JCBAu
Journal of City: Branding and Authenticity
JCBAu 2(1): 52–71
ISSN 3025-4000

Institute for Advanced Science, Social and Sustainable Future
MORALITY BEFORE KNOWLEDGE

# Urban morphology and identity: The dock spaces of Melaka on the maritime silk road

**Mo Zhihui[1]***
[1] *Master of Arts in Architectural Conservation, Department of Architecture, National University of Singapore, 117566, Singapore.*
*Correspondence: e1101827@u.nus.edu

Received Date: April 18, 2024 Revised Date: July 30, 2024 Accepted Date: July 31, 2024

## ABSTRACT

**Background:** This research investigates the intricate relationship between historical docks and the urban development of Melaka, a significant maritime entrepot along the Maritime Silk Road. Focusing on the physical connections and urban morphological performance, this study explores how these docks have influenced the urban morphology and architectural typology of Melaka from its earliest settlement to the present. **Methods:** Utilizing a multidisciplinary approach that combines urban planning, architectural analysis, historical research, and extensive fieldwork, this research identifies key dock spaces along the Melaka River and examines their connections to the city's inland areas. Through historical mapping and analysis of lost docks and market spaces, as well as religious buildings, the study reveals the complex interactions between these maritime infrastructures and urban development. **Findings:** The findings highlight numerous challenges in preserving these historical nodes, including issues related to modern urban integration and conservation. **Conclusion:** The research concludes with recommendations for the conservation and management of these historical sites, emphasizing their importance in preserving Melaka's historic urban landscape. By safeguarding these cultural heritage nodes, Melaka can maintain its urban identity and continue to honor its rich maritime history. **Novelty/Originality of this study:** The development of a comprehensive and adaptive maritime heritage integration model in modern urban planning, which combines urban morphology, historical mapping, and socio-economic impact assessment, provides a multidimensional framework for urban planners to preserve and revitalize infrastructure nodes while accommodating contemporary urban development needs, thereby creating a balance between heritage preservation and urban progress.

**KEYWORDS**: historical docks; urban morphology; Melaka; maritime silk road; architectural typology.

## 1. Introduction

Urban morphology is a key factor in comprehending the structure and development of cities. It encompasses various elements such as population size, density, connectivity, city form, street network components, architectural complexity, and open spaces (AbouKorin et al., 2021; Nor, 2021). Scholars emphasize the importance of urban morphology in urban sustainability and design (Li & Yeh, 2004; Bouzgarrou et al., 2019). The study of urban morphology offers insights into the historical origins of cities' spatial and functional structures, aiding in the analysis of urban transformation processes (Navastara, 2017; Sarihan, 2021). Additionally, urban morphology is crucial for urban regeneration, providing tools for designing cities with adaptive approaches (Trisciuoglio et al., 2021).

**Cite This Article:**
Zhihui, M. (2024). Urban morphology and identity: The dock spaces of melaka on the maritime silk road. *Journal of City: Branding and Authenticity*, *2*(1), 52-71. https://doi.org/10.61511/jcbau.v2i1.2024.911

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Urban morphology extends to the analysis of urban fabrics, natural and human-made structures, and street layouts, which significantly influence the physical form of cities (Nor, 2021; Wang & Jia, 2020). Understanding urban morphology involves examining spatial patterns, development, and historical evolution of cities (Wardhani & Bahri, 2020; Kowalczyk et al., 2019). It also entails studying the morphological structure of cities, encompassing changes in shape, form, and geographic features (Prasertsuk & Busayarat, 2022). Moreover, urban morphology helps identify morphological regions within cities based on their characteristics, enhancing the understanding of urban spatial logic and historical development (Perez et al., 2019).

The interdisciplinary nature of urban morphology allows for contributions to urban development and management during times of significant change (Moudon, 1997). Urban morphology not only focuses on physical aspects but also considers social forms expressed in the layout of cities, highlighting the interconnectedness of physical form and social structures (Khiani, 2022). This field is instrumental in guiding interventions in cities, and promoting informed decision-making for sustainable urban development (Bouzgarrou et al., 2019; Mamun et al., 2020). Urban morphology is a fundamental tool for understanding the complexities of urban environments and guiding urban planning, design, and regeneration efforts. By exploring the spatial, historical, and functional aspects of cities, urban morphology provides valuable insights for creating sustainable, resilient, and well-designed urban spaces. Melaka, also known as Malacca, stands as a testament to the rich maritime history of Southeast Asia. Positioned strategically along the Maritime Silk Road, Melaka has played a pivotal role as a significant maritime entrepot, facilitating trade and cultural exchanges between the East and the West.

This research delves into the intricate relationship between the historical docks of Melaka and the city's urban development, focusing on how these maritime structures have shaped the urban morphology and architectural typology from the earliest settlements to the present day. The docks of Melaka are not merely functional spaces for maritime activities; they are integral to the city's urban fabric. These docks have historically served as the nexus points connecting the bustling waterfront with the inland urban areas, influencing the spatial organization and architectural evolution of the city. Understanding the physical connections between the docks and the city involves exploring the urban morphological performance of Melaka, which reveals how these structures have directed urban growth and development over centuries.

This study employs a multidisciplinary approach, combining urban planning, architectural analysis, historical research, and extensive fieldwork. By identifying and analyzing key dock spaces along the Melaka River, the research aims to map out the connections between these maritime nodes and the city's inland areas. Historical mapping of lost docks, market spaces, and religious buildings provides a comprehensive view of the interactions between these elements and the broader urban landscape. Moreover, this research addresses the contemporary challenges of preserving Melaka's historical docks amidst rapid urbanization. By proposing recommendations for managing and preserving these historical sites, this research highlights the significance of maintaining Melaka's cultural heritage and urban identity. It aims to contribute to the broader discourse on heritage conservation and sustainable urban development in historical cities.

### *1.1 Historical context of Melaka*

The evolution of Melaka as a maritime hub is a multifaceted process that historical events, economic activities, and environmental changes have influenced. Initially, Melaka served as a crucial center for procurement, trans-shipment, and commerce in the maritime trading world of the Malay Peninsula and Sumatra (Borschberg, 2022). The Portuguese conquest of Melaka in 1511 marked a significant turning point, leading to the relocation of diverse traders and seafarers to emerging regional ports of trade (Hall, 2014). This event disrupted the existing trade routes and patterns impacting the dynamics of maritime commerce in the region.

