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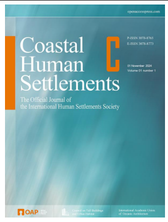

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Research on the Systematic Construction and High-Quality Development of Urban Coastal Slow Traffic Spaces

Sun Dong[1,*]

[1] School of Architecture and Urban Planning, Shenyang Jianzhu University, Shenyang 110168, China

*** Correspondence:** sundong@sjzu.edu.cn

ABSTRACT: With the advancement of coastal living environment development and the improvement of urban ecological conditions, the systematic construction and high-quality development of coastal slow traffic spaces have become one of the important issues in promoting urban sustainable development. Coastal slow traffic spaces undertake multiple functions including ecology, transportation, society, and culture. The study first examines the significance of coastal slow traffic spaces from a multidimensional perspective, highlighting their importance across four key areas: public health, ecological resilience, cultural heritage preservation, and economic vitality. Then system analyzed key issues in the current coastal slow traffic spaces, including continuity, right-of-way protection, spatial quality, and functional integration. The study proposes a comprehensive optimization framework and implementation strategies based on four dimensions—multi-network integration, cultural expression, enhancement of ecological resilience, and smart services. This approach helps to build an efficient, green, people- centered, and intelligent coastal slow traffic system. It also promotes coastal slow traffic spaces to truly become high-quality public spaces that serve all citizens and foster sustainable urban development.

KEYWORDS: Coastal Cities; Slow Traffic Space; People-Centered City; Multi-Network Integration

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Urban coastal spaces are located at the interface between the ocean and the land, possessing exceptional geographical advantages. They not only carry the historical memory of urban development but also hold the potential for future sustainable growth. As the most valuable areas of coastal cities, these spaces concentrate high-value land, superior landscape resources, and intensive economic activities. In the context of ecological priority and urban regeneration, this period represents a critical opportunity to promote high-quality coastal living environments and a critical stage for advancing deep harmony between nature and human settlements.

As the important component of urban road system, coastal slow traffic space play dual key role at this stage. On one hand, as the main transportation network， coastal slow traffic space offers diverse activities, including daily commutes, sporting events, social interactions, family activities. On the other hand, it combine diverse functions to form a multifunctional leisure corridor, such as tourism, fitness, and daily travel. The coastal slow traffic space serves not only as a transportation network and leisure corridor, but also as a systemic public space to provide multi-dimensional values such as ecological, culture, health, and smart technology. It could meet public demand for access to the sea. Its excellent landscape and ecological environment provide an ideal place for people to communication and leisure. The coastal slow traffic space creates a more livable, workable, and enjoyable environment for the city. It not only meet to the growing and diverse needs of residents but also significantly enhances the quality of the urban landscape and ecological environment. Currently, the coastal slow traffic space has become an important showcase for urban charm.

1、Coastal Slow Traffic Spaces Guided by Multi-Dimensional Values

The planning of coastal slow traffic spaces has transcended traditional functions such as transportation access or landscape aesthetic. It has transformed into a systemic public space that combines multiple values -including ecological, public health, culture, and economy. This shift reflects the core requirements of high-quality urban development and the a people-centered urban concept. Urban spaces must not only prioritize efficiency, but also respond to the public's aspiration for enhancing quality of life along the waterfront. In this context, the coastal slow traffic spaces could be understood through four key value dimensions:

The value of public health. Based on blue-green spaces, coastal slow traffic space provide resident with places for proactive health activities such as walking, cycling, and fitness. By optimizing path continuity, environmental comfort, and facility amenities, they could effectively promote physical and mental well-being, meeting the growing demand for healthy living.

The value of eco-resilience. Some methods could enhance the ecological resilience of coastal areas in response to climate change. For example, the slow traffic system should not only follow the natural shoreline and watercourse direction, but also retain the original vegetation and ecological foundation as much as possible. Moreover, planners could protect the diversity of rivers, lakes, and seas through low-intervention approaches.

The value of cultural Legacies. As the "urban living room", coastal slow traffic spaces carry regional memories and spirit of the place. It combines legacies, cultural landmarks, and natural landscapes. By narrative design and spatial translation, waterfront cultural corridor could be constructed with history, regional character, and emotional resonance.

