borders are investigated from the perspectives of economics and evolutionary biology. These two disciplines are profoundly correlated because, as stated by the evolutionary biologist Richard Dawkins in "The Selfish Gene," living organisms will maximize their genes' probability of survival (Dawkins, R., 1976). Based on his assertion of the innateness of selfishness, a branch of social science, bioeconomics, has emerged (Zhang, Q., 2019, p. 5; James, 2022). It applies to societies since

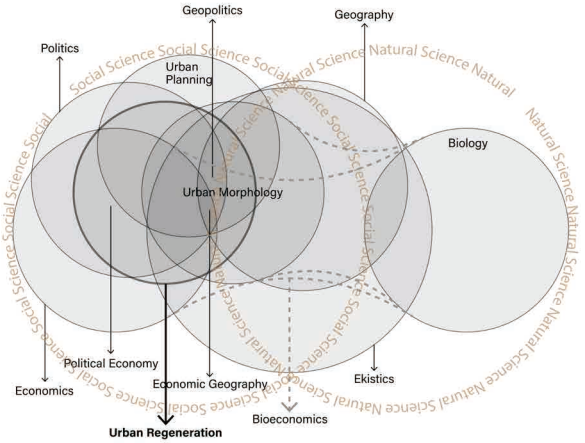

Figure 3. Positioning of disciplines directly related to the border topic, drawn by the author, 2022

they are comprised of self-serving individuals in an environment with limited resources but unbounded desires, as proclaimed by basic economic assumptions (Nordqvist, 2021). Hence, one may rightfully postulate that while economics concludes the spatial patterns in which humans seek and manipulate their settlements, societies' selfishness is the driving force of this spatial pattern, as proclaimed in evolutionary biology (Zhang, Q., 2019, p. 45). It again resonates with Figure 2, which explains that the chaos of wars essentially begets border formation. One can view this phenomenon as the adjusting period toward the dynamic equilibrium between individuals' ecological values and the ecological conditions of a region (Lin, T., 2007,

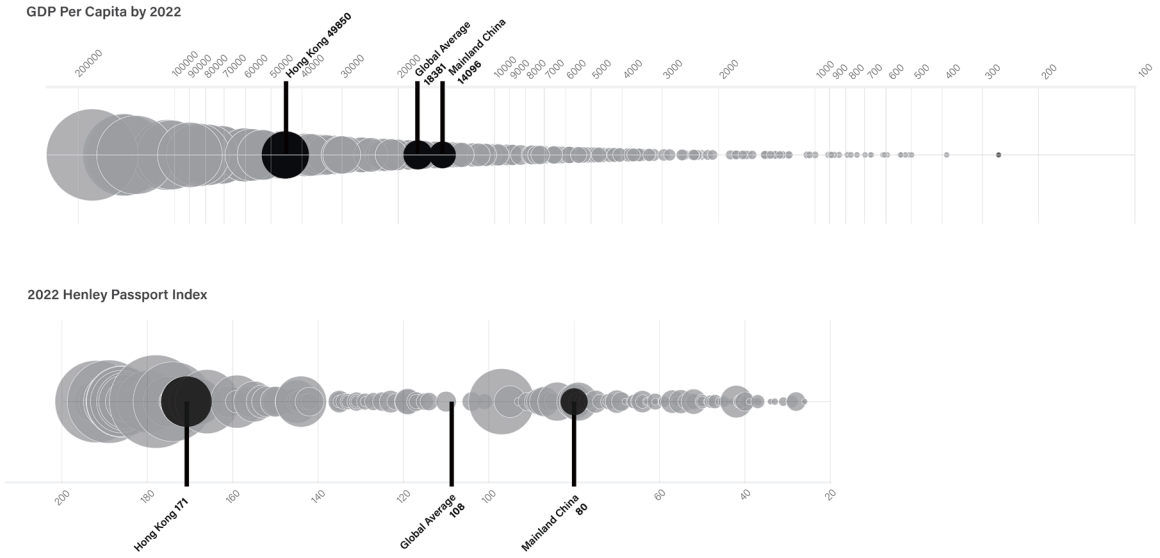

Figure 4. The GDPPC and Henley Passport Index rankings of global countries/regions, with Hong Kong and Mainland China highlighted, drawn by the author, 2022, based on Henley & Partners and The World Bank.