Over time, Melaka's strategic location and port facilities attracted attention and investments for infrastructural development, including large-scale projects like the Melaka Gateway Project (Ngah, 2024). Funds linked to initiatives such as the Belt and Road Initiative have been allocated for enhancing port facilities and connectivity, reflecting the city's importance as a maritime hub (Ngah, 2024). The development of Melaka as a maritime hub has been intertwined with broader geopolitical and economic agendas, shaping its role in regional trade networks. Environmental factors have also played a role in the evolution of Melaka. The rapid and destructive development of the city has led to environmental challenges such as land reclamation, deforestation, soil erosion, and water pollution (Cipriani, 2021). These environmental issues have posed significant challenges to the sustainable development of Melaka as a maritime hub, highlighting the need for balanced urban planning and environmental conservation efforts. Furthermore, Melaka's inclusion in the UNESCO World Heritage List in 2008 underscores its historical and cultural significance as a multi-ethnic and multi-religious urban center (Giosa, 2021).

The city's heritage and urban fabric have been recognized and celebrated, contributing to its identity as a unique maritime hub with a rich historical legacy. A complex interplay of historical events, economic activities, infrastructural developments, environmental challenges, and cultural heritage has shaped the evolution of Melaka as a maritime hub. Understanding this evolution requires a holistic approach that considers the city's past, present, and future trajectories as a key player in regional maritime trade networks. The significance of docks in the trade networks of the Maritime Silk Road cannot be overstated. Docks have historically served as crucial nodes in maritime trade routes, facilitating the loading, unloading, storage, and transshipment of goods traded along the Maritime Silk Road (Lam et al., 2018). The strategic placement of docks along the Maritime Silk Road has played a vital role in enhancing shipping networks and connectivity, thereby fostering international trade and maritime transport (Lam et al., 2018). Countries such as Italy, Singapore, China, Greece, Turkey, Cyprus, Lebanon, and Israel have established a structured maritime traffic flow in the eastern Mediterranean Sea, with Saudi Arabia acting as a pivotal bridge for maritime trade between Asia and Europe (Mou et al., 2021). These docks have not only facilitated trade but have also nurtured diplomatic relationships between nations, contributing to the development of robust maritime trade networks.

Moreover, the development and efficient management of docks along the Maritime Silk Road have been essential for improving transportation networks and advancing international digital trade capabilities (Zhang & Pan, 2022). Investments in port infrastructure and the optimization of transportation networks have played a key role in enhancing the connectivity and operational efficiency of the Maritime Silk Road (Zhang & Pan, 2022). The assessment of the resilience of ports along the Maritime Silk Road has been a focal point, with a focus on evaluating investment and construction aspects to ensure the sustainability and functionality of these critical maritime facilities (Lin & Liu, 2023).

Additionally, the analysis of interactions between Japanese ports and those along the Maritime Silk Road has underscored the importance of port interactions within global port networks and trade dynamics (Hu et al., 2020). Docks have been pivotal in shaping the trade networks of the Maritime Silk Road, acting as essential hubs for maritime trade, connectivity, and economic exchanges between regions. The strategic development, effective management, and resilience of docks along the Maritime Silk Road have been instrumental in shaping historical trade patterns and fostering international cooperation and economic growth.

### *1.2 Urban morphology and architectural typology*

#### *1.2.1 Theoretical frameworks and previous studies on urban morphology.*

Urban morphology and architectural typology are crucial fields that contribute to understanding the physical form and structure of cities. Urban morphology focuses on the study of urban form, spatial patterns, and the evolution of cities over time (Nogalski, 2022).

It involves analyzing elements such as street layouts, building forms, open spaces, and the relationship between different urban components (Nogalski, 2022). On the other hand, architectural typology deals with categorizing and classifying different building types based on their characteristics and functions (Fisher et al., 2019).

Previous studies have emphasized the significance of urban morphology and architectural typology in urban planning and design. Research has shown that building types and architectural typologies are foundational elements of urban morphology, playing a crucial role in identifying architectural patterns within cities. Understanding the relationship between architectural typologies and urban morphology is key to comprehending the built environment and its impact on urban form (Fisher et al., 2019).

Studies have also explored the impact of urban densification on urban morphology and architectural typologies. Urban densification can lead to modifications in urban form and building typologies, affecting factors such as air pollution, congestion, and urban infrastructure (Amer et al., 2017). By analyzing the potential of urban densification through methods like roof stacking, researchers have sought to address the challenges posed by increasing urbanization.

Furthermore, the interdisciplinary nature of urban morphology and architectural typology has been highlighted in various studies. These fields intersect with disciplines such as architecture, planning, geography, and anthropology, providing a comprehensive understanding of urban form and design (Salama, 2020). By integrating concepts from different disciplines, researchers can gain insights into the complex relationships between urban elements and patterns (Sonne, 2022). Theoretical frameworks and previous studies on urban morphology and architectural typology have shed light on the intricate dynamics of urban form, building types, and spatial patterns within cities. By examining these aspects, researchers and urban planners can develop informed strategies for sustainable urban development, heritage preservation, and effective urban design.

### *1.2.2 Architectural typologies in historical maritime cities.*

To explore architectural typologies in historical maritime cities, it is essential to consider the unique characteristics and urban forms that have evolved in these coastal urban centers. The architectural typologies in historical maritime cities are influenced by a combination of factors such as trade networks, cultural exchanges, urban morphology, and historical developments. Understanding these typologies provides insights into the urban fabric, building forms, and spatial organization of these cities.

One relevant reference that can contribute to this exploration is the study by (Wang & Jia, 2020), which delves into the urban tissue of traditional Chinese and Southeast Asian port cities and examines the influence of maritime trade on their architectural forms. This study highlights the significance of culture in analyzing the traditional urban forms of these port cities, shedding light on how architectural typologies have been shaped by historical maritime trade networks.

