City, Territory
and Architecture

RESEARCH ARTICLE

Open Access

Examining similarity indicators in six planned capital cities from Africa and Asia: a qualitative research technique

Hisham Abusaada[1] and Abeer Elshater[2*]

Abstract

There is little research-based evidence regarding the similarities and differences in urban plans and urban forms, regarding urban planning and design, between planned capital cities in Africa and Asia. In recognition of the establishment of planned capital cities on these continents, this article limited its case studies to six planned capital cities of the Global South, in the post-independence and post-crisis period. By using bibliometric analysis, snowballing technique, and content analysis approaches, this study determines data sources, including books, journals, city reports, and internet blogs. The results show that these planned capital cities are similar in their urban plans: geographical, socio-cultural and demographic dimensions (location, size, and population densities), historical context of societies, and their goals and aspirations. Meanwhile, urban forms have similarities and differences based on paradigms, organization and spatial formation, spatial arrangement of activities, and architectural artefacts. This study suggests a conceptual and phasal framework, which combines planning history and theory in the first phase, and urban planning and design implementations in the second phase. The results demonstrate how considering our framework can limit similarities in the urban plans and urban forms of planned capital cities. This framework can guide urban planners and designers in academia and professional practice.

Keywords: Planned capital cities, Urban planning, Urban design paradigms, Asia, Africa

Introduction

Planned capital cities (PCCs) emerged between 1945 and 1960 when 30 African and Asian nations gained independence and altered their political and economic trajectories. This freedom is coupled with the desire to produce objects that would elicit feelings of independence in people (Jansen and Osterhammel 2017). At the time, relocating the state's administrative headquarters to a location with morale-boosting advantages was seen as an acceptable idea (Obiadi et al. 2019). Throughout the first two decades of the twenty-first century, demographic, economic, topographical, and military difficulties were repeatedly faced by nations identified as rising economies in the Global South. Various challenges have created significant problems for these nations, forcing some of the Global South to flee their initial places of residence for new cities.

To realise the establishment of new capital cities, it was necessary to restore the concepts of 'planned capital cities' (Chalana 2015; Côté-Roy and Moser 2019; Nor et al. 2020) and 'cities built from scratch' (Chalana and Sprague 2013; Sarshar 2019; Shelekpayev 2020). These concepts have re-emerged, along with other supporting concepts that reflect the ambitions of urban planning and urban design paradigms, such as smart cities (Bhattacharya et al. 2020; Elshater et al. 2022a; Hayat 2016), technology-driven development (Côté-Roy and Moser 2019), sustainable development and integrated cities (Adeponle 2013), and green and walkable cities (Naeem et al. 2018).

*Correspondence: abeer.elshater@eng.asu.edu.eg

[2] Faculty of Engineering, Ain Shams University, Cairo, Egypt
Full list of author information is available at the end of the article

PCCs have been a well-known idea in urban planning literature for decades, growing into a form of real estate investment and city reputation enhancement (Dastgerdi and Luca 2019). The similarities among PCCs stem from the repetition of urban plans (Chalana 2015; Elleh and Edelman 2013; Nor et al. 2020; Preecharushh 2011; Sarshar 2019; Shaw 2009). PCCs seem to follow a procedure that may not affect the final formation of cities. According to our assumption, there is a similarity in urban forms between PCCs as each city's unique historical, social, and geographical surrounding context is not adequately considered when planning and designing certain modern capital cities. However, similarity indicators may occur at lower levels of urban forms, including urban paradigms, spatial formation, spatial arrangement of activities, and urban artefacts (Adeponle 2013; Gawęcki 2013; Moulis 2012), which requires deep study by urban planners and urban designers. However, the analytical review confines itself to diagnosing similarity indicators between PCCs, both post-independence and post-crisis, based on two concepts—urban plans and urban form.

The challenge of having similarities between cities affects the imageability, socio-cultural, and visual competitiveness of capital cities (Kavaratzis 2009; Mohamad et al. 2022). Several academic studies have emphasised the importance of cities' unique urban forms that reflect their prestige (e.g., London, Rome, Paris, Prague, and Washington) (Elshater and Abusaada 2022; Elshater et al. 2019). A question might arise whether modern PCCs exhibit distinctive, salient, and singular urban forms that reflect their inhabitants' lifestyles. Alternatively, what makes planned capital cities emulate urban plans and forms of other cities? In professional practice, this emulation hinders innovation in the design process.

Few studies have discussed the correlation between urban plans and urban forms, when examining the similarities between PCCs in the Global South in Africa and Asia. Additionally, such similarities were not considered in the context of planning and designing them. Solving this problem requires looking for a specific description of the similarities, identifying these and other common indicators, and using them to find ways to avoid them in the future. Therefore, we analysed six PCCs from the African and Asian continents, investigated their similarities, and explained the process for avoiding them.

This study aims to map the key concepts underpinning the research area and develop a comprehensive understanding of the causes, processes, and players involved in creating PCC similarities. Its main objective is to achieve development based on the concept of PCCs, which may seem similar in urban plans but is unique at the level of urban form.

As part of the research design, initial selection criteria for PCCs around the world were used in order to reach the research goal. These criteria included the PCCs established during post-independence or post-crisis periods with similar political conditions and located in the Global South in Asia and Africa between 1950 and 2021. After selecting our PCCs, we conducted a bibliometric investigation and content analysis of data yielded from snowballing search to identify indicators that make similarities between PCCs.

In terms of academic contribution, the added value of this paper is in developing a conceptual framework that detects the similarities between PCCs and avoids them. This suggested conceptual framework would allow practitioners to limit similarities in future urban plans of PCCs.

Methodology

Selection criteria for PCCs

This study highlights the similarities among six PCCs (Fig. 1), which were selected based on five criteria. The first criterion was that the PCCs should be in the Global South. The second was that PCCs should have been established in Africa or Asia, between 1950 and 2021. The third was selecting PCCs in adjacent geographical zones, to the West of the Greenwich line and north of the equator. The fourth was discussing the reasons for their establishment, during post-independence and post-crisis periods. The fifth was ensuring that the same political condition, that is the republican regime of government, existed. The five issues were considered as two variables that contributed to their similarities, based on urban plans and urban form. We developed a conceptual framework for urban planners and urban designers to use in building new PCCs that is intended to minimise similitude and verify both components.

Data processing

This study dealt with urban plans and urban forms, and aimed at answering the following research questions: What indicators can reveal similarities between PCCs? In what ways can we avoid similarity among PCCs? This study employed a scoping study (Arksey and O'Malley 2005; Smith et al. 2021), and the research design included two phases (Fig. 2). The first phase had two steps: (i) selecting the PCCs for this study, and (ii) searching for sources of knowledge, which included the PCCs, and explaining study terms such as city similarity, urban plans, PCCs, and urban form. The second phase was an interpretive review of the literature, to identify the similarity indicators that can help urban planners and designers in exploring city similarities among the six selected capital cities.

Fig. 1 The included and excluded capital cities
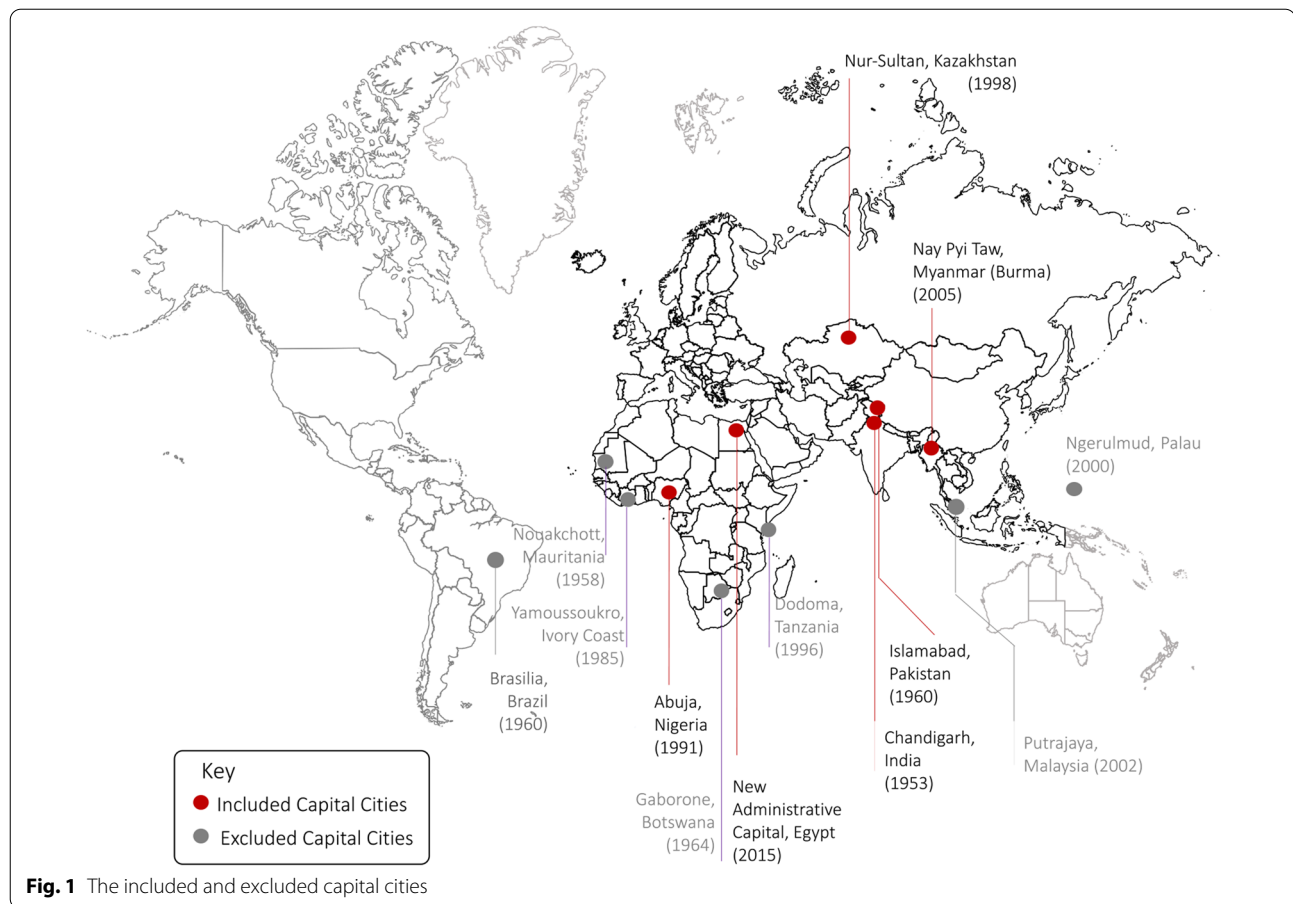
The first phase focused on searching for capital cities and resources by using bibliometric analysis (Ball, 2017), and snowballing techniques (Bell et al. 2018; Kemper et al. 2003). In the first step of this phase, we searched for PCCs around the globe, and ended with an extremely large number that was beyond the scope of this research. A recent monograph stated that the number of PCCs is more than 200 (Gordon 2006). Therefore, this study's selection included only those PCCs established after the state's independence. Simultaneously, unplanned capital cities were excluded.