The value of economic vitality. Coastal slow traffic spaces are mainly located in city centers or key functional zones. Based on the high density of pedestrian flow and activity, it activates commercial, tourism, and social functions in these spaces. These functions could enhances land value and stimulates urban vitality.

In summary, the systematic coastal slow traffic space is the product of multiple values. Its planning and construction need to combine natural, cultural, and societal demands. This could achieve the spatial paradigm transform from the "vehicle-centered" to the "people-centered".

2、Existing Problems of Urban Coastal Slow-Traffic Spaces

Urban coastal slow-traffic spaces serve as an important link between natural environments and urban areas, playing a vital role in enhancing urban livability and promoting healthy lifestyles. However, many challenges remain in current coastal slow-traffic spaces. These problems are mainly reflected in four aspects: spatial structure, traffic organization, user experience, and functional vitality.

2.1 Fragmented development and insufficient continuity of slow-traffic spaces

At present, the development of slow-traffic spaces is largely characterized by scattered and segmental construction, lacking systematic and integrated planning at the overall level. Influenced by urban roads, railways, and land development, clear discontinuities exist between different sections, resulting in poor pedestrian connectivity and weak spatial continuity. In addition, slow-traffic spaces were insufficiently connected with surrounding residential areas and public service facilities, showing limited spatial permeability and failing to integrate effectively into the overall urban spatial structure. This constrains their ability to function as comprehensive corridors for slow mobility and public activities, leading to inadequate continuity.

2.2Weakened right of way and insufficient priority for slow traffic

In terms of traffic organization, the protection of slow traffic right of way remains insufficient. In some sections, slow-traffic spaces are occupied by motorized traffic, and conflicts. The phenomenon of mixed traffic flow between motorized and non-motorized vehicles was relatively common. Key locations such as crossings, intersections, bridges, and underpasses often fail to adequately accommodate slow-traffic needs, resulting in low levels of safety for pedestrians and cyclists. Moreover, poor connectivity between slow-traffic routes and public transport stations reduces the attractiveness and practicality of the slow-traffic system within daily travel patterns.

2.3 Inadequate spatial quality and lack of human-centered design

From the perspective of user experience, some slow traffic spaces shown deficiencies in spatial scale, pavement quality, and facility provision. Sidewalk widths were uneven, and pavement deterioration and damage occur in certain areas, negatively affecting walking safety and comfort. At the same time, facilities such as shading, seating, and wayfinding were insufficient, making it difficult to respond to the coastal environment's characteristics of high temperatures and strong sunlight. Friendliness toward elderly people, children, and individuals with limited mobility remains limited, and overall spatial quality and user experience were relatively low.

2.4 Single function and insufficient vitality of slow-traffic spaces

Currently, the functional configuration of slow traffic spaces was relatively limited, with an emphasis on sightseeing and basic circulation, while support for commuting, fitness, and social interaction was insufficient. Space usage was concentrated in specific periods, daily participation was low, and continuous activity support was lacking, resulting in limited overall vitality. Furthermore, the weak integration between slow-traffic spaces and surrounding public spaces, commercial areas, and cultural facilities prevents the formation of mixed-use and interactive public life scenarios, constraining their comprehensive value in urban public life.

3、Comprehensive Optimization Pathways and Implementation Strategies for Coastal Slow Traffic Spaces

In response to the numerous shortcomings existing in coastal slow traffic spaces, enhancing their overall efficiency and quality requires a systematic and multi-level approach. This study explores four key dimensions—multi-network integration, ecological and smart design, cultural character shaping, and technology-enabled experiences—with the aim of constructing a coastal slow-traffic system that is efficient, sustainable, human-centered, and intelligently driven.