Additionally, the work by Fisher et al. (2019) on the typology of ancient Purépecha (Tarascan) architecture from Angamuco, Michoacán, Mexico, showcases how a process-typological approach can be used to categorize and understand architectural forms in historical contexts. Applying similar typological approaches to maritime cities could provide valuable insights into the diverse architectural styles and building types present in these urban centers (Fisher et al., 2019). Moreover, the study by Hole (2024) on the evolution of heritage and development in Liverpool's waterfront over 40 years demonstrates how adaptive reuse strategies have positively contributed to preserving heritage values in historic urban landscapes (Hole, 2024).

This approach could be relevant in the context of historical maritime cities, where preserving architectural typologies and heritage buildings is crucial for maintaining the cultural identity and historical significance of these urban areas. By integrating insights from these studies and applying typological analyses to historical maritime cities, researchers can gain a deeper understanding of the architectural diversity, urban

morphology, and cultural heritage that characterize these unique urban environments. Analyzing architectural typologies in historical maritime cities can provide valuable knowledge for urban planning, heritage conservation, and sustainable development initiatives in these culturally rich and historically significant urban centers.

### *1.3 Historical docks and urban development*

Historical docks have played a significant role in the development of urban areas, with port towns serving as cultural and economic hubs (Bell et al., 2016). The adaptation of working ports to containerization has led to the transformation of historic waterfronts for various uses, including corporate, residential, and entertainment (Hein, 2014). The preservation and incorporation of industrial building fabric in waterfront redevelopment have contributed to the success of these projects (Spector, 2010).

This trend is not limited to advanced countries, as developing nations are also revitalizing their historic port cities (Hoyle, 2001). Urban waterfront regeneration is a global phenomenon, with China being a key player in this trend (Zhi-pen, 2001; Wang, 2014). The interdependencies between global shipping flows and urban development have been explored, revealing the fading correlation between traffic volume, port centrality, and city size (Ducruet et al., 2018).

The impact of docks on urban morphology and architectural forms is a complex and multifaceted issue. Kilian and Dodson (1996) and Hradilová (2013) both highlight the role of docks in the creation of postmodern harborscapes and the influence of waterfront appearance on public space functions. However, Allen et al. (1992) and Landon et al. (2016) point out the challenges of water quality and the environmental archaeology of dock areas. The shift of production centers of seaports also has a significant impact on urban spatial forms (Wenyuan et al., 2019). These studies collectively underscore the need for a holistic approach to understanding the relationship between docks, urban morphology, and architectural forms.

## 2. Methods

This research identifies numerous issues related to the integration of historical docks into modern urban planning, emphasizing the need for effective conservation strategies. Then, this research employs a multidisciplinary approach to investigate the relationship between historical docks and the urban morphology and development of Melaka. The methodology integrates urban planning, architectural analysis, historical research, and extensive fieldwork to provide a comprehensive understanding of how docks have influenced the city's morphology and architectural typology. The study begins with a thorough literature review to contextualize Melaka's historical significance within the broader framework of maritime cities and their development patterns. This review informs the selection of key dock spaces and architectural features for detailed analysis.

Fieldwork forms a crucial component of this study, involving qualitative data collection. Site visits to the historical dock areas along the Melaka River are conducted to document the physical condition, spatial organization, and architectural characteristics of these sites. Detailed mapping and photographic documentation are used to capture the current state of the docks and their surrounding urban areas. Additionally, interviews with local historians, urban planners, and conservation experts provide valuable insights into the historical and contemporary significance of these docks. Archival research supplements this fieldwork, involving the examination of historical maps, records, and documents to trace the development and transformations of Melaka's docks over time.

Urban morphological analysis is employed to assess the physical connections between the docks and the city's inland areas. This involves analyzing the spatial patterns, street layouts, and building typologies that have emerged in response to the presence of docks. Historical mapping timelines are created to illustrate the spatial relationships and changes over time. By combining these various methods, the research aims to provide a holistic

understanding of the impact of historical docks on Melaka's urban development, offering recommendations for conservation and sustainable urban planning that preserve the city's cultural heritage and authenticity.

## 3. Results and Discussion

### *3.1 Historical analysis of Melaka's docks*

A range of studies have explored the historical significance and development of Melaka's docks. Shamsuddin et al. (2012) and Salim & Mohamed (2018) both highlight the importance of sustainable waterfront development and the role of tourism in revitalizing historic waterfronts. Erham & Hamzah (2014) and Nor (2021) focus on the morphology and land use changes in Melaka, with Erham emphasizing the conflict between commercial viability and local identity in waterfront development. Hall (2022) and Cartier (2001) provide a historical context, discussing Melaka's role as a port city and its global maritime history. Hussin (2012) and Ooi & Shevren (2014) delve into the trading networks and creative heritage of Melaka, respectively, further enriching our understanding of the city's historical significance.

One relevant study that contributes to this exploration is the research by (Madricardo et al., 2019), which evaluates the human footprint on the sea-floor of coastal systems, including the effects of ship traffic on the sea-floor. This study highlights the environmental impact of maritime activities, such as propeller-wash erosion and keel ploughing, which can have implications for coastal urban areas and architectural forms near docks. Additionally, the research on post-military geographies delves into how naval docks, influenced by military needs, can impact urban morphology, land ownership, and structures of urban governance (Rech & Yarwood, 2019).

This study underscores the transformative effects of docks on the physical and administrative aspects of cities, illustrating how these infrastructures shape the built environment and urban fabric. Moreover, the study on urban regeneration in seaside cities emphasizes the significance of waterfront recovery and transformation plans, often involving docks and harbor areas (Girasole, 2014). This reference underscores the role of docks in urban regeneration efforts, showcasing how these maritime elements contribute to reshaping urban spaces and architectural forms in coastal cities. By synthesizing insights from these studies and examining the relationship between docks, urban morphology, and architectural forms, researchers can develop a comprehensive understanding of how maritime infrastructures influence the spatial organization, design, and development of historical maritime cities. Analyzing the impact of docks on urban morphology and architectural typologies provides valuable insights for urban planning, heritage conservation, and sustainable development initiatives in coastal urban areas.