According to the importance of the geographical location and climatic impacts, we selected the capital cities that are located north of the equator and west of the Greenwich line (Prime Meridian) and excluded other capital cities. Finally, this study identified four PCCs: Abuja, Chandigarh, Islamabad, and Nur-Sultan. The inclusion process then moved towards PCCs established after the political and environmental crises that passed through their countries. We focused on this period, in the first two decades of the twenty-first century, and on two capital cities: Nay Pyi Taw and the New Administrative Capital of Egypt.

In the second step, we relied on bibliometric analysis and a snowballing technique to collect information, through query and exclusion, to select the PCCs that would be the focus of the investigation. In this set of query settings, as shown in Additional file 1, we searched for open and available information databases, such as Google, ResearchGate, and Academia, at random. We aimed to exclude and organise the random search results on the indexed journal. The first set of query settings included the six selected PCCs in Cluster 1: 'Abuja' OR 'Astana' OR 'Chandigarh' OR 'Islamabad' OR 'Nay Pyi Taw' OR 'New Capital City of Egypt'. We also extracted coexisting words from the entire text to ensure that these sources are relevant to the current research topic.

The following words answered the essential questions in Cluster 2: 'capital cities' OR 'cities built from scratch' OR 'similar' OR 'similarity' OR 'similarities'. Cluster three was considered for the components of the first group of auxiliary words. It also included the names of the
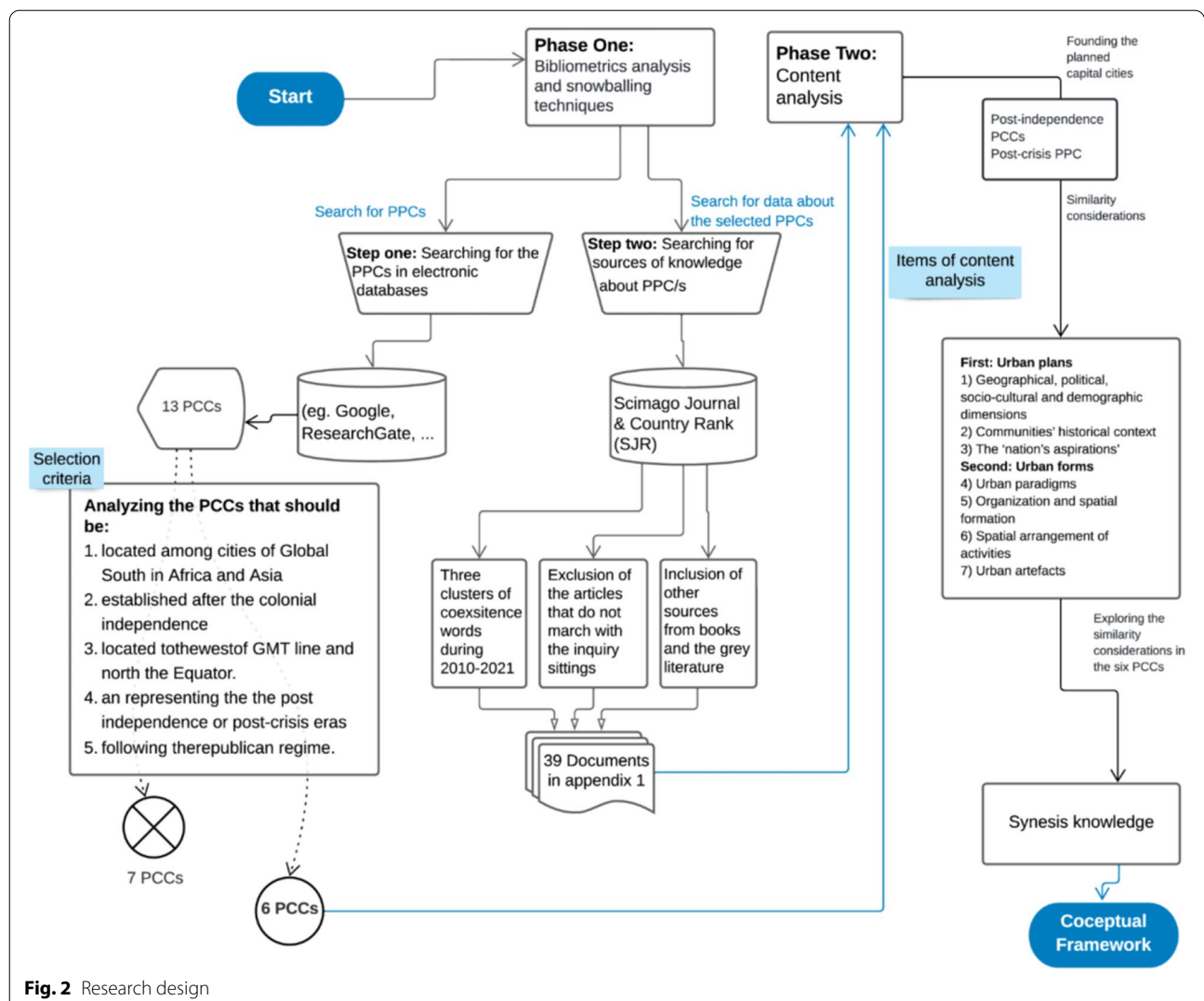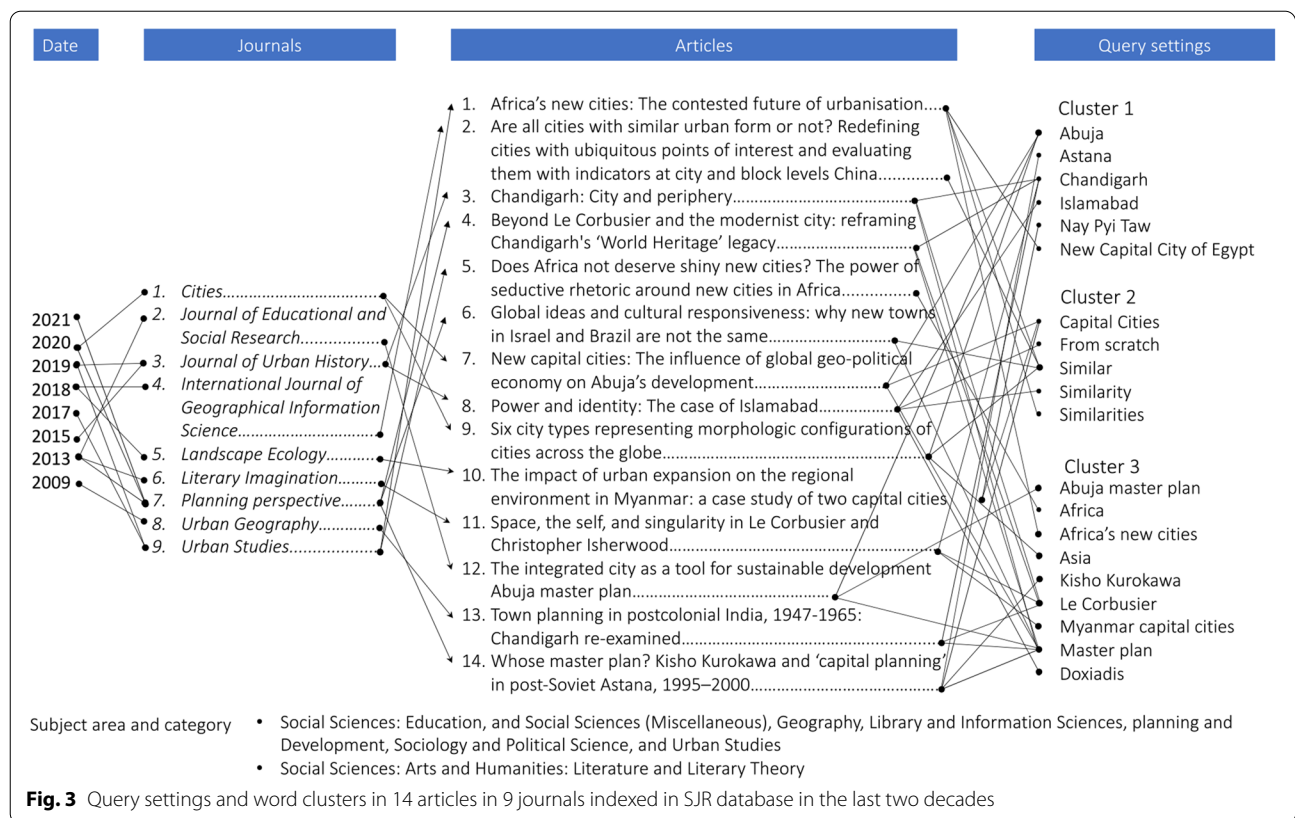
Fig. 2 Research design

countries in which these capitals were established, such as 'Africa' OR 'Asia' OR 'Doxiadis' OR 'Kisho Kurokawa' OR 'Le Corbusier' OR 'master plan' which frequently referred to the sources' reliability (Additional file 1: Table S2). Repeated word analysis in the title, abstract, and full text of the selected peer-reviewed scientific journals showed that Chandigarh was the most mentioned capital city, followed by Abuja, Nay Pai Taw, Islamabad, and Nur-Sultan. In contrast, the NAC in Egypt was not even mentioned once. The words 'capital city' and 'capital cities' and 'new capital cities' were also mentioned in ten papers out of fourteen, while the word 'planned cities' or 'planned city' was only in one study.

The term 'from scratch' appeared in six research papers, at one time. 'Similarity' and 'similarities' were noted only in six articles. Africa was mentioned in four studies, and Asia in three. The general word outline was noted in eight studies. The percentages of the use of these words in refereed scientific reports show that an analysis with this logic will be vertical. The comparison will be between similar words, and in a few of them, there will be no link between the effect of words on each other. Therefore, we expanded the research base from grey papers, unreported scientific journals, technical reports, and websites, to include planned capitals that are not adequately covered by refereed journals. We also used scientific books.