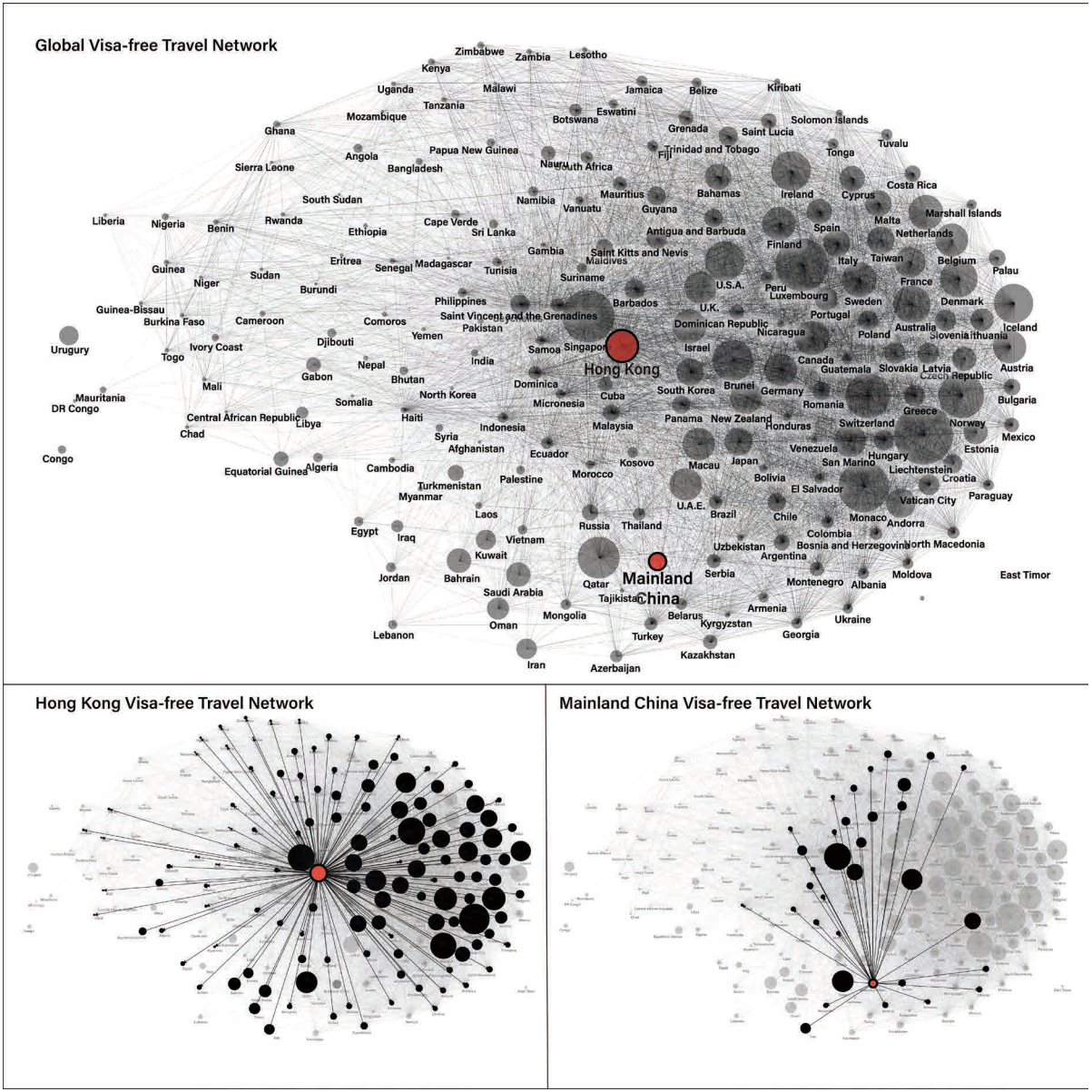

Figure 5. The visa-free travel network map, drawn by the author, 2022, based on List of mutual visa waiver agreements between China and foreign countries----Bureau of International Cooperation Chinese Academy of Sciences, Visa-free Access or Visa-on-arrival for HKSAR Passport | Immigration Department, Henley & Partners, The World Bank, Singapore Immigration & Checkpoints Authority, etc.

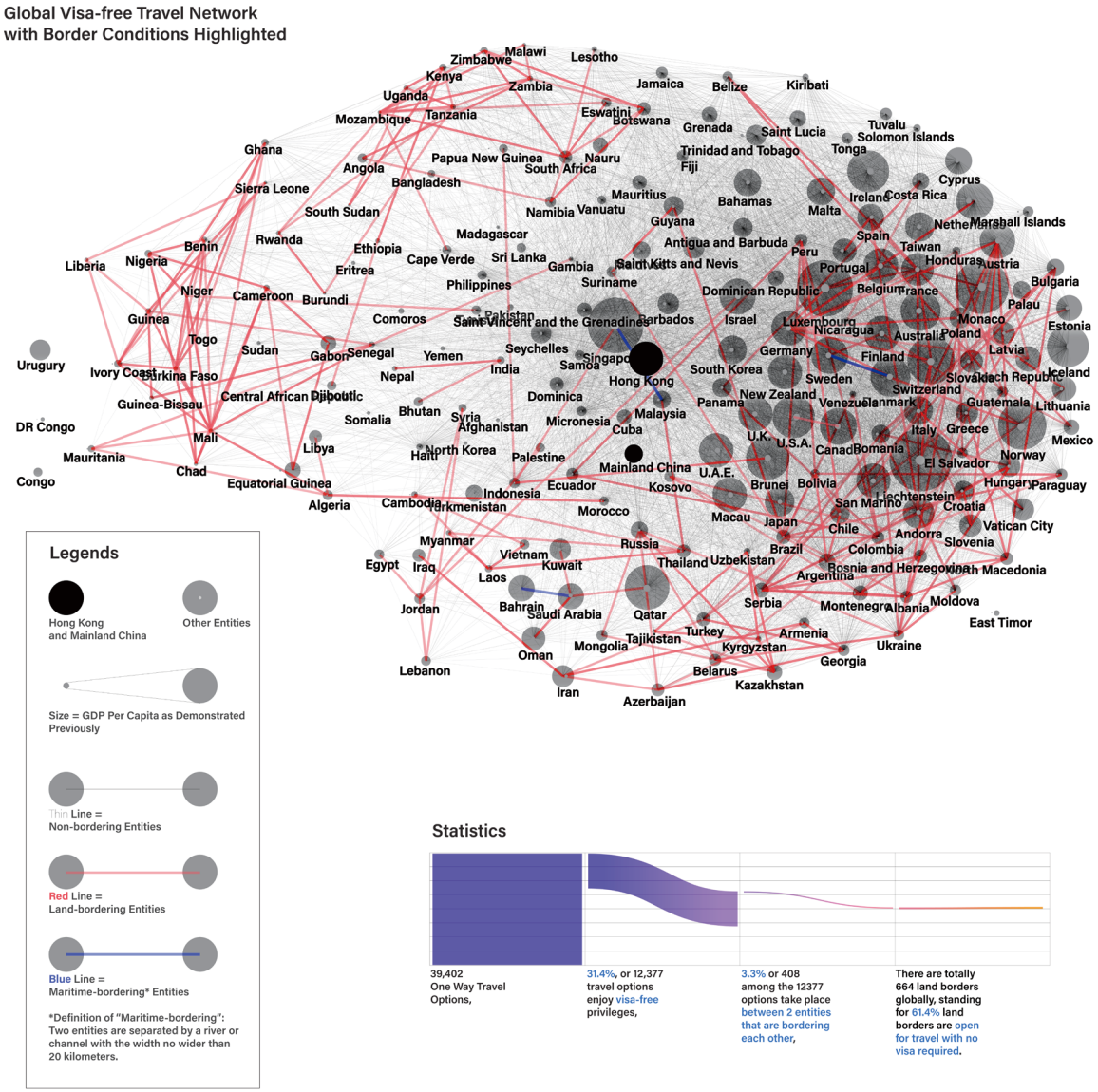

Figure 6. The visa-free travel network considering border attributes, surveyed and drawn by the author.

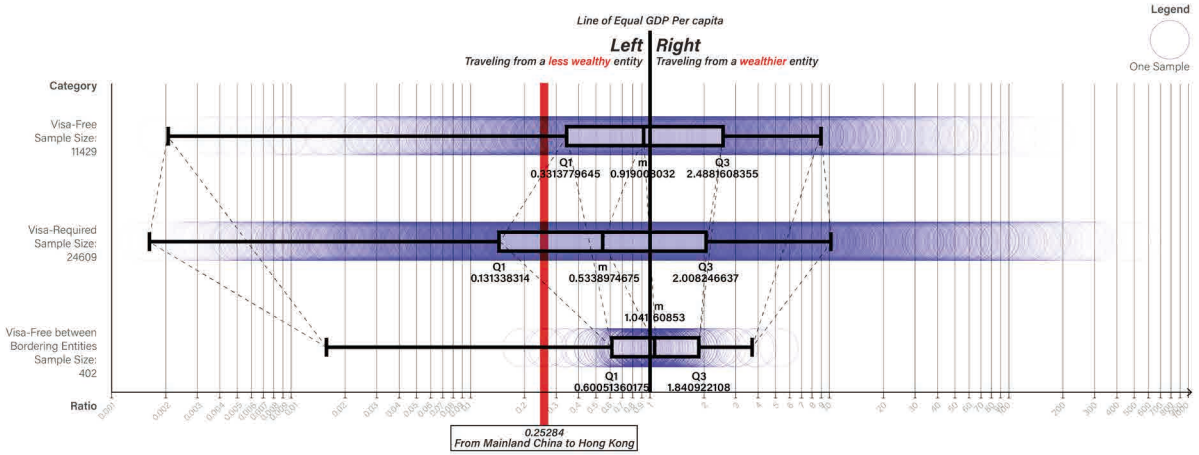

Figure 7. The visa-free travel mobility in relation to the ratio between the two entities' latest GDPPC and their border conditions, drawn by the author, 2022.