The coastline of Melaka has undergone significant changes over the centuries, reflecting the city's evolving role as a major maritime hub. Figure 1 below, illustrates the transformation of Melaka's coastline from the 1950s to the early 21st century. This sketch map, adapted from Chin-Kwan Lew (2010) and translated by the author, delineates various phases of coastal development. The map highlights the original section of the Melaka River and subsequent land reclamation projects that expanded the coastline, particularly during the 1980s and 1990s. These developments have had a profound impact on the urban morphology and spatial organization of Melaka, shaping its waterfront areas and influencing the location and structure of its docks. By understanding these historical changes, we gain insights into the interplay between natural geography and human intervention in the evolution of Melaka's urban landscape.

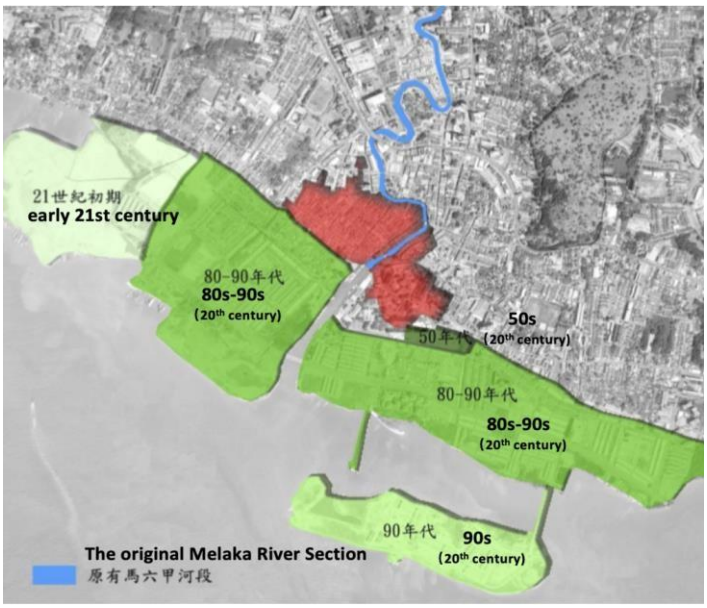



Fig. 1. Sketch map of Melaka coastline changes (Translated by author)
(Chin-Kwan Lew, 2010)

The research scope encompasses the key dock areas along the Melaka River, as depicted in Figure 2 below. This map outlines the specific segments of the river that are central to understanding the interplay between the historical docks and the urban development of Melaka. By focusing on these strategic locations, the study aims to explore how the docks have influenced the spatial organization and architectural evolution of the city. The highlighted areas represent critical nodes where maritime activities historically intersected with urban growth, offering valuable insights into the physical and cultural transformations that have shaped Melaka. This spatial delineation is essential for conducting a detailed analysis of the historical and contemporary significance of the docks with the broader urban landscape.

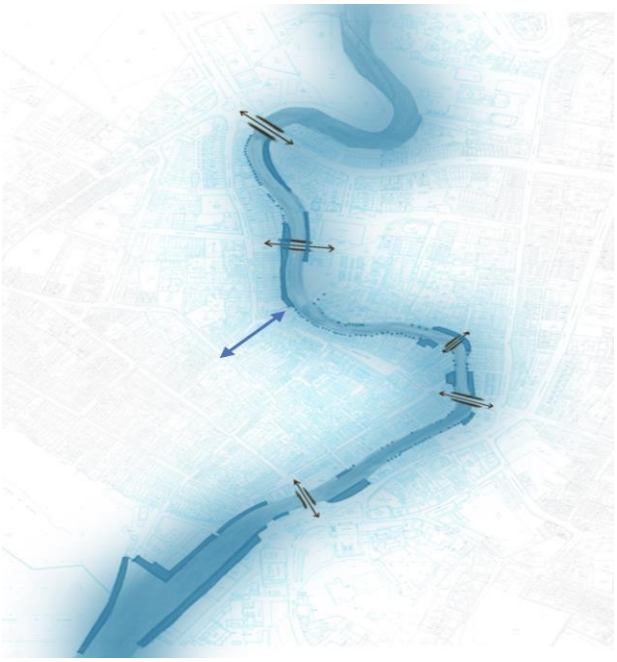


Fig. 2. Research scope of space

Table 1 below, outlines the temporal scope of the research, detailing the historical periods and corresponding maps that will be analyzed to understand the development of Melaka's urban morphology concerning its docks. The timeline is divided into three major

periods: Pre-Colonial, Colonial, and Post-Colonial. Each period reflects significant changes in the city's layout and architectural forms, influenced by different ruling powers and socio-economic conditions.

Table 1. Research scope of time

| Pre-colonial period | Colonial period | | | | | Post-colonial period | |
|---|---|---|---|---|---|---|---|
| Sultan Dynasty | Portuguese (1511-1640) | Dutch (1641-1797) | | British (1797-1940) | | Malaysia | |
| Early 14th Century | 1613 | 1744 | 1791 | 1916 | 1939 | 1980 | 2023 |
| Without data/map |  |  |  |  |  |  |  |

In the Pre-Colonial period, the Sultan Dynasty's early 14th-century maps, though limited, provided a baseline for understanding the initial urban structure. The Colonial Period is further segmented into Portuguese, Dutch, and British eras, each marked by specific maps from 1613, 1744, 1791, 1916, and 1939, illustrating the transformations under European influence. These maps highlight the changes in urban planning and dock development as Melaka evolved into a significant colonial port city.

The Post-Colonial period, beginning in 1980 and continuing to the present day, shows the modern urban landscape of Melaka as it integrates historical elements with contemporary development. The maps from 1980 and 2023 are crucial for analyzing recent urban changes and the current state of the historical docks within the city's fabric. This chronological framework facilitates a comprehensive examination of how Melaka's docks have influenced its urban development over centuries, providing insights into the preservation and future planning of the city's heritage sites.

### *3.1.1 Early settlement and dock development*

The history of Melaka's docks is deeply intertwined with the early settlement patterns and economic growth of the region. Established in the early 15th century, Melaka quickly rose to prominence as a crucial maritime entrepot along the Maritime Silk Road. Its strategic location at the narrowest point of the Straits of Malacca made it an ideal port for traders from China, India, the Middle East, and Europe. The initial establishment of docks in Melaka was driven by the need to accommodate the increasing volume of maritime trade. These docks served as critical nodes facilitating the unloading and loading of goods, providing a bustling hub of commercial activity that spurred the city's economic development.