After filtering, the sources of information were settled by the words that were most relevant to the content from 39 documents. The qualitative data collected from different sources were divided into two types, as shown in Additional file 1. The first search yielded 14 articles, published in nine journals indexed in the Scimago Journal & Country Rank (SJR) database. They covered the following subject

Fig. 3 Query settings and word clusters in 14 articles in 9 journals indexed in SJR database in the last two decades

areas: social science, geography, planning and development, and urban studies (Additional file 1: Table S1). This selection helped confirm similar views in the theoretical literature on the discourse (Additional file 1: Table S2).

We aimed to exclude and organise the random search results on the publishing houses considered for books and book chapters (Additional file 1: Table S3). Another source was grey literature, where we examined four articles in three non-indexed journals (Additional file 1: Table S3), eight technical reports (Additional file 1: Table S5), and master plans of the six PCCs (Additional file 1: Table S6). We depended on secondary data analysis because there was little information in peer-reviewed scholarly journals about the capital city projects in Africa and Asia. Figures 3 and 4 show the query settings and coexisting words from these 39 documents.

In the second phase of the research design, we collected, analysed and synthesised knowledge using the content analysis (Neuendorf, 2016). The focus was on the literature that could provide helpful evidence to answer the study's research questions. Building upon the six PCCs, we analysed the similarities between them from a critica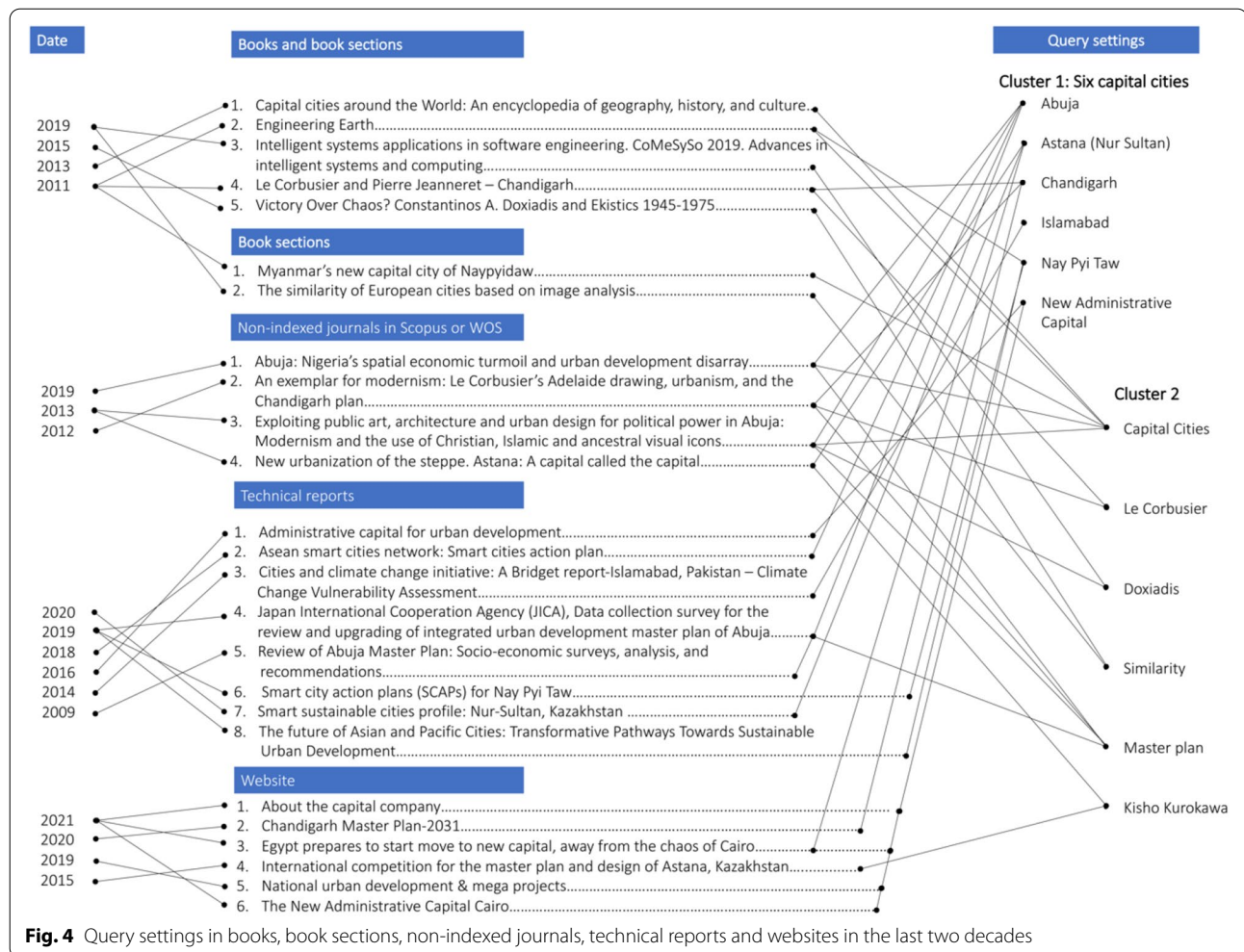l perspective through two elements: urban plans and urban form. Based on qualitative data, the synthesis analysis throughout the comparative PCC studies helped to avoid their similarities.

Results

The results are structured into three tracks: the first provides a brief overview of the six PCCs in two groups, the second identifies similarity indicators between the PCCs, specifically urban plans and urban forms in urban literature, and the third determines similarities, and elements of similarities, within each PCC.

A brief overview of the PCCs

Planning history records a remarkable repetition of changes in the world's capital cities. Most of these changes achieve political, social, cultural, economic, and security benefits (Noorloos and Kloosterboer, 2017). The research design found six PCCs, two in Africa and four in Asia, and divided them into two groups: (1) post-independence capitals—Chandigarh, Islamabad, Abuja, and Nur-Sultan; and (2) post-crisis capitals—Naypyidaw and the administrative capital of Egypt. Figure 5 shows the schematic diagram of these cities.
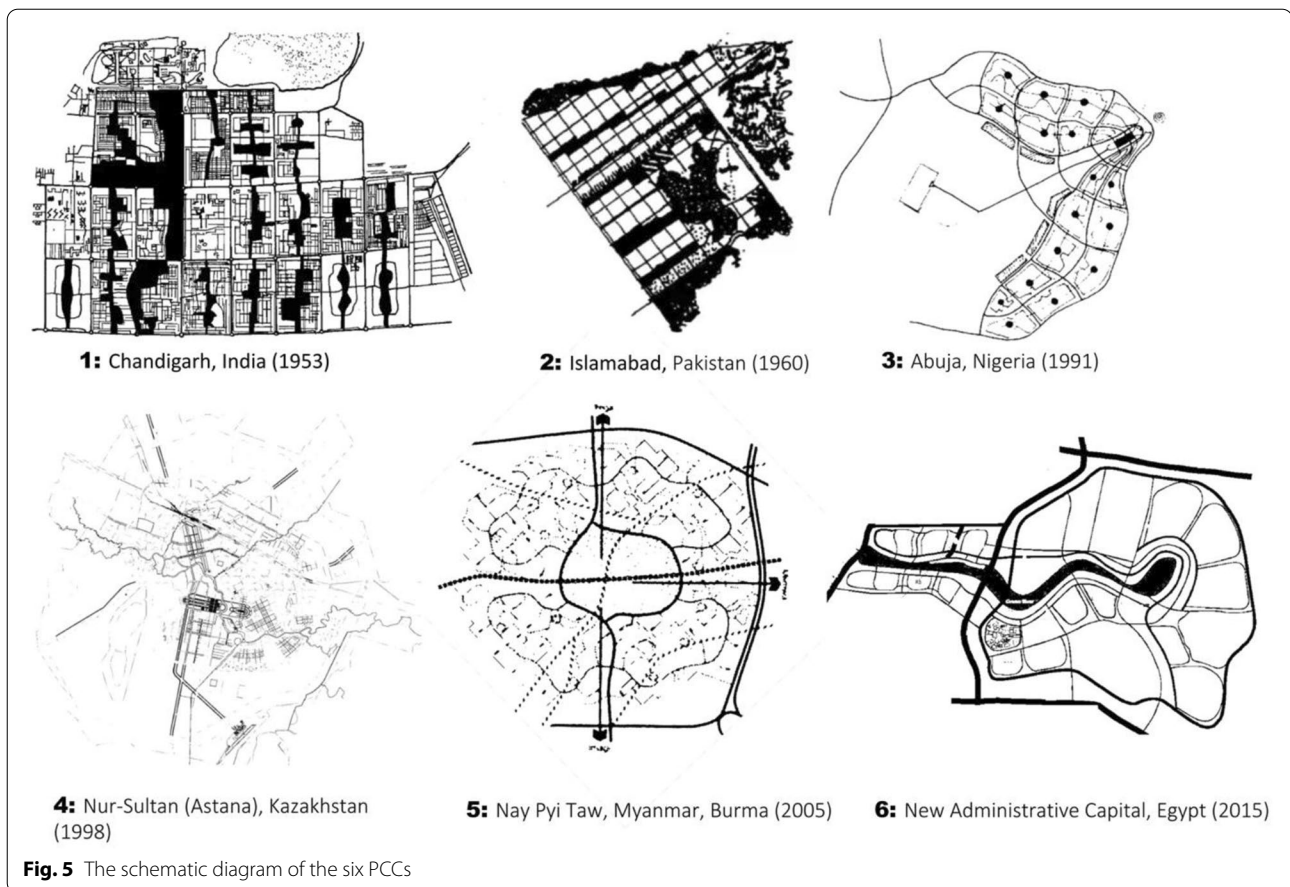
Fig. 4 Query settings in books, book sections, non-indexed journals, technical reports and websites in the last two decades

Post-independence PCCs

Since the mid-50 s, many countries that gained independence have adopted the creation of PCCs. In 1951, Chandigarh was planned to be the capital of Punjab Province (British India) (Aand 2019).[1] During the era of Jawaharlal Nehru, the first prime minister after the country's independence in 1947, asked Le Corbusier to create a different capital city expressing aesthetic singularity (Chalana and Sprague 2013; Gehlawat 2013). In 1947, Pakistan became independent, and Islamabad was proposed in 1959, replacing Karachi as the country's new capital in 1967 to reduce ethnic conflicts and assert its identity (Sarshar 2019).