3.1Coordination between Integrated Networks and Daily Life Spaces

The slow coastal traffic system should not be regarded as an isolated auxiliary facility, but rather as an integral part of the comprehensive urban transportation system. Together with rail transit, surface public transport, and waterside transport, it forms a multi-modal transport network with clearly defined functional roles and a well-structured hierarchy. By enhancing integrated connectivity across all transport modes, the fundamental role of the slow-moving transport system in supporting short-to-medium distance commuting and intermodal transfers will be fully leveraged. It will achieve efficient coordination between slow-moving transport, bus services, rail networks, and waterborne transport. At the same time, in line with the development of the "15-minute community living circle," slow mobility should be encouraged to serve more every day and life-oriented travel needs. It should improve accessibility and convenience between residential areas and public service facilities. These facilities include education, healthcare, and commercial services. On this basis, greenway networks should be organically integrated with blue–green ecological corridors as key carriers of slow mobility, promoting the multifunctional use of ecological spaces and transportation functions. This approach will comprehensively improve operational efficiency, carbon-reduction performance, and system resilience of transportation systems in coastal areas.

3.2 Coordinated Shaping of Cultural Expression and Historical Memory

At the level of humanistic character development, regional culture and a sense of place should be taken as the core, with the coastal slow-traffic system serving as an important medium for carrying urban memory and cultural expression. Through systematic analysis of local historical, cultural resources and natural characteristics, achieve contemporary expression and spatial translation of cultural elements. Within coastal slow-traffic spaces, emphasis is placed on preserving and reusing historical fabric, key nodes, and iconic imagery, thereby weaving a continuous cultural narrative across the temporal dimension of pedestrian exploration. Simultaneously, guiding the organic integration of public art and landscape spaces, employing artistic expression and contextual design to invigorate the ambience of pedestrian zones. This enhances the participatory nature and emotional resonance of the walking experience, propelling the slow-moving system from a mere passageway into an urban living vessel that embodies both cultural identity and public value.

3.3 Sponge-like—Resilient—Smart Integrated Guidance

Based on the principles of ecological priority and sponge-based integration, coastal slow traffic spaces should be incorporated into the blue–green ecological network. Integrating sponge city principles, the design coordinates rainwater infiltration, storage, and purification functions. It guides the integration of pedestrian and cycling spaces with natural hydrological processes, reducing disruption to the coastal ecological environment while enhancing the system's overall ecological safety and environmental stability. In response to risks such as flooding and storm surges, disaster prevention, mitigation, and emergency evacuation requirements should be integrated into slow-traffic system design. This improves spatial resilience and adaptability under extreme climate conditions. At the same time, smart monitoring and information-based management technologies should be introduced to support dynamic assessment and refined management, promoting the development of an eco-friendly and efficient coastal slow-traffic system.

3.4 Enhancement of Intelligent Services and Operational Management

In the development of coastal slow traffic systems, technological empowerment should serve as a key driver to promote the transformation of coastal slow-mobility spaces from "static facility supply" to "dynamic smart services." By introducing smart navigation systems that integrate route guidance, cultural interpretation, ecological information, and safety alerts, users' cognitive efficiency and depth of experience within coastal spaces can be significantly enhanced. Relying on smart parking and slow traffic transfer management, motor vehicles, non-motorized transport, and shared mobility resources can be better coordinated, alleviate the problem of coastal slow-traffic spaces being occupied, and strengthen traffic order that prioritizes slow-moving vehicles. At the same time, a dynamic management system based on the Internet of Things and big data should be established to enable real-time monitoring and refined regulation of pedestrian flow density, facility operations, and environmental conditions, thereby allowing proactive responses to peak-period pressures, safety risks, and facility maintenance needs.

4、Conclusion and Future Prospect

In the new phase of high-quality urban development, the systematic construction of coastal slow traffic spaces has become a key issue for driving the transformation of coastal cities and enhancing the quality of the living environment. Its core breaks through the limitations of single access or landscape function in the slow traffic space. Meanwhile, it explores the multiple dimensions values such as ecological, cultural, health, and smart. Based on this foundation, the existing slow traffic system will be systematically optimized, integrated, and restructured within the coastal context.

In the future, based on long-term behavioral observation and big data analysis, the studies could establish the evaluation systems for meeting different user groups' demands. Scholars could deepen research on micro-level experiences in coastal slow traffic spaces, including age-inclusivity, all-day vitality, comfort, sense of security, and social interaction. They are helpful for coastal slow traffic spaces becoming the high-quality public spaces and promote well-being. We look forward to future research and practice continuing to deepen and iterate toward refinement. Moreover, they could play a key role in coastal cities transforming into a new phase of high-quality development that is greener, healthier, smarter and more attractive.