The early docks were simple structures, often wooden platforms extending into the river or sea, designed to accommodate a variety of vessels. As trade flourished, these docks were expanded and improved to handle larger ships and greater volumes of cargo. The growth of the docks paralleled the expansion of Melaka's urban areas, with new settlements emerging around these maritime facilities. The docks not only served as points of commercial exchange but also became focal points for social and cultural interactions, attracting a diverse population of traders, laborers, and settlers from various parts of the world.

The architectural influences on Melaka's early docks and urban layout were as diverse as the traders who frequented its port. The city's architecture was a confluence of styles brought by Chinese, Indian, Arab, and later European settlers. This eclectic mix created a unique urban landscape characterized by a blend of indigenous Malay elements with foreign architectural features. The early buildings near the docks often featured traditional Malay stilt houses, which were adapted to accommodate the needs of a busy port city. These

structures were elevated on stilts to protect against flooding and to provide ventilation in the humid tropical climate.

As the city grew, more permanent structures were built using materials such as brick and stone. The influence of Chinese architecture became prominent, particularly in the design of shophouses that lined the streets leading to the docks. These shophouses typically had narrow frontages but extended deep into the lot, maximizing the use of limited urban space. They combined commercial and residential functions, with shops on the ground floor and living quarters above, reflecting the integration of trade and daily life.

The urban layout of early Melaka was organic, with narrow, winding streets that followed the natural contours of the land and the course of the Melaka River. The river itself was a vital artery for the city, with docks and warehouses lining its banks. The spatial organization of the city was largely dictated by the needs of trade and the movement of goods. Marketplaces, religious buildings, and administrative centers were strategically placed near the docks to facilitate easy access for merchants and officials. The early settlement and dock development in Melaka played a pivotal role in shaping the city's urban morphology and architectural typology. The docks not only drove economic growth but also influenced the cultural and social fabric of the city. The blend of architectural styles and the organic urban layout reflect the dynamic and multicultural nature of Melaka's early history as a maritime hub. Understanding these historical foundations is crucial for appreciating the city's current urban landscape and for developing strategies to preserve its authentic character.

The initial establishment of docks in Melaka can be traced back to the early 15th century, a period that marked the city's rise as a crucial maritime hub along the Maritime Silk Road. The strategic positioning of Melaka at the narrowest point of the Straits of Malacca made it a natural stopover for traders from China, India, the Middle East, and later, Europe. The early docks were vital to facilitating this burgeoning trade, providing the necessary infrastructure for the efficient unloading and loading of goods. These docks started as simple wooden platforms extending into the river or sea, capable of accommodating a variety of trading vessels.

As Melaka's reputation and importance grew, so did the scale and complexity of its docks. The initial rudimentary structures were gradually replaced with more permanent and expansive constructions, capable of handling larger ships and greater volumes of cargo. This expansion of the docks mirrored the city's economic growth, turning Melaka into a bustling entrepot that attracted merchants and settlers from diverse backgrounds. The docks were not only centers of commercial activity but also became focal points for social and cultural exchanges, contributing significantly to the cosmopolitan character of early Melaka.

The architectural influences in early Melaka were a rich tapestry woven from the various cultures that converged at its docks. The city's architecture during its early years was primarily characterized by traditional Malay elements, most notably the stilt houses. These structures were elevated on wooden stilts to protect against flooding and to provide better ventilation in the tropical climate. Built using local materials such as timber and thatch, these houses reflected the practical and adaptive approaches of the indigenous Malay population.

As Melaka grew into a significant maritime hub, it attracted traders and settlers from China, India, and the Middle East, each bringing their architectural styles and building techniques. The Chinese influence became particularly pronounced, especially in the design of shophouses that lined the streets leading to the docks. These shophouses, with their narrow frontages and deep plots, combined commercial and residential functions, creating a unique urban form that was both efficient and adaptable to the limited urban space available. The continuous facades and shared walls of these shophouses created a coherent streetscape, facilitating trade and community interaction.

The urban layout of early Melaka was organic, shaped by the natural topography and the course of the Melaka River. The river served as the main artery of the city, with docks and warehouses strategically placed along its banks to maximize the efficiency of goods

movement. Narrow, winding streets radiated from the docks, connecting the waterfront to the inland areas. This layout reflected a pragmatic approach to urban planning, driven by the needs of trade and the constraints of the local geography. Marketplaces, religious buildings, and administrative centers were often situated close to the docks, ensuring easy access for merchants and fostering a vibrant urban core.

The blend of architectural styles and the organic urban layout of early Melaka not only catered to the practical needs of a bustling port city but also contributed to its distinctive cultural and social fabric. The interaction between different architectural traditions and the adaptive urban planning practices laid the foundations for Melaka's unique identity as a historic maritime city. Understanding these early influences provides valuable insights into the city's development and its enduring architectural legacy.

### *3.1.2 Colonial influence*

The colonial period marked significant transformations in the dock structures and urban planning of Melaka. From the early 16th century, Melaka experienced successive waves of colonial rule, beginning with the Portuguese (1511-1641), followed by the Dutch (1641-1795), and finally the British (1795-1946). Each colonial power brought its own approaches to urban planning and dock construction, profoundly reshaping the city's landscape. During the Portuguese era, the focus was on fortifying the city to protect it from other colonial powers and local resistance. The construction of A Famosa, a massive fortification near the docks, exemplified this defensive approach. The docks were expanded and reinforced to accommodate larger Portuguese galleons and to ensure the secure movement of goods. The urban layout was adjusted to integrate these new fortifications, with roads and pathways designed to facilitate military movements as well as trade.

The Dutch, who succeeded the Portuguese, continued to enhance the docks but shifted the focus towards optimizing trade efficiency. They introduced systematic urban planning principles that emphasized order and functionality. The docks were restructured to improve access and storage, incorporating advanced engineering techniques. The Dutch also implemented a grid pattern in the city layout, which contrasted with the organic growth of the earlier periods. This grid system was designed to streamline the movement of goods from the docks to the markets and warehouses, ensuring a more efficient commercial operation.