In 1991, Abuja replaced Lagos as the national capital after Nigeria's independence in 1960. It was established in 1975 to address national identity concerns in a diverse ethnic community through a federal government (Elleh and Edelman 2013). Meanwhile, specialists developed the Abuja Plan to envision an integrated and sustainable city (Adeponle 2013; Abubakar et al. 2009). To counteract the economic turmoil and chaos of urban development (Obiadi et al. 2019), and despite the impact of the global geopolitical economy, Abuja has become a global international trading centre (Nor et al. 2020). In 1997, after Kazakhstan's independence from the former Soviet Union in 1991, Nur-Sultan replaced Almaty, earlier called Astana, or 'the capital' in the Kazakh language. Later, it took its name from President Nursultan Nazarbayev. Kisho Kurokawa designed the city to have European and Asian characteristics, while Norman Foster designed

---

[1] New Delhi has been the capital of India, since 1912, under the British rule. When India gained independence, the existing capital of New Delhi was used by the new government, as Delhi was strategically placed, and already had an infrastructure exclusively designed for central administration of the country. New Delhi still remains the capital of the country. Chandigarh was a planned capital of the now-divided state of Punjab, which originally had its capital in Lahore. Since Lahore was in the newly formed Pakistan, the Indian state of Punjab needed a new capital. Jawaharlal Nehru intended Chandigarh, as the first post-colonial planned city in the country, to become an architectural symbol for the new, independent, modern India.

1: Chandigarh, India (1953)   **2:** Islamabad, Pakistan (1960)   **3:** Abuja, Nigeria (1991)

4: Nur-Sultan (Astana), Kazakhstan (1998)   **5:** Nay Pyi Taw, Myanmar, Burma (2005)   **6:** New Administrative Capital, Egypt (2015)

Fig. 5 The schematic diagram of the six PCCs

multiple projects that were compatible with the country's multi-ethnicity (Shelekpayev 2020).

Post-crisis PPC

Many African and Asian countries facing significant demographic, economic, geographical, martial, and strategic challenges have adopted the idea of creating their capital cities (Ghalib et al. 2021). In particular, countries are classified among the emerging economies in the Global South. This necessitated that these countries expand outside the overcrowded territories that have a dense population.

In the third millennium, many embraced the concept of creating new cities and capital cities to resolve the problems in existing capitals. This required development-free solutions, mainly because the old capitals were unable to support an increase in population due to the absence of recreational amenities. For instance, Nay Pyi Taw was planned as the capital of Myanmar in 2006 and as the official centre of government administration (Preecharushh 2011; Wang et al. 2018). A year after its establishment in 2005, it replaced Yangon (or Rangoon), the old capital, with the city development plan of 2001

(Aung 2019). Security, political and military safety, the development of remote areas, and historical and cultural influences were the motives for making Nay Pyi Taw the capital (Preecharushh 2011). In 2015, Egypt established the NAC to address demographic, economic, and social challenges. The country needed capital that met the requirements of a green, smart, walkable, connected, and entrepreneurship-based sustainable development (Administrative Capital for Urban Development (ACUD) 2016; CUBE Consultants 2021).

Classifications of similarity indicators

Urban literature has been discussing the similarity between cities for decades. A capital city is where the government and political authorities are located, which provides prosperity to the PCCs (Sarshar 2019). Even if the urban plans of the capital cities are similar, they differ in terms of social and demographic structure, including the political, bureaucratic, economic, financial, and scientific institutions of the community. Site selection (location), target region, and population are the three major categories of geographical, demographic, political, and socio-cultural dimensions.

In another context, Côté-Roy and Moser (2019) discussed the (seduction) discourse of circulating urban policies for establishing new cities through urban developers of elite stakeholder groups, which led to similar urban plans. Shelekpayev (2020) discussed another similarity related to the confusion of determining who would prepare the new master plan for a country's new capital city. According to Shaw (2009), architectural modernism has been linked to federal and local identity problems in capitals constructed after independence. Each capital city seems to have a complete growth plan that considers its communities' historical context, objectives, and aspirations. It is sometimes even driven by top leaders and the ruling class. In addition to the consolidation of administrative and political concepts in the capital, it also has a symbolic meaning along with national slogans and the 'nation's aspirations' (Elleh and Edelman 2013; Nor et al. 2020; Obiadi et al. 2019; Sarshar 2019).

A recent study by Nor et al. (2020) concluded that most capitals looked like urban projects built on a large scale. They were made from scratch and developed in stages. For instance, according to the concepts of cities built from scratch (Chalana 2015; Nor et al. 2020; Sarshar 2019; Shaw 2009; Shelekpayev 2020), expansive choice iterations are available in the literature on urban principles and paradigms that create similarity of cities (but mismatches) in terms of urban form (Song et al. 2018). In another vein, Song et al. (2018) noted the similarity of Chinese cities owing to urban morphology variables, while Dobesova (2019) saw the similarity of American cities due to the repetition of urban fabrics and green areas. Locke et al. (2019) discussed the impact of developing urban and green spaces on the uniqueness of Detroit, a change which was reflected in the landscape surrounding Lafayette Park. Taubenböck et al. (2020) believed that current urban development projects have changed the morphological formations within cities, which appeared in Rome as a result of the temporary use of abandoned facilities and spaces (Galdini 2020), and in Paris due to the multiplicity and diversity of Olympic projects for 2024 (Geffroy et al. 2021) and mega malls (Lemarchand 2021).

Three primary variables seem to have significantly influenced the similarities between cities and capitals during the last two decades. These include the impact of applying modernist architectural thinking, the recurrence of similar concepts, and the growth of the usage of dominant paradigms of urban planning and urban design (Chalana and Sprague 2013; Sarshar 2019; Shaw 2009). These paradigms are based on modernist urbanism, characterised by grid-iron or linear urban patterns

Fig. 6 The similarity considerations between PCCs
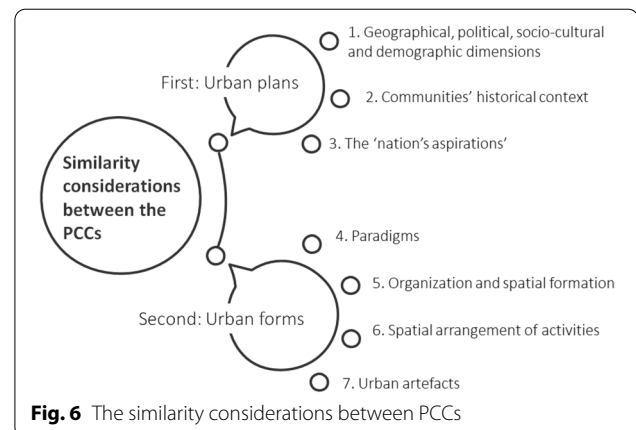
with mixed land use, similar architectural archetypes, and the proximity of supertall buildings. According to Le Corbusier, the impacts of modernist urbanism were seen in the urban planning implemented in Chandigarh, India (Khan et al. 2010) and were related to Doxiadis' victory over chaos in Islamabad, Pakistan (Theodosis 2015). Both Chandigarh and Islamabad promoted the impact of the human scale on the homogenisation of public spaces and the provision of comfortable and safe walking areas in 1999 within the framework of the New Urbanization Charter's principles (Mehaffy and Haas 2020). This has become the de facto charter of a global movement since the adoption of the United Nations Conference on Housing and Sustainable Development's outcome document in 2016 (p. 441). Finally, the similarity between cities appears to be the result of the repetition of some urban paradigms, such as the concept of a garden city, the modernism movement, the applications of the International Congress of Modern Architecture principles (CIAM), and sustainable cities. According to this perspective, the similarities are due to the urbanisation associated with designing based on the same ideas and overlooking the changes in natural and built environments (Song et al. 2018).

The concept of capital cities envisaged for the future has solidified national identity, the power of authority, and the state's official definition through symbols and emblems. Two things must be highlighted regarding the main findings: the urban forms are comparable, and the city similarity can be traced from the urban artefacts (massive memorial monuments) (Shaw 2009). Elleh and Edelman (2013) argued that modernist-inspired elements of architecture and urban design, combined with Christian, Islamic, and hereditary styles of visual representation, accompany public art as tools of political, social, and economic struggles.

Findings: similarities and elements of similarity in PCCs

Previous studies confirm that there are two stages for establishing urban plans and urban forms in PCCs, as summarised in Fig. 6. The first stage includes the urban plans, which discusses political, sociocultural, and human indicators. It includes determining the purpose of establishing a new capital. This begins with its geographical location, spatial relationship to the country's old capital, and its area and size in terms of population density. It also includes defining the objectives of the city's master plan. The second stage is concerned with urban morphology variables and formations at both the master plan level and in detailed plans, which includes urban paradigms. It focuses on the urban form based on the organisation and spatial formation of the elements of the physical structure of cities, spatial arrangement of activities, and urban artefacts.

To determine the similarities and elements of similarities in each new capital city, we relied on the analysis of six integrated schemes (or cities built from scratch) for African and Asian capitals: Chandigarh, Islamabad, Abuja, Nur-Sultan, Naypyitaw, and the NAC. The temporal divergence between the plans of these capitals was about 70 years, ranging from the date of construction of the first two cities, Chandigarh in 1953 and Islamabad in 1960, to the NAC in Egypt in 2015. Next, we conclude the implications of the similarities in two indicators, including urban plans and urban forms.

First: urban plans

Geographical, demographic, political, and socio-cultural dimensions

The PPCs in this study are similar in how they are located away from the old capital cities. The distance between Islamabad and Karachi is 1140.4 km (Pakistan Meteorological Department 2020), while Lagos is 761 km away from Abuja (National Bureau of Statistics (nbs) 2010). Nay Pyi Taw is 320 km to the north of Rangoon (Wang et al. 2018) and 12.8 to 16 km west and northwest of the city of Phimana (Preecharushh 2011). The distance between Chandigarh and Shimla (the temporary capital city before Chandigarh) is 113 km, while the NAC is 60 km from Cairo (CUBE Consultants 2021). According to Google Earth measurements, the distance between Akmola and Almaty (Astana/Nur-Sultanto) is 162.84 km.

The locations of the PPC were chosen for several reasons. Islamabad's main objective was its location near the foot of the Margalla Pass, which would enable access from all locations (Preecharushh 2011). It was considered ideal for fostering an Islamic identity in this place, which benefits from the climate's unique characteristics, the beauty of the terrain, the ease of transportation, the

capital's defence, and the availability of construction materials, water, and energy resources (Sarshar 2019). Additionally, Islamabad was linked to the old city of Rawalpindi, and both towns grew in a monodirectional fashion (Sarshar 2019, p. 255).