p. 460). This period stabilizes when the individuals or societies localize their matching, spatial niche (Bai, G., & Zhu, H., 1999; Carlson, B. S. et al., 2021), and consequently, a border materializes.

In concluding this section, border research is fundamentally interdisciplinary, as depicted in Figure 3, and requires input from all related disciplines to establish a shared knowledge base to foster meaningful political and social improvements (Gross-Wyrtzen et al., 2020).

3.4 Openness of Borders Related to Global Visa-free Travel Mobility and Economic Status

As hypothesized, economic status affects border openness. The author then produced Figure 4-7 to examine how economic status affects cross-border travel mobility and border openness.

It is evident from Figure 5 that Hong Kong is situated in the denser area of intersecting lines, indicating an assemblage of visa-free arrangements among nations, whereas Mainland China is sidelined. Additionally, as illustrated in Figure 4, the bubble size represents GDPPC, and entities with high GDPPC values enjoy a more "borderless" world, while those with low GDPPC values have limited mobility.

To learn how border attributes affect the network, the author created Figure 6, which shows that there are few borders globally, and only 61.4% of them are open for visa-free travel. Then, the author further examined how GDPPC affects the openness of borders using Figure 7.

The author then further analyzed the relationship between the ratio of visiting and hosting entities' GDPPC values and their border conditions to observe how economic disparity affects

cross-border travel freedom. The author visualized the distribution of the GDPPC ratio using the following simple formula:

$$R = \frac{\alpha}{\beta}$$

R=The ratio of the GDPPC values of the two entities,R<1 indicates traveling from a less wealthy entity,R>1 indicates traveling from a wealthier entity,while R=1 indicates that the visiting and hosting entities have the same GDPPC values .

α=The 2022 GDPPC of the entity where the individual or group is traveling from.

β=The 2022 GDPPC of the entity where the individual or group is traveling to.

As Figure 7 proves, the wealthier the visiting individual or group, the more likely they will enjoy a visa-free border crossing, and the same holds for visa-free travel between bordering entities, whose samples largely match that of general visa-free samples.

In addition to GDPPC, population size, political ideology, and many other factors are also pivotal to border openness (Bangwayo-Skeete, & Skeete, 2017). However, the author did not elaborate further, so border matters are prioritized.

Thus, it seems that economic status plays a significant role in border restrictions and is proven correct; i.e., the greater the economic gap is, the less likely the border is to be open, which in turn results in more defensive built forms on the border, such as fences and walls.

4. Case Study of the HKMC Border: Investigating its Process of Change via Cross-border Demographical Connections and Land Use Transformations

4.1 Case Study Area Delineation: the FCA

Finally, a case study of the HKMC border is presented. As mentioned earlier, cross-border human flow, demographical change, and land use change are analyzed to observe how this border follows the global border trend to identify its drivers of change from 1997 to 2022.

The specific study area is the FCA. It stretches twenty kilometers and covers approximately 2,800 hectares, with a diverse landscape of natural resources, historic settlements, and burial grounds (Hasdell & Bolchover, 2016). As depicted in Figure 8, the FCA underwent three phases of size reduction; the scheme was initially proposed in 2006, and the phases were initiated in 2012, 2013, and 2015, reducing the FCA to the remaining 400 hectares on the western and eastern extremities of the land border.

4.2 The Demographical Connections between the Two Sides

Zooming in from the macro perspective to the daily lives of inhabitants, one can see that all social fabrics are intertwined with the border due to globalized supply chains and human flows, although it seems invisible for most.

The author drew Figure 9-10, which gathers the passenger counts entering and leaving Hong Kong and the proportion of passenger flow at different control points from 1997 to 2022. It is