Under British rule, Melaka's docks and urban infrastructure saw further modernization. The British introduced advanced port facilities and expanded the dock areas to handle the increasing volume of trade in the 19th and early 20th centuries. New warehouses, piers, and transportation networks were built to support the growing economic activities. The urban planning during the British period was influenced by contemporary European cities, focusing on wide streets, public spaces, and improved sanitation. The docks were integrated into a broader urban development plan that aimed to enhance both commercial efficiency and the quality of urban life.

The colonial periods in Melaka were also characterized by the introduction and integration of European architectural styles, which significantly influenced the city’s built environment. The Portuguese were the first to leave a lasting architectural legacy, with structures like A Famosa showcasing Renaissance military architecture. The use of stone and masonry, along with features such as bastions and cannons, marked a departure from the earlier wooden structures and traditional Malay architecture.

The Dutch era brought about a distinct architectural transformation with the introduction of Dutch colonial architecture. This style is evident in the Stadthuys, the former Dutch administrative building, which is one of the oldest surviving Dutch buildings in the East. Characterized by red-brick construction, large windows, and steep roofs, Dutch architecture in Melaka was designed to suit the tropical climate while maintaining European aesthetics. The influence of Dutch urban design principles also permeated residential and commercial buildings, with features such as internal courtyards and covered walkways becoming common.

The British further diversified Melaka's architectural landscape by introducing Victorian and Georgian styles. This period saw the construction of grand public buildings, churches, and institutions that reflected British colonial power and prestige. Notable examples include the Christ Church and the Clock Tower, which feature elements such as gabled roofs, intricate ironwork, and large verandas. The British also promoted the construction of shophouses that combined commercial and residential uses, characterized by five-foot ways, decorative plasterwork, and tiled facades. The colonial influence in Melaka resulted in a unique architectural blend that combined local building traditions with European styles. This eclectic mix not only enhanced the aesthetic appeal of the city but also reflected its historical evolution as a melting pot of cultures and influences. The integration of European architectural elements into the local context created a distinctive urban identity that continues to define Melaka's historical core. Understanding these influences is crucial for appreciating the city's architectural heritage and for guiding contemporary conservation efforts.

### *3.1.3 Post-colonial evolution*

#### *3.1.3.1 Transition from colonial to modern dock structures*

The post-colonial period in Melaka, beginning after the end of British rule in 1957, marked a significant transition from colonial-era docks to modern port infrastructure. This era was characterized by efforts to modernize the city and its facilities to meet the demands of a rapidly globalizing world. The initial years of independence saw a focus on rebuilding and upgrading the existing docks, which had suffered from neglect and damage during the later years of colonial rule and the Japanese occupation during World War II.

The modernization of Melaka's docks involved the introduction of advanced engineering techniques and materials. Traditional wooden docks were replaced with concrete piers and steel structures, designed to accommodate larger and more diverse types of vessels. These modern docks were equipped with improved cargo handling facilities, including cranes, warehouses, and container storage areas, which significantly increased the efficiency of port operations. The development of these new structures was driven by the need to support Malaysia's economic growth and integration into the global trade network.

The establishment of the Melaka Gateway project in the early 21st century exemplifies the continued evolution of dock infrastructure in the post-colonial period. This ambitious project aimed to transform Melaka into a major maritime and tourism hub, featuring state-of-the-art port facilities, commercial centers, and luxury waterfront developments. The project underscores the shift from traditional dock functions towards multifunctional waterfronts that serve commercial, residential, and recreational purposes. This transition reflects broader trends in urban development, where historical port cities adapt to new economic realities and technological advancements.

#### *3.1.3.2 Impact on contemporary urban morphology*

The transition from colonial to modern dock structures has had a profound impact on the urban morphology of contemporary Melaka. The modernization of the docks and the subsequent development of surrounding areas have significantly altered the city's spatial organization and land use patterns. One of the most notable changes has been the expansion of the urban core to incorporate newly developed waterfront areas, blending historical and modern elements.

The integration of modern docks into the city's fabric has led to the creation of new urban zones characterized by mixed-use developments. These areas combine residential, commercial, and recreational functions, reflecting the multifunctional nature of modern urban planning. The shift from purely industrial docklands to vibrant urban spaces has attracted new investments and populations, contributing to Melaka's economic dynamism

and urban growth. This transformation has also spurred the development of infrastructure such as roads, bridges, and public transport systems, enhancing connectivity between the waterfront and the inland city areas.

However, the impact on urban morphology has also presented challenges, particularly in terms of preserving Melaka's historical identity and heritage. The rapid development and commercialization of waterfront areas have sometimes led to tensions between conservation efforts and modern urban expansion. The juxtaposition of historical buildings with contemporary structures has created a complex urban landscape that requires careful planning and management to maintain its unique character.

Efforts to balance modernization with heritage conservation are evident in initiatives such as the Melaka Historic City Council's urban planning strategies. These strategies aim to protect the historical core of the city, including its iconic shophouses, colonial buildings, and traditional neighborhoods, while accommodating new developments. By promoting sustainable urban practices and emphasizing the importance of cultural heritage, Melaka seeks to preserve its historical essence amidst ongoing urban transformation.

In conclusion, the post-colonial evolution of Melaka's docks has significantly influenced the city's contemporary urban morphology. The transition from colonial to modern dock structures has facilitated economic growth and urban expansion, but it has also necessitated a nuanced approach to urban planning that respects the city's rich historical legacy. Understanding this evolution is crucial for developing strategies that ensure Melaka's continued growth while preserving its unique cultural and architectural heritage.

### *3.2 Urban morphological performance*

#### *3.2.1 Physical connections between docks and city*

The relationship between docks and urban areas is a complex one, influenced by physical, social, and cultural dimensions (Marat-Mendes, 2016). Urban morphology, including the design of city edges and vertical connections, plays a crucial role in this relationship (Camiz, 2014). The potential influence of urban morphology on planning practice is also significant (Hall, 2013). Economic factors, such as the role of ports in industrial and urban development, further underscore the importance of this relationship (Suykens, 1989). Urban morphology can be used as a pedagogical tool in urban design, as demonstrated in the case of waterfront redevelopment in Auckland, New Zealand (Gu, 2018). The morphological analysis of waterfronts, such as in the city center of Kuala Lumpur, can provide valuable insights for decision-making in urban development (Latip et al., 2009). However, the contemporary condition of urban morphology and its role in architectural design is a topic that requires further exploration (Strappa, 2019). The practical application of urban morphology in urban design is emphasized by Ding (2013).