Abuja was selected for its location in the Gwagwa Plains in the northeastern quadrant of the Federal Capital Territory, bordered by hills on all three sides (Adeponle 2013, p. 146). This position offered almost equal access to the whole nation (p. 147). The Nay Pyi Taw site was also chosen as it was close to large developing industrial centres, in contrast to isolated places, such as the ancient capital of Yangon (Gawęcki 2013, p. 40). Meanwhile, Nur-Sultan is on 'low floodplain terraces and is divided by the River Ishim' (United Nations 2020, p. 8).

Similar to the large planned regions that have millions of people, the master plans for capital cities have been planned as follows: Chandigarh, 114 km^2 and 1.055 million in 2014 (Shaw 2009, p. 864; NOSPlan 2020); Islamabad, 906 km^2 and 2 million (UN-Habitat 2014); Nay Pyi Taw, 4600 km^2 and 1.16 million in 2014 (Wang et al. 2018); Abuja, 7,315 km^2, around 3.09 million in 2019 (and expected to increase to 7.17 million by 2040) (Japan International Cooperation Agency [JICA], 2019, pp. 1–1, 2–1); Nur-Sultan, 722 km^2 and 'the master plan predicted that the city which has one million inhabitants today would have 490,000 inhabitants by 2010 and 800,000 by 2030' (Shelekpayev 2020, p. 518); the NAC in Egypt, 600 km^2, with seven million in the first stage and predicted to become 2000 km^2 by 2045 (CUBE Consultants 2021).

According to the current study, emerging capital cities may be similar from a theoretical point of view. Following the political and strategic planning thought led to their distinction on a national level as 'nation's aspirations' in Islamabad (Sarshar 2019, p. 252), the physical embodiment of the national goals of unity in Abuja (Elleh and Edelman 2013, p. 3), a symbol of Nigeria's aspiration for unity and greatness (Obiadi et al. 2019, p. 376), and the pride of the black race as a modern and efficient city (Nor et al. 2020, p. 4).

Communities' historical context

The problem of communities' historical context was apparent in the creation of Chandigarh as a symbolic city for an independent India, and Prime Minister Nehru's wish for the new capital to embody the values of the new nation-state (Chalana and Sprague 2013). Such ambition to establish the new nation's identity was also evident in Islamabad, which was regarded as the dream of Ayub Khan, the country's head of state after its independence (Sarshar 2019). In contrast, Abuja was designated as a federal capital before its construction (Elleh and Edelman 2013, p. 3). It was required to handle ethnic diversity, and

solidify national identity, through a 'state-led project' using all its resources (Nor et al. 2020). Nay Pyi Taw was established while considering the changes in strategic environments and shifts in safety scenarios in the twenty-first century (Preecharushh 2011).

Goals and aspirations

Parallel with the goals of the vision behind the urban plan, the master plans were developed to reject the religious and political divergences in the Chandigarh region (Chalana and Sprague 2013, p. 200) and reflect the ideals of 20th-century modernism in its architecture (Chalana 2015, p. 62). Similarly, Islamabad sought to find a designated capital of national identity, in the form of a postcolonial model that would establish the idea of unity in a country split ethnically and geographically and become the central government's seat (Sarshar, 2019). Abuja also has set its goals as an administrative, commercial, cultural, agricultural, and industrial centre (small and large industries) that supports construction work. It is also a centre for the absorption of immigrants. It serves the residents of the surrounding villages, linking them with communication channels to facilitate urban integration in the country (Obiadi et al. 2019).

The Nur-Sultan master plan aimed to build a political nation and ultimately identify the state with its citizens, regardless of ethnicity or religion (Gawęcki 2013, p. 48), and with an emphasis on architectural elements. Nay Pyi Taw's vision was also based on an urban expansion centred on government-led infrastructure development. It was among the first batch of 26 cities nominated by their national governments to be in the Association of Southeast Asian Nations (ASEAN) Smart Cities Network (UN-Habitat 2019, p. 126).

Second: urban form
Urban paradigms

We discuss how similar or different paradigms influence the production of urban forms in this section. Here the argument is that practitioners who follow a similar or limited number of urban paradigms might produce similar urban forms.

The evidence from literature shows that many capitals adopted modernism to express nationalist and utopian ideals (Abusaada and Elshater 2018; Chalana and Sprague 2013, p. 201). These capital cities also applied the International Congress of Modern Architecture principles (CIAM) to the Athens Charter (Moulis 2012, p. 881; Shaw 2009), which is to live, work, move, and entertain (Chalana 2015, p. 64). In Chandigarh, Le Corbusier applied his idea of a grid-iron pattern, following the concept of modernist urbanism (Moulis 2012, p. 871). Doxiadis' ideas for

Ecumenopolis in Islamabad are based on the power of money and industry and combine a grid-iron plan with free-planning sectors influenced by the surrounding valleys and topography (Sarshar 2019, p. 254). Nor et al. (2020) described the idea of Abuja's general plan as being based on California, particularly its central area. It uses its natural characteristics, such as hills, which are the site of the city's most famous elements, and which appear to be the symbols for achieving the city's goal. In addition, the planners utilised a service hierarchy, beginning with the central, sector, and residential districts. In this respect, Shaw (2009) claimed that international styles affected individual buildings.

Considering urban paradigms, Islamabad is a sustainable city and Abuja is an integrated and sustainable city (Adeponle 2013). The vision of Nay Pyi Taw was to build a smart, climate-resilient, environmentally sustainable, green and liveable city by 2040, that is a hub for knowledge, international aviation transit, freight and logistics (Aung 2019). At Nur-Sultan, Kurokawa applied the symbiotic idea of the city, to connect the past with the future (Kisho Kurokawa Architect & Associates 2015). In addition, the NAC employs the six principles, namely, sustainable, green, walkable, liveable, connected, smart, and entrepreneurship-friendly cities (Kisho Kurokawa Architect & Associates, 2015).

Organisation and spatial formation

The following paragraphs describe the similarity argument produced by organising and forming urban structures. The six PCCs have similar features in urban formations, central axis, activity sites, structural hierarchy, and city divisions.

Islamabad was planned to be built in stages to determine the location and size of the land and dimensions of the main roads and lanes from the beginning. Abuja was also implemented through four stages, starting from the urban centre in the northeast, with the integration of the different areas into the central area in a sequential manner, and evolving a harmonious relationship (Adeponle 2013, p. 147). The NAC adopted three phases in the central park (known as the green river), including the main activities in the first phase, such as the presidential palace, the ministries area, the diplomatic district, and residential areas. Previous studies have highlighted that many PCCs utilised the 'grid-iron plan', sometimes with slight changes to the site circumstances and landscape, infrastructure, and grid systems, like in Chandigarh (Moulis 2012, p. 885). In Islamabad, this kind of planning reflects the spatial needs within a basic planning unit of 2.2×2.2 km, surrounded by the main roads (Sarshar 2019, p. 526). In Abuja also the streets reflect the grid

layout (Adeponle 2013, p. 147). The NAC grid layout, however, appears in curved lines.

Some master plans aim to preserve the architectural and urban vision particularly. For instance, a rectangular grid has been used to organise self-contained neighbourhood units or sectors in Chandigarh (Chalana 2015, p. 62). Additionally, a structural hierarchy has been used in residential areas, from the residential neighbourhood (the largest planning unit) to the local street (a basic planning unit) through the residential neighbourhood unit, and the cell that includes the residential block and plots of land. Capital cities applied a hierarchy of grids in circulation routes. Chandigarh used the grid to subdivide the city government, business, and leisure functions (Chalana 2015, p. 62). Family life is contained in segments with super-large apartment complexes (Shaw 2009, p. 867). The grid was used in Islamabad to form a dynamic city with expanding residential areas and various central functions such as administration, industry, and recreation (Sarshar 2019). According to Adeponle (2013), the neighbourhood unit appeared as the smallest planning unit in Abuja, with a capacity of 5000 people, followed by the city centre with business district, comprising government offices, official residences, a hospital, a transport station, and national symbols, such as the National Assembly, Supreme Court, museum, the National Mosque, churches and the International Conference Centre.

Kurokawa maintained and redeveloped the city of Nur-Sultan following its symbolic visibility (Shelekpayev 2020, p. 508). He intended to transform it into a symbiotic city, composed of various city functions, such as housing, business, culture, entertainment, and education, with the business city and capitol building (the city government) on the southern side of the Ishim River. The new city was established to the south and east of the Ishim River, and aimed to create two symbols, locally and globally, within the city through its architecture (Kisho Kurokawa Architect & Associates 2015). The first symbol is the river and the city (history and future), expressed through the new dwellings on both sides of the river. The second symbol is the forest and the city, with the development of the train station (the business city), and the central axis of the city (central park) extending from the city train.

Spatial arrangement of activities

This study confirmed that the six PCCs adopted a central axis where cultural and recreational activities converged. This axis is the city's green lung, with 'the leisure valley' in Chandigarh (Chalana 2015, p. 64), and the 'green river' in the NAC (Administrative Capital for Urban Development (ACUD) 2016). In both capitals, the axis extends to create a green network that connects residential areas

into green nuclei. Furthermore, both capitals are surrounded by a green belt, reflecting, according to Chalana (2015), the garden city movement in Chandigarh and the parkway style in Abuja (Adeponle 2013, p. 148).

In Abuja, the surrounding slopes of inland hills and mountains in the Gwagwalada plains form the city's visible rear and the primary contact points inside (Adeponle 2013). The best sites for the most important activities were chosen in Abuja, similar to Chandigarh, including the positioning of the capitol complex with significant government and civic buildings, network-free and landscaped beyond—at the foothills of the Himalayan hills (Moulis 2012) This issue also arose when selecting the location of the Presidential Palace in Islamabad, where the city is the centre of government activities, and the least valuable services were distributed at the borders of the city.

The Nigerian federal government is at the heart of the central hub in Abuja, and is flanked by the architectural elements (Adeponle 2013). The central axis in Nur-Sultan extends from the developed train station in the old city to the modern city centre which is represented by the city's central park (Kisho Kurokawa Architect & Associates 2015). Nay Pyi Taw includes three sectors, according to Preecharushh (2011, p. 1034). The northern region is the administrative and irrigated sector, which includes the ministries of commerce, construction, cooperatives, livestock, and fisheries and the central region is an executive and developmental area and an urban nucleus, which includes civil buildings, such as hospitals, shopping complexes, and residential areas. The city also includes the Nay Pyi Taw Miomo Market, the National Library, the National Theatre, the National Zoo, various government ministries dealing with energy, foreign affairs and information, the police force headquarters, the capital development commission, and an agricultural research station. Moreover, the city consists of many parks and green spaces, specifically the National Grass Garden in the centre of the capital (p. 1041).