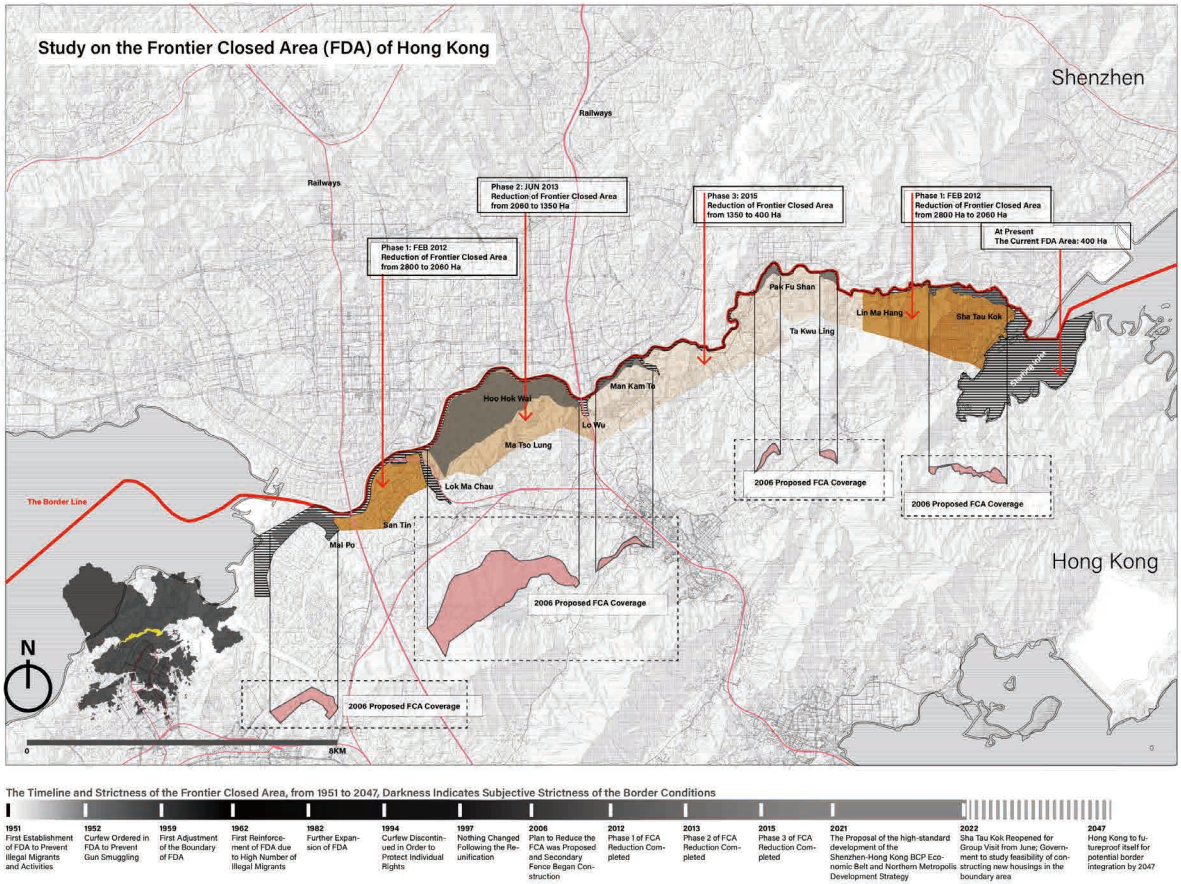

Figure 8. The study area and its timeline, drawn by the author, 2022.

evident that passengers primarily flowed via the land border and a strong and steady increase was maintained between 1997 and 2014; travel across the border plateaued in approximately 2015, and peaked in 2018, with the sum of arrivals and departures exceeding 300 million this year, 40 times the total population of Hong Kong. From 2019 to 2022, due to political events and COVID-19, cross-border travel free fell to nearly zero. Figure 10 shows that many travel options, such as the West Kowloon High-Speed Railway, shut down indefinitely.

Figure 11 shows the number of CBSs entering and leaving Hong Kong, which appears to be relatively small as the data are not consecutively recorded. Nevertheless, the number peaked from 2014 to 2016 and has been slowly declin-

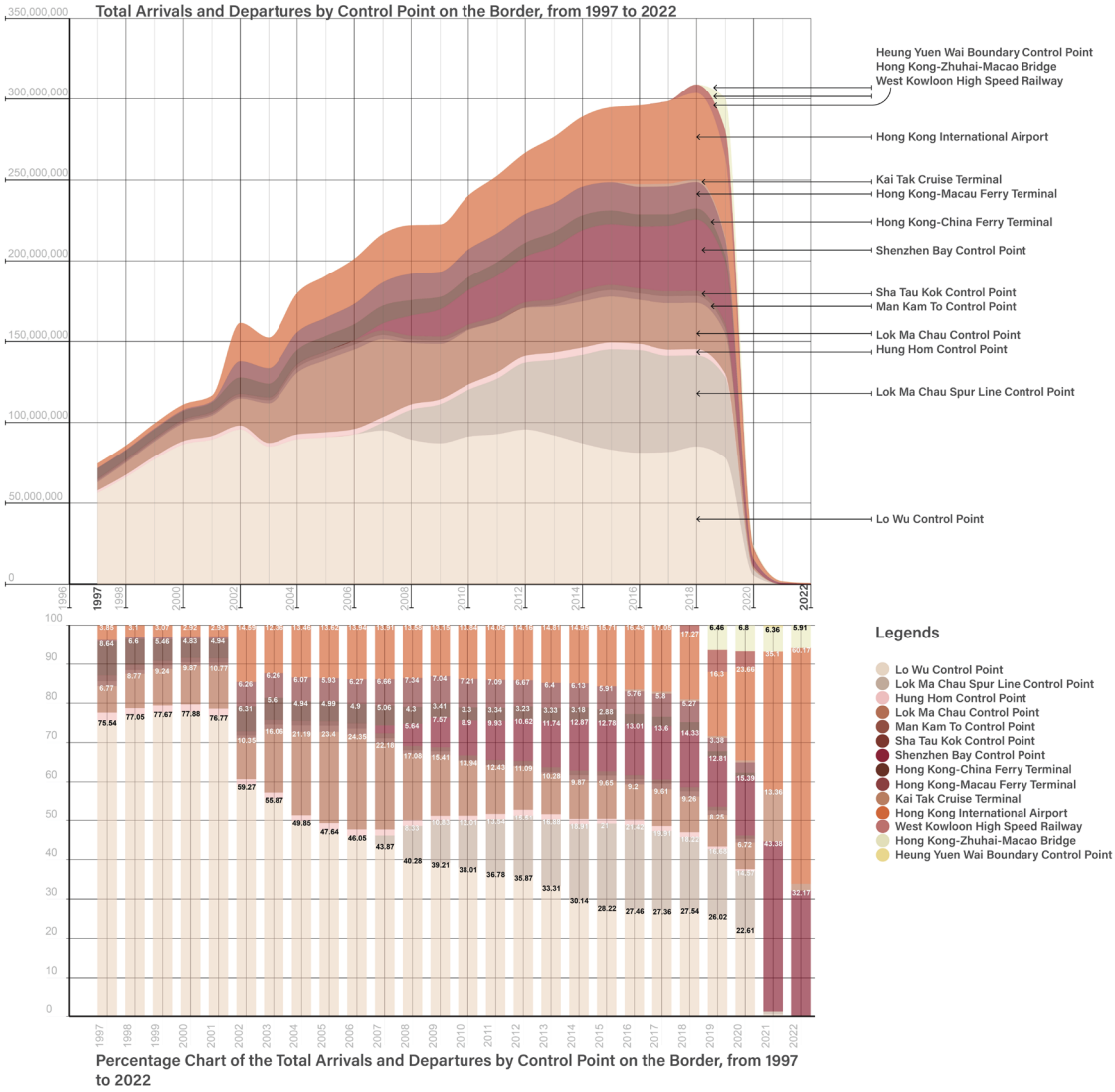

Figure 9. The human movement statistics at the HKMC Border, compiled and visualized by the author; Data source: Courtesy of Immigration Department of Hong Kong Special Administrative Region, 2005, 2010, 2015, 2020, 2022, copyright reserved.