Figure 3 below, illustrates the organization of the boating industry in Melaka, detailing the process of goods transportation from deep-water terminals to riverside warehouses. This diagram captures the multi-stage journey of goods, starting from their arrival at large deep-sea vessels which dock at the deep-water terminal, the first landing point. Upon disembarkation, goods are discharged and initially stored at the riverside quay, facilitated by the labor of coolies who handle the manual aspects of unloading. Subsequently, the goods are transported via sampans (traditional small boats) along the river to their final destination at the riverside warehouse, the second landing point. This system highlights the critical roles of different transportation methods and labor in maintaining the efficiency of Melaka’s historical maritime trade network.

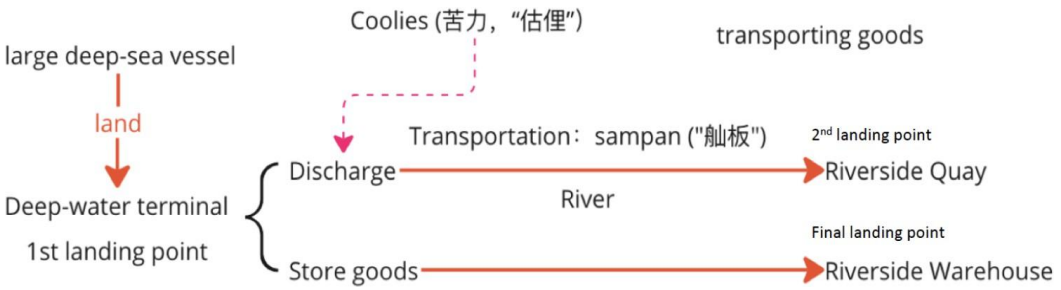



Fig. 3. Graph of organization in the boating industry

The process of terminal transportation in Melaka involves several sequential steps. Firstly, large ships anchor at the sea entrance. Secondly, barges are used to connect to the river, allowing for transportation inland. Thirdly, the barge sails into the river, navigating the waterway to reach the desired destination. Fourthly, coolies unload the goods from the barges onto the riverbank. Finally, the goods are carried by coolies to nearby warehouses, completing the terminal transportation process.

The physical connections between docks and the city play a crucial role in shaping Melaka's urban morphology. The docks along the Melaka River are strategically positioned to facilitate efficient movement of goods and people, influencing the layout and connectivity of the surrounding urban areas. The city's urban design reflects these connections, with streets and pathways radiating from the docks, providing direct access to markets, warehouses, and other key urban spaces. This arrangement not only supports commercial activities but also fosters social and cultural interactions, contributing to the vibrant urban life of Melaka.

Key dock spaces along the Melaka River, such as the deep-water terminal, riverside quay, and riverside warehouses, serve as vital nodes linking the waterfront to the inland city. These spaces are integral to the urban fabric, supporting a range of economic activities and shaping the spatial organization of the city. The connectivity between these docks and other urban areas is facilitated by a network of roads, bridges, and pathways that ensure smooth transportation and communication. Analyzing the layout and connectivity of these dock spaces provides insights into the historical development of Melaka and its adaptation to changing economic and social conditions.

### *3.2.2 Lost docks and market spaces*

The historical mapping of Melaka's lost docks reveals the dynamic nature of the city's urban development and the shifting priorities over time. Many of the early docks, which once thrived as centers of trade and commerce, have been lost or repurposed due to urban expansion, land reclamation, and modernization projects. Identifying these lost docks involves examining historical maps, records, and other archival materials to reconstruct their locations and understand their roles in the city's growth.

Market spaces played a critical role in the development of Melaka, serving as hubs of economic activity and social interaction. These markets were often situated near docks, capitalizing on the proximity to incoming goods and traders. The integration of market spaces into the urban layout facilitated the efficient distribution of goods and contributed to the vibrant commercial life of the city. As docks evolved and some were lost, market spaces also adapted, relocating or transforming in response to changing urban dynamics.

Understanding the historical significance of these lost docks and market spaces provides valuable insights into Melaka's urban evolution. It highlights the importance of these elements in shaping the city's economic and social fabric, offering lessons for contemporary urban planning and heritage conservation. Preserving the memory and remnants of these historical nodes can enrich the cultural heritage of Melaka, ensuring that the city's rich maritime history continues to inform its future development.

### 3.2.3 Religious buildings and cultural nodes

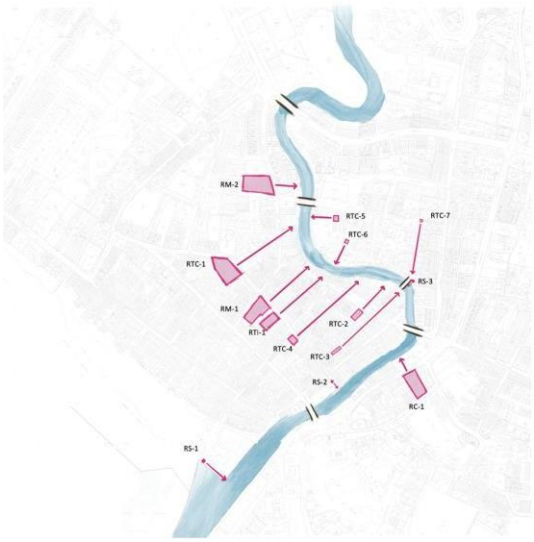
#### 3.2.3.1 Influence of docks on the location and architecture of religious buildings

The docks along the Melaka River have historically played a significant role in determining the location and architecture of the city's religious buildings. As Melaka developed into a major maritime hub, the influx of traders and settlers from diverse cultural and religious backgrounds necessitated the construction of various religious edifices to serve their spiritual needs. These religious buildings were often strategically situated near the docks to cater to the needs of the seafaring population and to facilitate easy access for worshippers arriving by boat.