In another context, the new downtown Nur-Sultan adopted a triangular shape to nest and live symbiotically with the forest. Presidential offices, such as the Diet Building, Supreme Court, National Guesthouse, and presidential houses form an abstract symbiosis architecture, through buildings that reflect abstract symbolism using simple geometric shapes. The buildings reflect the historical and cultural symbols of the state of Kazakhstan and its status as an international city (Kisho Kurokawa Architect & Associates 2015; Shelekpayev 2020).

The NAC master plan includes four unequal sections separated by the Green River, including the Opera House, the service strip that consists of the university city, the smart village, the train station, the financial and

business district, and the medical city. The first phase includes eight residential neighbourhoods, each comprising a green oasis and divided into compound residential neighbourhoods. They include the diplomatic quarters (embassies) and the presidential palace area, separated by the government district, which includes the city of arts and culture, the investors' district, and the government district. The second phase includes residential areas, city airports, and garden housing. According to Gawęcki (2013, p. 45), the presence of accredited diplomats is an essential feature that proves the capital's status in the city. These capitals are similar, in their transfer of ministries and embassies from the old to the new. Some of the capitals included low-to high-income housing patterns, high-cost housing, and high-rise buildings (skyscrapers) in the centre of the city, such as in Chandigarh, Islamabad, and NAC. Simultaneously, Nay Pyi Taw focused on innovative city technologies in several projects, such as affordable housing, low-cost housing, and inclusive international universities (Asean smart cities network: Smart cities action plan [ASEC], 2018, pp. 32–33).

Urban artefacts

This section discusses the similarity in urban artefacts in the six PCCs that were demonstrated by similar visual effects of landmarks, services, and residential blocks. Similarly, these effects may also be observed elsewhere. In Chandigarh, the designs of the four landmarks of the metropolis (the Supreme Court, Secretariat, Assembly, Knowledge Museum, and the surrounding Chandigarh City Park) symbolise visual singularities (Shaw 2009, p. 868). This is also evident in the monumental mosque in Islamabad, the Uppatasanti Pagoda building in Nay Pyi Taw, the capital mosque in Nur-Sultan, the mosque and cathedral in the NAC, and the Capitol Complexes in Chandigarh, Nay Pyi Taw, and the NAC. The evidence also includes the Presidential Palace in Islamabad, and the Ak-Orda Presidential Palace in Nur-Sultan (Shelekpayev 2020). These landmarks are repeated at the World Trade Centre, Abuja, and the Khan Shatyr Mall in Nur-Sultan. The Presidential Palace of President Office of Myanmar, Indonesia and the Square of Unity and Diversity are among the essential features of the master plan.

The review of literature showed a desire to enhance the visual effect of such landmarks. The Assembly Palace, Martyr's Monument, and Open Hand by Le Corbusier, for example, are architectural icons of Chandigarh (Shaw 2009, p. 868). These symbols may also be seen in Abuja's three arms area in the national parliament building, along with related sculptures by Kenzo Tange (Elleh and Edelman 2013, p. 4), and in Nur-Sultan in Norman Foster's Baiterek Memorial Tower and the Palace of Peace and Conciliation. In addition, Gawęcki discussed the

strength of Nur-Sultan's small architecture, adding to the city's image, which is repeated in copies of pieces of folk-art works taken from traditional Kazakh jewels (Gawęcki 2013, p. 52).

The literature also showed that many capital cities were similar in designing everything planned to be massive and striking, including residential towers, commercial centres, and hotels extending up to 24 floors and more, as in Abuja (Nor et al. 2020). For instance, the Baiterek Tower in Nur-Sultan, with a height of 79 m, is a national symbol, appearing on the Kazakh banknote, and was designed to establish three philosophical elements: earth, life, and sky (Gawęcki 2013, pp. 49–50). The Diamond Tower in the NAC, which is the highest building in Africa with a height of 400 m, is also a national symbol. Shaw (2009) refers to the Chandigarh style, which resembles boxes of bricks, stones, and tiny windows to reduce the cost of construction and protection from the climate. However, the Chandigarh style seems to be following an international trend. Besides, similarities also emerged in landscape architecture, for example, the large green lakes in Chandigarh, the water fountain park, zoo and boulevard in Nay Pyi Taw and the green river in the NAC.

Discussion

This study used content analysis techniques to shed light on how similar PCCs are and proposed a conceptual framework for examining their similarities in order to avoid them in the future.

Two indicators of similarities

The similarities were limited to two components: urban plans and urban forms. The contributions of this study to examining the similarities and differences between PCCs can be summarised in a few points. First, we analysed available data. This study provided a vision of the similarities of PCCs as follows: the similarity could happen at the national level due to urban plans, as in the case of Nay Pyi Taw, Nur-Sultan Chandigarh, and Abuja, and a similar result was reached by Shaw (2009), Chalana and Sprague (2013), Sarshar (2019), and Nor et al. (2020). Similarities may also occur at the urban planning level, which employ modernist architecture, new urbanisation, and similar design principles. These results are also consistent with those derived by Shaw (2009), Chalana (2015), Chalana and Sprague (2013) and Elshater and Abusaada (2022).

Second, data-driven methods for examining similarities are essential to reveal PCCs as products or built from scratch in the Global South, whether in post-independence or post-crisis periods. These methods also aimed to study how PCCs are related to urban plans at the level of top state administration and elite intervention. Local

urban planning and urban design professionals, and the capitals, individually or jointly with foreigners, have applied well-known paradigms such as urbanism and new urbanism.

Third, urban planning and urban design paradigms were used to examine the differences and similarities in the urban form at the level of movement and communication networks, which appear through variations in grid-iron planning, the hierarchy of urban structure, and the configuration of the architectural blocks. This aspect focuses on examining the effects of urban paradigms, which determine the urban form of each city, compared to previous studies that looked at it from a single perspective of block level (Song et al. 2018) or urban artefacts and landmarks (Gawęcki 2013).

Additionally, most PCCs are almost similar in their urban form, at the architectural mega-scale level, and their artefacts at the landscape architecture level, because of the use of symbols and icons. These findings are also consistent with Gawecki's (2013) study, which demonstrated the authority of small architecture, using the capital city of Nur-Sultan as an example, and the similarity or uniqueness of the experiences (despite the different geographical contexts) in terms of planning and urban morphologies.

Finally, the apparent differences in architectural design emerged through visual and aesthetic expressions in block architecture, urban museum pieces and the level of the monuments' biosphere. In this context, the similarity occurred due to the frequent use of artefacts, such as architectural elements aimed at visual distinction. However, each city differs from other cities in the provision of services by these architectural elements in the city's master plan. Whether at the level of form or the spatio-temporal sequence of each architectural piece, they reflect a different experience of daily life in each city. This result, in line with previous studies, shows that although the beginnings are taken from dominant paradigms, their variations are due to urban artefacts (Elshater et al. 2019; Gawęcki 2013).

In the Global South, we have observed that the similarities between PCCs need to be studied, especially in African and Asian countries. We sought to explore similarities in the level of urban plans and urban form, focusing on urban paradigms, that is the master plans (hierarchy and planning networks), and the detailed plans (activity places) of six PCCs. There are still concerns that all PCCs appear to be similar on the surface due to the similarity in the urban form, which depends on fixed elements and components based on well-known intellectual models. However, the idea of avoiding similarities leads to creating various formations that combine these elements and components. Resemblance is found

in all things, while congruence is rare. The things and shapes are similar, but not identical. Changes in topography, location, climate, people, and environmental conditions deny congruence. The PCCs may be identical in using different patterns of urban formation, but differ in structural and morphological variations. Exploring the singularity of a city is a significant limitation in this study.

All PCCs are similar in their use of architectural symbols and icons, but they differ in the architectural design of each character, the choice of place, and the surrounding context. This result requires future studies to ensure that the difference in block architecture is sufficient to confirm the uniqueness of cities and capitals, or to confirm difficulty of accessing the data for some PCCs, that are not published in documented scientific reports or refereed scientific articles. This is another limitation of this study. However, to avoid bias, future studies should identify similarities that occur over time, and appear in approved historical documents, such as digital government maps and photographic documentation. Simultaneously, data availability will present a challenge to further studies evaluating changes in urban plans and urban forms at the local and international levels in some Global South countries.

In what ways can we avoid similarities in PCCs?

The methodology used in this study can help urban planners and designers make informed judgements about the similarities and differences between PCCs. Consequently, this technique creates a conceptual framework for tracking and analysing cities' intellectual and professional elements and also projected capital cities in the following four areas: (1) focusing on the parts and components of the similarity; (2) examination of the history of urban planning and urban design thinking, where dominant paradigms are used to determine how, and to what extent, novel and current paradigms are distinct from past ones; (3) invitation to governments and experts to discuss how citizens might participate in the creation of unique projects; and (4) keeping up with the idea of creating work that is unmistakably unique in its identity, character, and singularity.

Consequently, this study aimed to present a comparative analysis of the contexts of six PCCs by systematically reading published and unpublished literature. This was done to show the similarities and open horizons that help PCCs be innovative while avoiding radical similarities. In this context, it appears that the scope of systematic innovation in the paradigms and vocabulary of the elements of formation have a strong influence on the innovation of PCCs. It appears that thinking about the causes and treatments of these elements can increase the chances of avoiding planned capital city similarity.