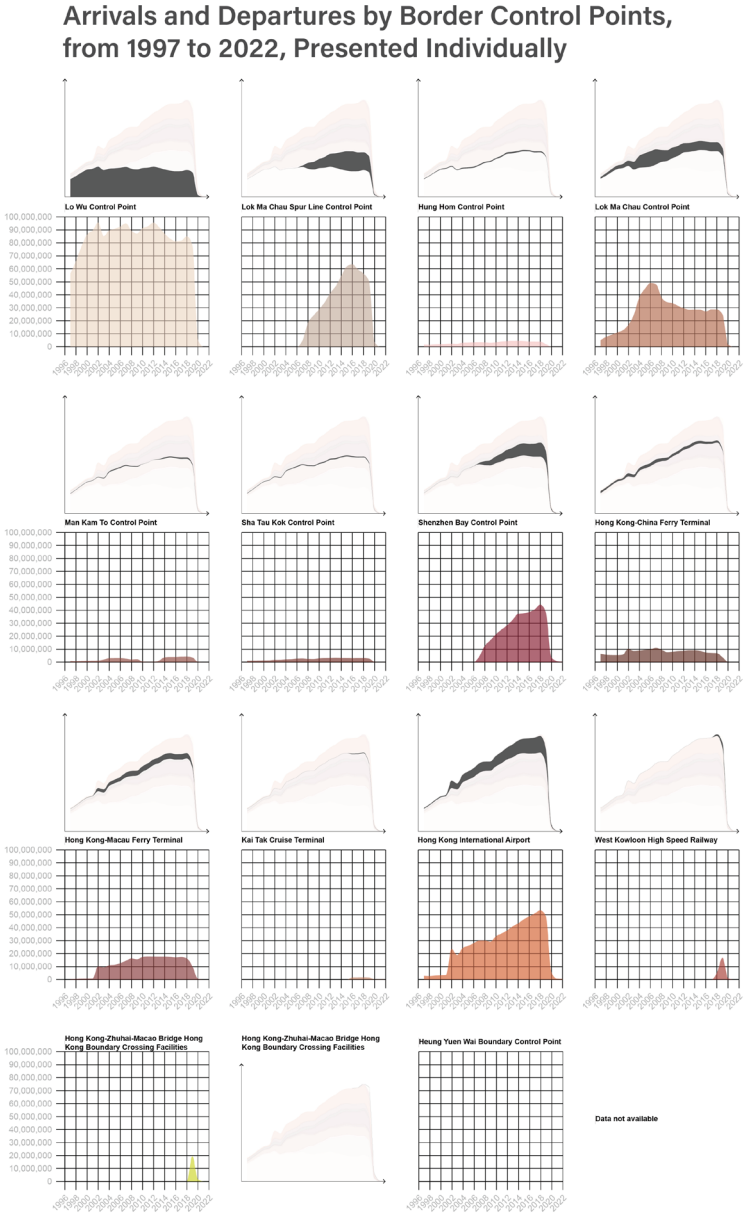

Figure 10. Passenger flow at different control points, individually presented, visualized by the author; Data source: Immigration Department of Hong Kong Special Administrative Region, 2005, 2010, 2015, 2020, 2022, copyright reserved.

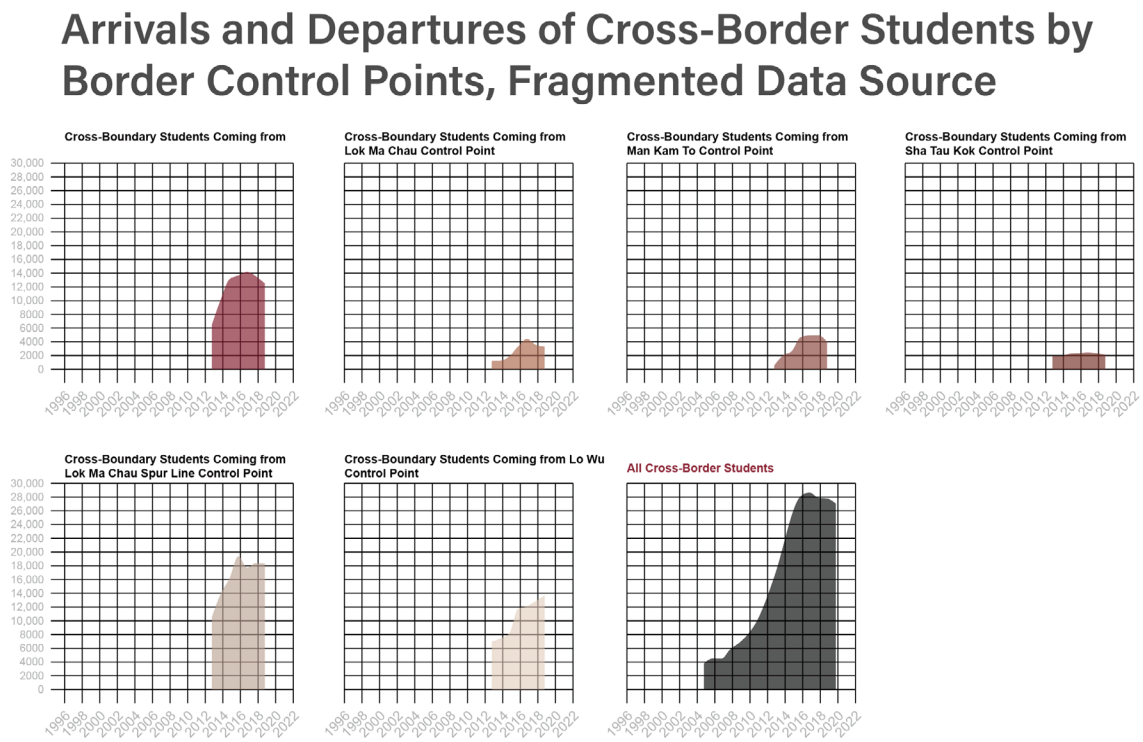

Figure 11. CBS flow by control points, visualized by the author; data source: Number of cross-boundary students by land immigration control point from 2014/15 to 2019/20 school year.

ing.

Figure 12 shows the data on cross-border families in Hong Kong. Due to a large number of illegal immigrants and women from Mainland China entering Hong Kong to deliver babies, the number of cross-border families has been high since data were first recorded. In some years, cross-border family marriages even exceeded the total number of marriages between local couples. This phenomenon led to a severe crowding out of local medical and educational resources in Hong Kong, so Hong Kong called a halt to the policy related to Mainland pregnant women coming to Hong Kong to give birth in 2011, effectively reducing new cross-border families. However, due to the increased freedom granted by the evolving cross-border policy, more Hong Kong citizens settled in Mainland China, driving up the number of cross-border families.