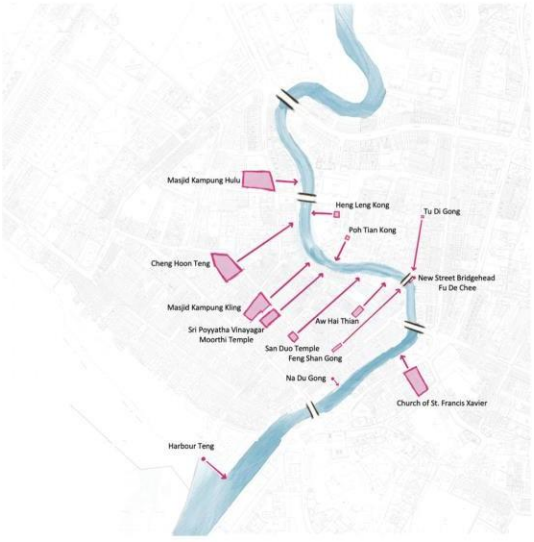
The proximity to the docks influenced the architectural styles of these religious buildings, incorporating elements that catered to the practicalities of the waterfront locations. For example, some temples and mosques feature prominent towers and minarets that served as navigational landmarks for incoming ships. Additionally, the architectural design often included large, open courtyards and covered walkways that provided shelter and respite for travelers and dockworkers. The stylistic features of these buildings often reflected the multicultural influences brought by the various trading communities, blending local architectural traditions with those from China, India, and the Middle East.

#### 3.2.3.2 Interaction between docks and cultural heritage sites

The interaction between docks and cultural heritage sites in Melaka is evident in the way these sites have evolved and been preserved over time. The docks served as gateways for cultural exchange, bringing in not only goods but also ideas, beliefs, and traditions. This cultural exchange is reflected in the religious buildings and heritage sites that line the Melaka River, forming a vibrant cultural landscape.




The morphological diagram of religious buildings




The detailed information of religious buildings

Fig. 4. Morphological analysis of religious buildings

Figure 4 above, illustrates the morphological diagram and detailed information of key religious buildings along the Melaka River, highlighting their spatial relationship with the docks. These buildings include temples, mosques, and churches, each with its unique architectural style and historical significance. The Cheng Hoon Teng Temple, for instance, is one of the oldest functioning temples in Southeast Asia and is located near the ancient docks, reflecting its historical role as a spiritual center for Chinese traders. Similarly, the Kampung

Kling Mosque, with its blend of Sumatran, Chinese, and Hindu architectural elements, showcases the multicultural interactions facilitated by the proximity to the docks.

The preservation of these cultural nodes is intertwined with the conservation of the docks. Efforts to maintain and restore these religious buildings often involve safeguarding their historical context, including the surrounding dock areas. The interaction between the docks and these heritage sites highlights the importance of an integrated approach to urban conservation, where the preservation of one aspect of cultural heritage supports the broader historical narrative of the city. The continuous use and adaptation of these religious buildings also reflect their resilience and ongoing significance in the urban fabric of Melaka. By understanding the historical connections between the docks and these cultural nodes, contemporary urban planners and conservationists can better appreciate the layered history of Melaka and develop strategies that honor and preserve its rich cultural heritage.The docks of Melaka have significantly influenced the location, architecture, and cultural significance of the city's religious buildings. The close interaction between these docks and cultural heritage sites underscores the need for comprehensive conservation efforts that recognize the interconnectedness of Melaka's maritime and cultural history. Through detailed morphological analysis and historical mapping, this research highlights the enduring legacy of the docks in shaping Melaka's unique urban landscape.

## 4. Conclusions

This research has illuminated the intricate relationship between historical docks and the urban development of Melaka, showcasing how these maritime structures have significantly influenced the city's urban morphology and architectural typology from its earliest settlement to the present day. By examining the physical connections between the docks and the city's inland areas, this study has highlighted the critical role of docks in shaping the spatial organization and urban layout of Melaka. The docks not only facilitated trade and economic growth but also served as focal points for cultural exchange and social interaction, contributing to the vibrant and multicultural character of the city.

The colonial and post-colonial periods brought significant transformations to Melaka's docks and urban landscape. Each colonial power—Portuguese, Dutch, and British—introduced new architectural styles and urban planning principles that reshaped the city's built environment. The transition from colonial to modern dock structures further influenced the urban morphology, as modern infrastructure and advanced engineering techniques were integrated into the city's fabric. Despite these changes, the historical significance of the docks has been preserved in the architectural heritage and cultural identity of Melaka. The juxtaposition of historical and contemporary elements in the city's landscape reflects the adaptive nature of Melaka's urban development.

Understanding the historical and contemporary significance of Melaka's docks provides valuable insights for future urban planning and heritage conservation efforts. The preservation of these historical nodes, including the religious buildings and cultural sites connected to the docks, is essential for maintaining Melaka's unique urban identity and cultural heritage. By adopting a multidisciplinary approach that combines historical research, architectural analysis, and urban planning, this study offers a comprehensive framework for preserving and enhancing the historical urban landscape of Melaka. It underscores the importance of an integrated conservation strategy that recognizes the interconnectedness of Melaka's maritime and cultural history, ensuring that the city's rich legacy continues to inform and enrich its future development.

## Acknowledgement

The author gratefully acknowledges the reviewers for their valuable critiques and insightful recommendations, which greatly improved this manuscript. Additional thanks are extended to colleagues and mentors who provided guidance and support throughout the research process.

## Author Contribution
This work was solely conducted by Z, M., who was responsible for the conceptualization, methodology, data collection, analysis, and writing of the manuscript.

## Funding
This research received no external funding.

## Ethical Review Board Statement
Not available.

## Informed Consent Statement
Not available.

## Data Availability Statement
Not available.

## Conflicts of Interest
The authors declare no conflict of interest.

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## Biography of Author

**Mo Zhihui,** Master of Arts in Architectural Conservation, Department of Architecture, National University of Singapore, 117566, Singapore.

- Email: e1101827@u.nus.edu
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A