Fig. 7 The framework: Two stages and five steps for avoiding similarity
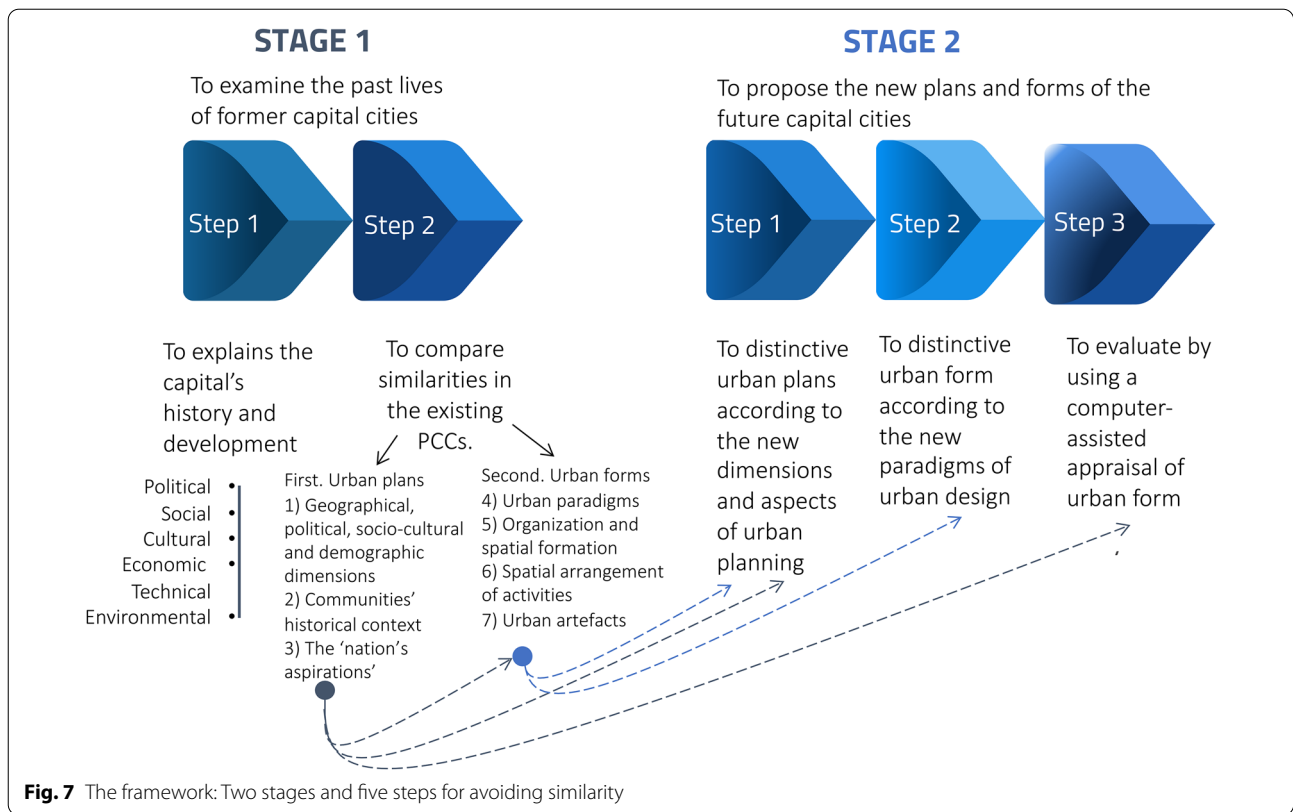
Therefore, a realistic conceptual framework should be implemented, whenever a country changes its capital. This framework includes two stages and five steps (Fig. 7).

The first stage is to look into the past lives of former capital cities, which consists of two steps. The first step explains the capital's history and development on political, social, cultural, economic, technical, and environmental grounds, and the reasons for changing the capital cities, and its spatial scope (location, size, and population). The second step comprises similarities based on the existing urban plans and urban forms.

The second stage is to suggest the new plans and forms for future capital cities, which includes three steps. The first step includes distinctive urban plans, according to the new dimensions and aspects of urban planning literature. The second step includes the distinctive urban form, according to new paradigms of urban design literature. Finally, the third step comprises an evaluation of urban form levels using a computer-assisted appraisal. These two stages and the detailed steps associated with them should clarify the similarities and differences, so decision-makers, urban planners, and designers can better plan for the future and diversify the approach to planning and project development.

As one of the limitations of the present study, it would be worthwhile to examine how the latest projects in the sample cities have gained community support. This could help to make planned capital cities distinct. The study also failed to investigate the dangers or pitfalls associated with PCCs that have similarities.

This recommendation aligns with previous studies mentioning how community involvement can orient the planning system (Abusaada and Elshater 2021; Alipour and Ahmed 2021; Hamama and Liu 2020). Besides, our suggested framework is in line with previous studies that tackle the immigration of architecture between different cities and causes similarities between urban plans and urban forms (Elshater et al. 2022a; Guerrieri 2021; Cárcel 2021; Wiese et al. 2014). Our research confirmed the results of previous studies, which illustrated that regarding city similarity there is no interaction with the user in contemporary "iconic" architecture (Pittaluga 2020; Elshater et al. 2022b). Reciprocally, this research provides a two-step framework that can be used to analyse the similarities in urban plans and urban forms. It can also help planners and designers avoid the similarities between cities, particularly capital cities, that were agreed on by researchers as being characterised globally and providing a local sense of belonging for their native citizens.

Conclusions

According to the current assessment, new cities and capitals are increasingly rising. Despite the ongoing debate among their supporters and opponents, planned capital city growth will remain essential to meet the African and Asian continents' demographic, social, economic, and environmental problems. This study's results indicate that large-scale projects continue to satisfy the demands of residents. The advantages of creating new planned cities and capitals will exceed administrative drawbacks, which will eventually diminish with time. Additionally, the increasing need for planners and designers of these cities and capitals to create products that appear dissimilar or similar will continue. Each capital city has a unique layout, from Chandigarh and the NAC to Islamabad, Abuja, Nur-Sultan, and Nay Pyi Taw. Therefore, further research is required to enquire into the reasons for the capitals' existence, size, location, and characterisation.

This study has multiple research questions that extend and complement our primary research questions. One such example is the question of what urban policies can be chosen by decision-makers, and followed by planners and designers, to prevent similarities in urban plans and urban form. An additional open research question, related to the process of establishing PCCs could be about the function of the PCCs, and how should they have functioned?

In addressing the research limitation and one-sided questions, future research can continue to look for common features in urban plans, with the recommendation that city-makers should be bound by the dominant paradigms of modernist, neo-modern, postmodern or meta-modern architecture, which allows practitioners to invent a new style. Moreover, the links between urban plans and urban form, as found by intellectuals and academics, need to be further explored to increase people's involvement. Future research can also focus on the impact of urban forms on daily life experiences. In the future, related to the process of establishing PCCS, we could explore the function of the PCCs and how they should have functioned compared to the present. Furthermore, further studies are needed to validate the implementation of our study's findings. For future research, urban planners and designers should realise how to plan systemically to avoid similarities between cities. Many projects in our selected PCCs can be examined and analysed, emphasising the local community's role in understanding people's opinions about similarities in the salient urban form.

According to the findings of this research, it would be beneficial to enhance general schemes to demonstrably satisfy lifestyles and consider future evaluations of the result of changes in urban morphologies related to their spatial and cognitive settings. We understand the potential social, economic, and environmental advantages of developing planned cities. Consequently, we recommend that governments consider the similarities between new cities and planned capital cities. It could enable a singularity, based on citizen participation, of building cities and capital access from the ground up. It remains difficult to find a balance between urban plans, urban forms, and a lifestyle that represents various viewpoints while avoiding self-credit.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40410-022-00181-2.

> **Additional file 1: Table S1.** Query settings and Coexistence word in **14** articles in **9** Journal indexed in SJR database in the last two decades. **Table S2.** The repletion of the coexistence words in the full text comparing with our current article. **Table S3.** Query settings and coexistence words in five books and two book chapters in the last two decades. **Table S4**. Four articles in three non-indexed journals: Abuja, Chandigarh, and Nr-Sultan in the last two decades. **Table S5**. Eight technical reports of six cities: Abuja, Chandigarh, Islamabad, Nay Pyi Taw, New administrative capital, and Nur-Sultan in the last two decades. **Table S6**. Six websites for Chandigarh, New Administrative Capital, and Nur-Sultan in the last two decades.

Author contributions
HE and AE analyzed and interpreted the data regarding bibliometric analysis. HE and AE performed the examination of the sources. HE and AE equality were the contributor in writing the manuscript. Both authors read approved the final manuscript.

Availability of data and materials
The datasets generated and/or analysed during the current study are available in the Figshare repository, https://doi.org/10.6084/m9.figshare.20407791.

Declarations

Ethics approval and consent to participate
Not applicable here.

Consent for publication
Not applicable here.

Competing interests
The authors declare that they have no competing interests.

Author details
[1]Housing and Building National Research Centre, Cairo, Egypt. [2]Faculty of Engineering, Ain Shams University, Cairo, Egypt.

References

Aand H (2019) 'Nehru projected UT as face of modern India to world'. http://timesofindia.indiatimes.com/articleshow/70414874.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst. https://timesofindia.indiatimes.com/city/chandigarh/nehru-projected-ut-as-face-of-modern-india-to-world/articleshow/70414874.cms. Accessed July 2022

Abubakar IR, Benna U, Garba SB (2009) Review of Abuja Master Plan: Socio-economic surveys, analysis and recommendations. Federal Capital Development Authority, Abuja, Nigeria

Abusaada HG, Elshater A (2018) Knowledge-based urban design in the architectural academic field. In: Raouf (ed) Knowledge-based urban development in the Middle East. https://doi.org/10.4018/978-1-5225-3734-2

Abusaada H, Elshater A (2021) Improving visitor satisfaction in Egypt's Heliopolis historical district. J Eng Appl Sci 68(1):19. https://doi.org/10.1186/s44147-021-00022-y

Adeponle B (2013) The integrated city as a tool for sustainable development Abuja master plan. J Educ Soc Res 3(5):145–153. https://doi.org/10.5901/jesr.2013.v3n5p145

Administrative Capital for Urban Development (ACUD) (2016) Administrative capital for urban development. https://www.ecrg.de/images/Download_pdf/Brochure.pdf. Accessed July 2022

Alipour SM, Ahmed KG (2021) Assessing the effect of urban form on social sustainability: a proposed 'integrated measuring tools method' for urban neighborhoods in Dubai. City Terr Archit 8:1–21

Arksey H, O'Malley L (2005) Scoping studies: towards a methodological framework. Int J Soc Res Methodol 8(1):19–32. https://doi.org/10.1080/1364557032000119616

Asean smart cities network: Smart cities action plan [ASEC]. (2018). Asean smart cities network: Smart cities action plan. https://asean.org/storage/2019/02/ASCN-Consolidated-SCAPs.pdf. Accessed July 2022

Aung M (2019) Smart city action plans (SCAPs) for Nay Pyi Taw. Nay Pyi Taw Development Committee, Yokohama

Ball R (2017) An introduction to bibliometrics: New development and trends. Chandos Publishing, Zuerich

Bell E, Bryman A, Harley B (2018) Business research methods. Oxford University Press, Oxford

Bhattacharya TR, Bhattacharya A, Mclellan B, Tezuka T (2020) Sustainable smart city development framework for developing countries. Urban Res Pract 13(2):180–212. https://doi.org/10.1080/17535069.2018.1537003

Cárcel JA (2021) The spatialization of time and history in the skyscrapers of the twenty-first century in Shanghai. City Territ Archit 8:1–17. https://doi.org/10.1186/s40410-021-00136-z