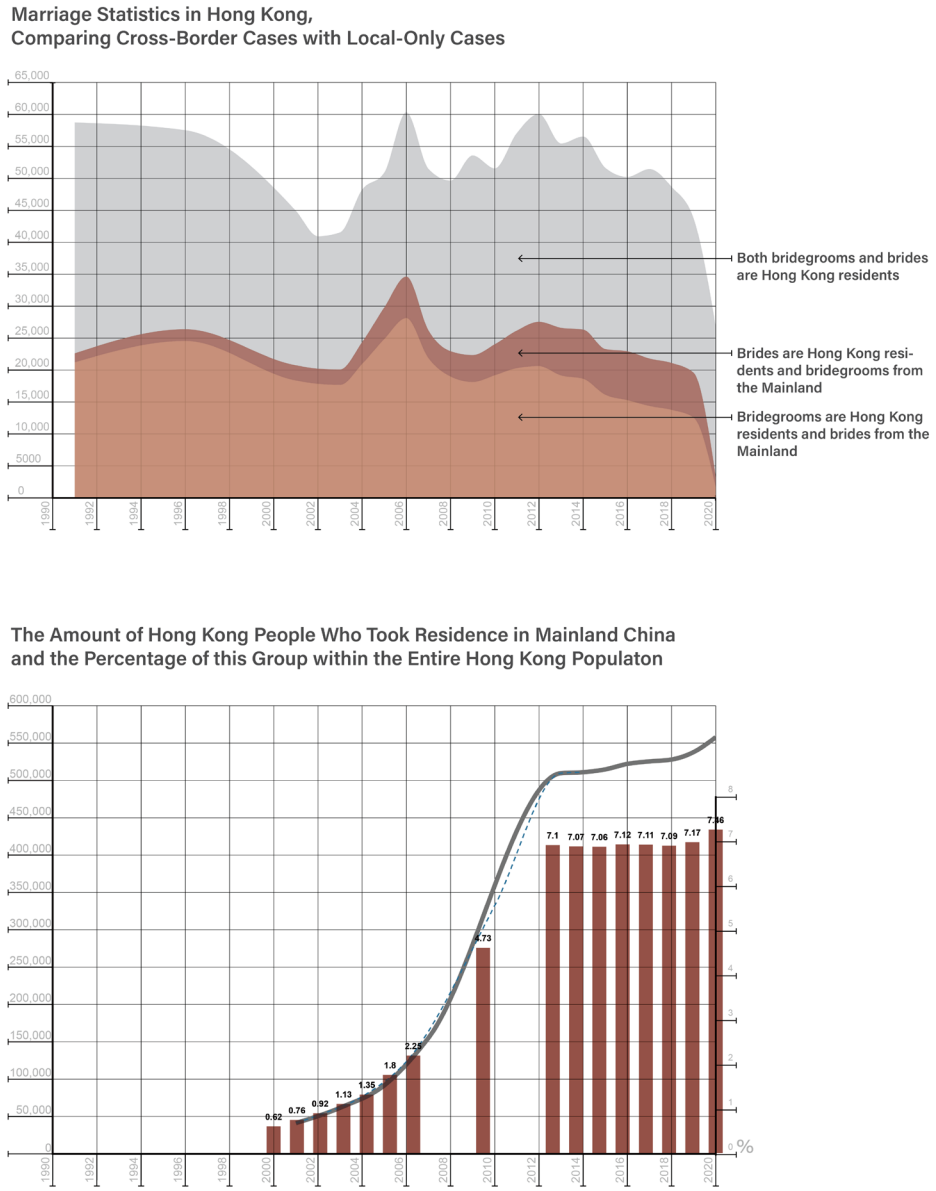

Figure 12. Cross-border demographical connections using data from marriages and change of residence, visualized by the author; data source: Census and Statistics Department, Hong Kong Special Administrative Region, 2022.

In summary, it is clear that Hong Kong and Mainland China are deeply socially connected, and as long as there are no strict border controls, residents of both sides can, theoretically, maintain stable and close relationships.

4.3 Land-use Transformation

For an urban system to survive and grow in a highly competitive environment, the system's goal must be to minimize costs, maximize profits and optimize markets (Duan, J., 2006, p, 105). Then, each industry establishes its location based on its interests and maximizes its profits through economic agglomeration by integrating factors such as land price and rent (Duan, J., 2006, p, 59). Therefore, with close economic interaction and interdependence between two cities, their urban cores should mutually magnetize, thus bringing them geographically closer (Alexander, C., 1977, p, 155).

However, the land use of the FCA has not yet reflected that notion. Whereas Shenzhen, the once fast-growing city that was hugely dependent on Hong Kong, maximized its development intensity on its side of the border to boost economic profits; however, the land use types on Hong Kong side linked to economic growth are virtually nonexistent, as shown in Figure 13. Even though most travelers only spend time in the downtown area, this does not adequately explain the absence of an economic magnetic force that should have brought the urban cores closer. Moreover, as illustrated in Figure 14, the land use change on Hong Kong's side from 2000 to 2020 was limited to internal conversions of natural attributes, such as shrubland turning to woodland. Furthermore, no notable changes in residential and commercial land use were documented. It is certain that prior to 2020, Hong Kong prioritized ecological value over economic profits regarding border region integration. It was not until the NMDS was proposed in 2021 that disruptive strategic planning of border land use took place, and therefore, it is worthwhile to continue following up on border region transformations in the coming years.

5. Data Synthesis And Final Discussion

5.1 Border Metamorphosis

As the self-organizing mechanism of cities resembles that of biological organisms, and exciting findings may occur once biology is extrapolated into urban studies, the author applied biotic analogies to interpret the border metamorphosis in Figure 15, where borderlines are compared to cell membranes, control points are compared to channel proteins that filter substances in and out, and the population is represented by bubbles, and the metamorphisis process is divided into three phases.

The first phase was getaway and blockage, which occurred from 1997 to 2002. The second is cooperation and common prosperity, which occurred from 2002 to 2019, while the most recent is filter and blockage. A unique human flow pattern characterizes each phase during its timeframe, illustrated by cell movements within a larger organ.