Chalana M (2015) Chandigarh: city and periphery. J Plan Hist 14(1):62–84. https://doi.org/10.1177/1538513214543904

Chalana M, Sprague TS (2013) Beyond Le Corbusier and the modernist city: reframing Chandigarh's 'World Heritage' legacy. Plan Perspect 28(2):199–222. https://doi.org/10.1080/02665433.2013.737709

CUBE Consultants (2021) The New Administrative Capial Cairo. https://cubeconsultants.org/thecapitalcairo/. Accessed July 2022

Côté-Roy L, Moser S (2019) Does Africa not deserve shiny new cities? The power of seductive rhetoric around new cities in Africa. Urban Stud 56(12):2391–2407. https://doi.org/10.1177/0042098018793032

Dastgerdi AS, Luca GD (2019) Strengthening the city's reputation in the age of cities: an insight in the city branding theory. City Territ Archit 6(2):1–7. https://doi.org/10.1186/s40410-019-0101-4

Dobesova Z (2019) The similarity of European cities based on image analysis. In: Silhavy R, Silhavy P, Prokopova Z (eds) Intelligent systems applications in software engineering. CoMeSySo 2019. Advances in intelligent systems and computing, vol 1046. Springer, Cham, pp 341–448. https://doi.org/10.1007/978-3-030-30329-7_31

Elshater A, Abusaada H (2022) From uniqueness to singularity through city prestige. Proc Inst Civil Eng - Urban Design Plan 175(2):91–97. https://doi.org/10.1680/jurdp.21.00046

Elshater A, Abusaada H, Afifi S (2019) What makes livable cities of today alike? Revisiting the criterion of singularity through two case studies. Cities 92:273–291. https://doi.org/10.1016/j.cities.2019.04.008

Elshater A, Abusaada H, AlWaer H (2022a) Editorial: Smart liveable cities: plans or forms? Proc Inst Civil Eng - Urban Design Plan 175(3):98–102. https://doi.org/10.1680/jurdp.2022.175.3.98

Elshater A, Abusaada H, Tarek M, Afifi S (2022b) Designing the socio-spatial context urban infill liveability and conviviality. Built Environ 48(3):341–363. https://doi.org/10.2148/benv.48.3.341

Elleh N, Edelman DJ (2013) Exploiting public art, architecture and urban design for political power in Abuja: modernism and the use of Christian, Islamic and ancestral visuali icons. Curr Urban Stud 1(1):1–10. https://doi.org/10.4236/cus.2013.11001

Galdini R (2020) Temporary uses in contemporary spaces. A European project in Rome. Cities 96:1–8. https://doi.org/10.1016/j.cities.2019.102445

Gawęcki M (2013) New urbanization of the steppe. Astana: a capital called the capital. Stud Hist Oecon 31(1):35–56. https://doi.org/10.2478/sho-2013-0003

Geffroy D, Oliver R, Juran L, Skuzinski T (2021) Projecting the Metropolis: Paris 2024 and the (re)scaling of metropolitan governance. Cities 114:1–9. https://doi.org/10.1016/j.cities.2021.103189

Gehlawat M (2013) Space, the self, and singularity in Le Corbusier and Christopher Isherwood. Lit Imagin 15(3):349–364. https://doi.org/10.1093/litimag/imr140

Ghalib H, El-Khorazaty MT, Serag Y (2021) New capital cities as tools of development and nation-building: review of Astana and Egypt's new administrative capital city. Ain Shams Eng J 12(3):3405–3409

Gordon D (ed) (2006) Planning twentieth century capital cities. Routledge, London

Guerrieri PM (2021) Migrating architectures: Palladio's legacy from Calcutta to New Delhi. City Terr Archit 8(6):1–17. https://doi.org/10.1186/s40410-021-00135-0

Hamama B, Liu J (2020) What is beyond the edges? Gated communities and their role in China's desire for harmonious cities. City Terr Archit 7(13):1–12

Hayat P (2016) Smart cities: a global perspective. India Quarterly 72(2):177–191. https://doi.org/10.2307/48505495

Jansen JC, Osterhammel J (2017) Decolonization: a short history. Princeton University Press, Princeton. https://doi.org/10.2307/j.ctvc77drk

Japan International Cooperation Agency [JICA] (2019) Data collection survey for the review and upgrading of integrated urban development master plan of Abuja, Federal Capital Territory, Nigeria. Federal Republic of Nigeria, Tokyo

Kavaratzis M (2009) Cities and their brands: lessons from corporate branding. Place Brand Public Dipl 5:26–37

Kemper E, Stringfield S, Teddlie C (2003) Mixed methods sampling strategies in social science research. In: Tashakkori AM, Teddlie CB (eds) Sage handbook of mixed methods in social and behavioral research. SAGE Publications Inc., Thousand Oaks, pp 273–296

Khan H-U, Beinart J, Correa C (2010) Le Corbusier: Chandigarh and the Modern City. Mapin Publishing Gp Pty Ltd, New York

Kisho Kurokawa Architect & Associates (2015) International competition for the master plan and design of Astana, Kazakhstan. www.kisho.co.jp: https://www.kisho.co.jp/page/222.html. Accessed Nov 2021

Lemarchand N (2021) Mega-mall, global city and social issues of our times the case of Europacity in Paris. Cities 114:1–6. https://doi.org/10.1016/j.cities.2021.103205

Locke R, Elmlund P, Mehaffy MW (2019) Evaluating landscape urbanism: evidence from Lafayette Park, Detroit. J Urban Int Res Placemaking Urban Sustain 12(1):34–59. https://doi.org/10.1080/17549175.2018.1531906

Mehaffy MW, Haas T (2020) New urbanism in the new urban agenda: threads of an unfinished reformation. Urban Plan 5(4):441–452. https://doi.org/10.17645/up.v5i4.3371

Mohamad B, Adetunji RR, Alarifi G, Ismail AR, Akanmu MD (2022) A visual identity-based approach of southeast asian city branding: a netnography analysis. J ASEAN Stud 10(1):21–42

Moulis A (2012) An exemplar for modernism: Le Corbusier's Adelaide drawing, urbanism and the Chandigarh plan. J Archit 17(6):871–887. https://doi.org/10.1080/13602365.2012.746043

Naeem S, Cao C, Fatima K, Najmuddin O, Acharya BK (2018) Landscape greening policies-based land use/land cover simulation for Beijing and Islamabad—an implication of sustainable urban ecosystems. Sustainability 10:1–22. https://doi.org/10.3390/su10041049

National Bureau of statistics (nbs) (2010) Annual abstract of statistics 2010. Federal Republic of Nigeria, Nigeria

Neuendorf KA (2016) The content analysis guidebook. SAGE Publications Inc, Thousand Oaks

Nor CJ, Razak S, Gajiga ZT (2020) New capital cities: the influence of global geo-political economy on Abuja's development. Cities 98:1–18. https://doi.org/10.1016/j.cities.2019.102566

NOSPlan (2020) Chandigarh master plan—2031. https://planningtank.com/development-plan/chandigarh-master-plan#:~:text=Chandigarh%20Master%20Plan%202031,16%20km%20periphery%20controlled%20area

Obiadi BN, Ezezue AM, Uduak PU (2019) Abuja: Nigeria's spatial economic turmoil and urban development disarray. Curr Urban Stu 7(3):371–398. https://doi.org/10.4236/cus.2019.73019

Pakistan Meteorological Department (2020) Preparatory survey report on the project for the installation of weather surveillance radar at Sukkur in The Islamic Republic of Pakistan. The Islamic Republic of Pakistan: Japan International Cooperation Agency, International Metropolitan

Pittaluga P (2020) Pioneering urban practices in transition spaces. City Territ Archit 7:1–10. https://doi.org/10.1186/s40410-020-00127-6

Preecharushh D (2011) Myanmar's new capital city of Naypyidaw. In: Stanley B (ed) Engineering earth. Springer, Dordrecht, pp 1021–1044. https://doi.org/10.1007/978-90-481-9920-4_58

Sarshar S (2019) Power and identity: the case of Islamabad. J Urban Hist 45(2):247–264. https://doi.org/10.1177/0096144217702368

Shaw A (2009) Town planning in postcolonial India, 1947–1965: Chandigarh re-examined. Urban Geogr 30(8):857–878. https://doi.org/10.2747/0272-3638.30.8.857

Shelekpayev N (2020) Whose master plan? Kisho Kurokawa and 'capital planning' in post-Soviet Astana, 1995–2000. Plan Perspec 35(3):505–523. https://doi.org/10.1080/02665433.2019.1598889

Smith N, Georgiou M, King AC, Tieges Z, Webb S, Chastin S (2021) Urban blue spaces and human health: a systematic review and meta-analysis of quantitative studies. Cities 119:1–12. https://doi.org/10.1016/j.cities.2021.103413

Song Y, Long Y, Wu P, Wang X (2018) Are all cities with similar urban form or not? Redefining cities with ubiquitous points of interest and evaluating them with indicators at city and block levels in China. Int J Geogr Inf Sci 32(6):1–30. https://doi.org/10.1080/13658816.2018.1511793

Taubenböck H, Debray H, Qiu C, Schmittb M, Wang Y, Zhu XX (2020) Seven city types representing morphologic configurations of cities across the globe. Cities 105:1–15. https://doi.org/10.1016/j.cities.2020.102814

Theodosis L (2015) Victory Over Chaos? Constantinos A. Doxiadis and Ekistics 1945–1975. Universitat Politècnica de Catalunya, Barcelona

UN-Habitat (2014) Cities and climte change initiative: Abridget report—Islamabad, Pakistan—Climate Change Vulnerability Assessment. United Nations Human Settlements Programme (UN-Habitat), Nairobi

UN-Habitat, (2019) The future of Asian and Pacific cities: transformative pathways towards sustainable urban development. United Nations Publication, Bangkok

United Nations (2020) Smart sustainable cities profile: Nur-Sultan, Kazakhstan. United Nations, United States of America

van Noorloos F, Kloosterboer M (2017) Africa's new cities: the contested future of urbanisation. Urban Stud 55(6):1223–1241. https://doi.org/10.1177/0042098017700574

Wang C, Myint S, Fan P, Stuhlmacher M, Yang J (2018) The impact of urban expansion on the regional environment in Myanmar: a case study of two capital cities. Landsc Ecol 33(5):765–782. https://doi.org/10.1007/s10980-018-0632-1

Wiese A, Förster A, Gilliard L, Thierstein A (2014) A spatial strategy for the production of place in two German cities—Urban design interventions as a driver for spatial transformation. City Terr Archit. https://doi.org/10.1186/s40410-014-0013-2

Publisher's Note