5.2 Envisioning the Future

In Figure 16, the author synthesized all col-

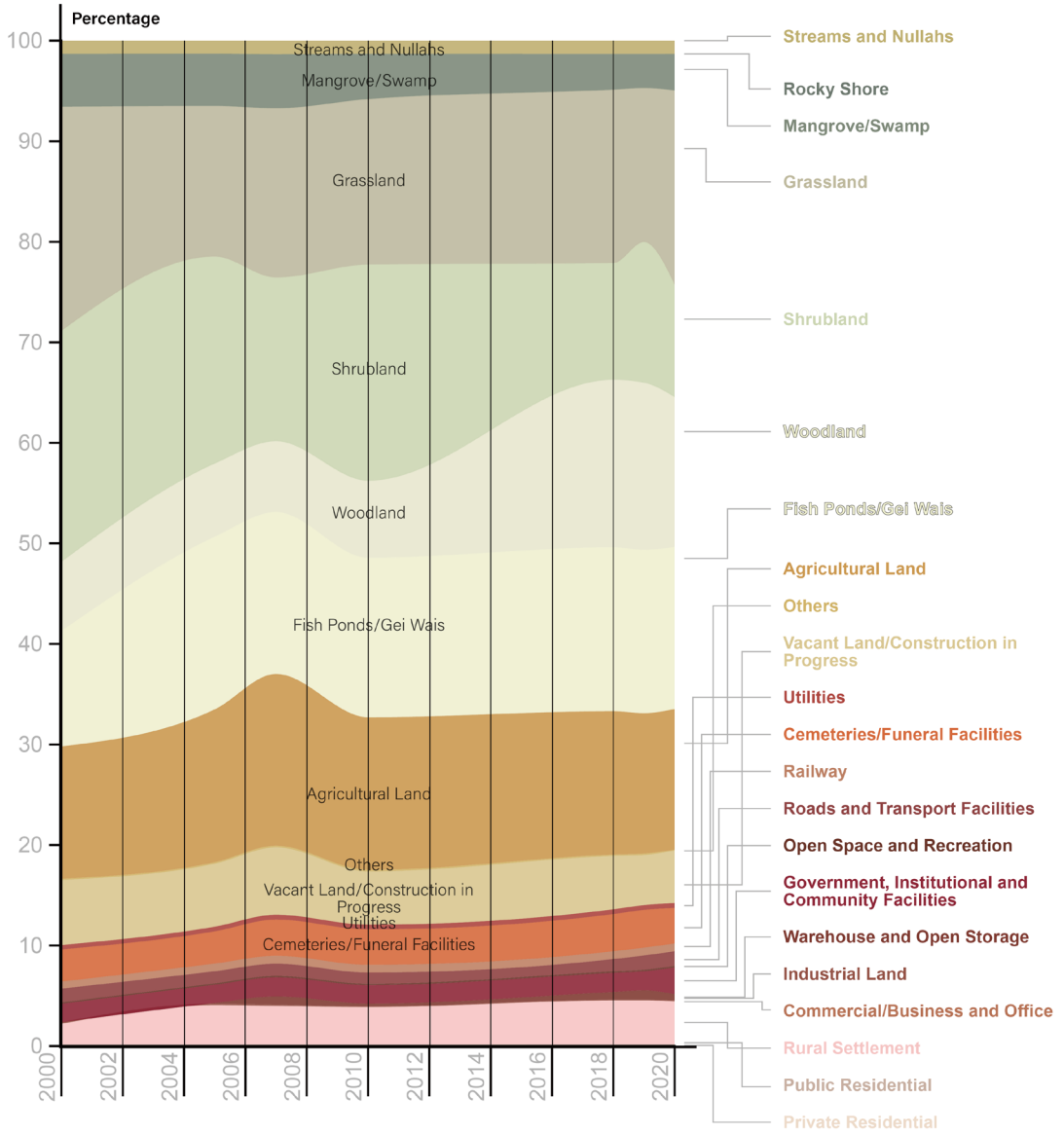

Figure 13. The change of land-use percentage of the FCA, from 2000 to 2020, processed and visualized by the author, based on "Land Utilization in Hong Kong", 2000, 2001, 2004, 2005, 2006, 2007, 2009, 2010, 2018, 2019, 2020, Planning Department, Hong Kong Special Administrative Region, all copyrights reserved.

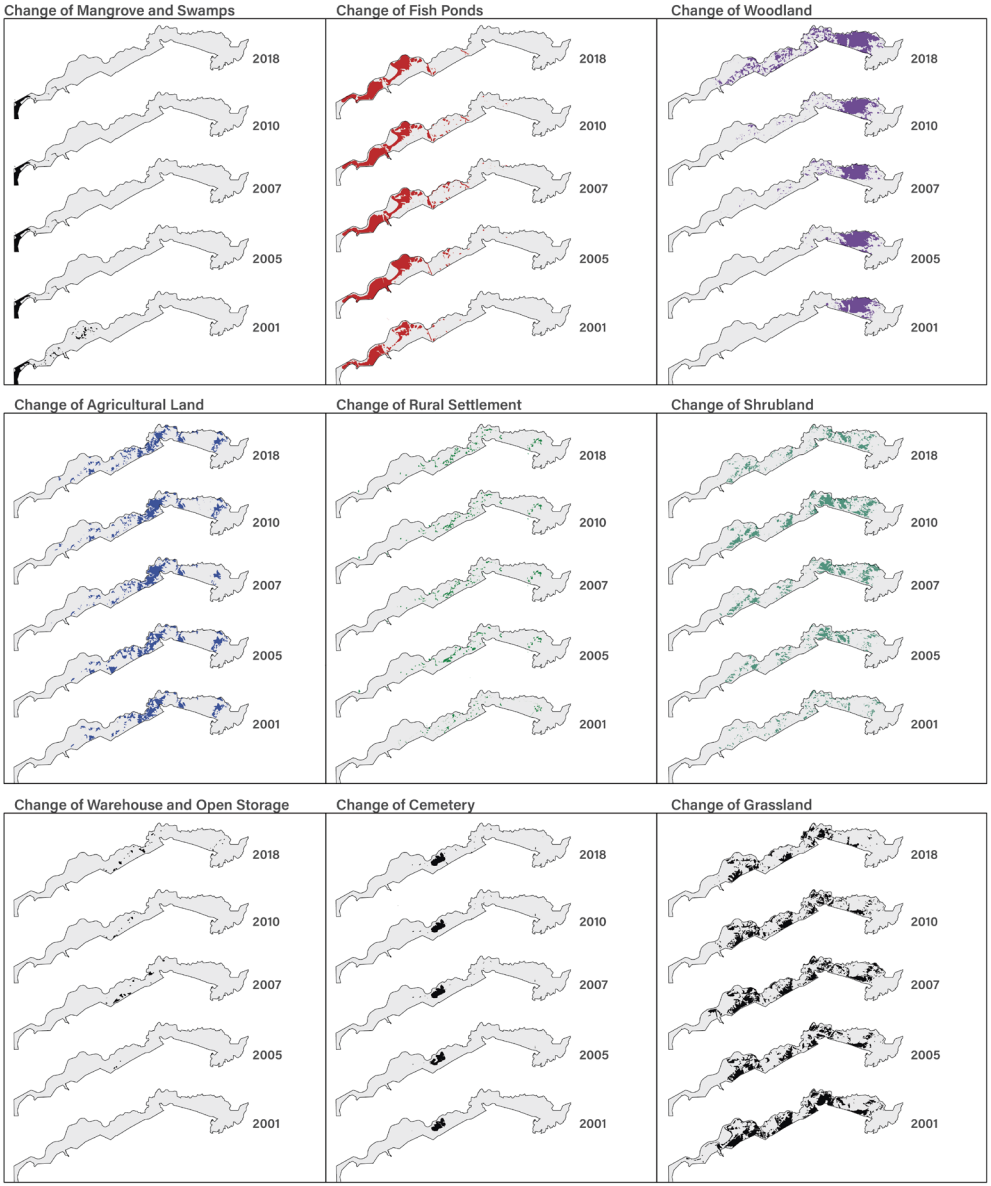

Figure 14. The selected nine largest land-use changes of the FCA, processed and visualized by the author, based on "Land Utilization in Hong Kong", 2001, 2005, 2007, 2010, 2018, Planning Department, Hong Kong Special Administrative Region, all copyrights reserved.

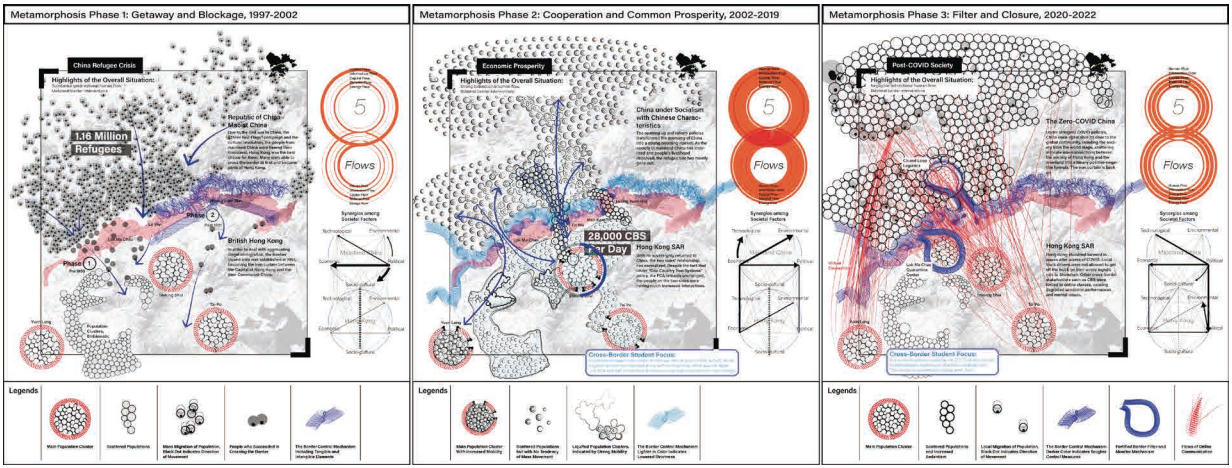

Figure 15. Using biotic analogies to depict the border metamorphosis, drawn by the author, 2022, based on Doxiadēs, K. A., Carmel Pak U Secondary School, Number of cross-boundary students by land immigration control point from 2014/15 to 2019/20 school year, Immigration Department of Hong Kong Special Administrative Region, 2022.

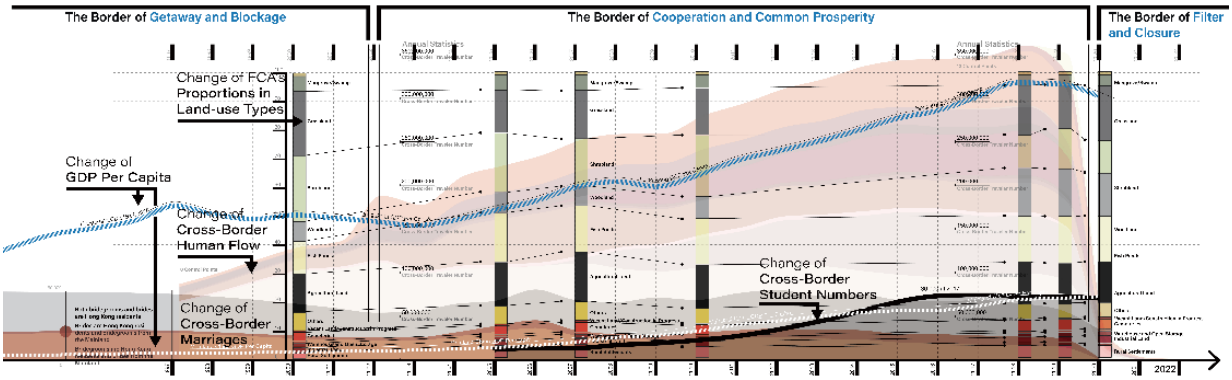

Figure 16. Data synthesis, compiled from Figures 10, 12, 13, and 14, drawn by the author.

lected data from land use, cross-border human flow data, GDPPC of Hong Kong and Mainland, cross-border marriage, and CBS data. After a comprehensive evaluation, the author concludes that the urban environment is a direct product of the human biological nature to avoid harm and increase chances of survival. The refugee wave from Mainland China and Hong Kong's following measures involving fence construction is a case in point, as biological communities protect themselves and their collective interests. Nonetheless, the Hong Kong government responded positively to the new political trajectory with the NMDS.

However, Mark W. Moffett, a renowned biologist, presented the following thought-provoking argument in his work: "Once a society splits into two separate societies, and once their members have established their own identities, the chances of those societies merging freely with each other are very slim" (Moffett, 2020). From his assertion, Hong Kong and Mainland China can, at best, maintain a prepandemic status where both can freely interact, while full social integration is unlikely. His theory has been proven correct by over two decades of research and advocacy for border reform. As early as 1997, scholars were already suggesting the "Hong Kong-Shenzhen Cross-border Urban Economic Zone" (Xue, F., & Yang, C., 1997). Ironically, two decades later, only the NMDS exists. Moreover, even the ex-vice-mayor of Shenzhen admitted that the "One should mind his own business" mindset persists in Mainland China because of the ideological barrier (Zhang, S., 2019, p. 41), and there are also cases revealing a deep sense of distrust from the Mainland China side, in which one of Hong Kong scholar's apolitical documents had to undergo censorship prior to the conference (Zhou, L., 2019). Thus, the future border will also reflect this reality physically. Defensive built forms, such as fences and walls, will remain, and the OCTS policy will, most presumably, remain unchanged after 2047.

In summary, border study will continue to be a heated topic in global academia because it concerns everyone's interests, and as we confront rising global uncertainties, it is imperative to promote cross-border cooperation. For the HKMC border, despite being part of one sovereign country, its actual cross-border restrictions far outweigh transnational borders within the European Union (EU). However, few organizations in China are solely dedicated to cross-border observation and monitoring, such as the European Territorial Observation Network (ESPON). Hence, more institutional reforms are needed to improve the livelihood, especially the economic status, of the Mainland China side because, according to the research results, reducing the economic gap can hugely increase the likelihood of an open border. Only then can the "two systems" stride into a future of win–win cooperation and provide a better border region for all people, especially the many cross-border families.

6. Appendix

Due to the page limit, the author has uploaded additional information on Figure 1 and 2 for download. Please scan the QR-code or use the hyperlink below:

https://www.dropbox.com/sh/js9rllg22ain3ay/AAC_eRJcIteSIctznQNyzg4ja?dl=0