Evaluating Sustainable Campuses based on CIPP Model —— a case study between Japan and China's universities

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Why Focus on Sustainable Campuses?

Global Background: The rapid urbanization and industrialization have exacerbated environmental degradation, intensified global warming and resource waste. Therefore, SDGs have gained significant global attention to address pressing ecological, social, and economic challenges (Quarrie,1992).

HEIs Role: University campuses, functioning as microcosms of society with large-scale infrastructure and social attributes (Alshuwaikhat and Abubakar, 2008), serve as critical platforms for advancing sustainable practices (Zakaria et al., 2016). As Qian (2021) suggests, the research outcomes of sustainable campus initiatives can be scaled to benefit broader societal systems.

Current Status

International Status

Although the 1992 Rio Summit laid the framework for sustainable development, the practice of sustainable campuses in universities has still progressed slowly and shows significant regional differences (Bokolo,2021).

Evaluation Guidelines

The international environmental assessment standards set by the Western society may not be suitable for China and other eastern or the third world countries (周宏春， 2021; Zhu et al., 2023)

China's Performance

Fudan University, the highest-ranked Chinese institution in the QS Sustainability University Rankings 2025, is placed only at 133rd globally.

Research Outlines

1. Explored the differences and similarities in sustainable campus practices between Japan and China, especially focusing on energy conservation and emission reduction in buildings.

2. Explored Japan's localization experiences and identified the challenges faced by China.

3. Provided insights into how global standards can be localized while addressing sustainability challenges in Chinese HEIs.

Reasons for Japan and China

Similarities: Japan and China share similar post-WWII industrial baselines and comparable green building standards, both prioritizing energy conservation and emission reduction in campus sustainability (Tan et al., 2014; Zhu & Dewancker, 2021; Yoshida et al., 2017).

Localization experience: Japan has successfully localized international standards, balancing global certification requirements (e.g., ZEBs) with national conditions (Oki et al., 2019).

Initiatives: Osaka University represents Japan's success in energy efficiency with its comprehensive ZEB projects, showcasing institutional adaptability. While China Petroleum University, as an energy-focused institution, addresses building energy challenges through the Resource Conserving Schools initiative.

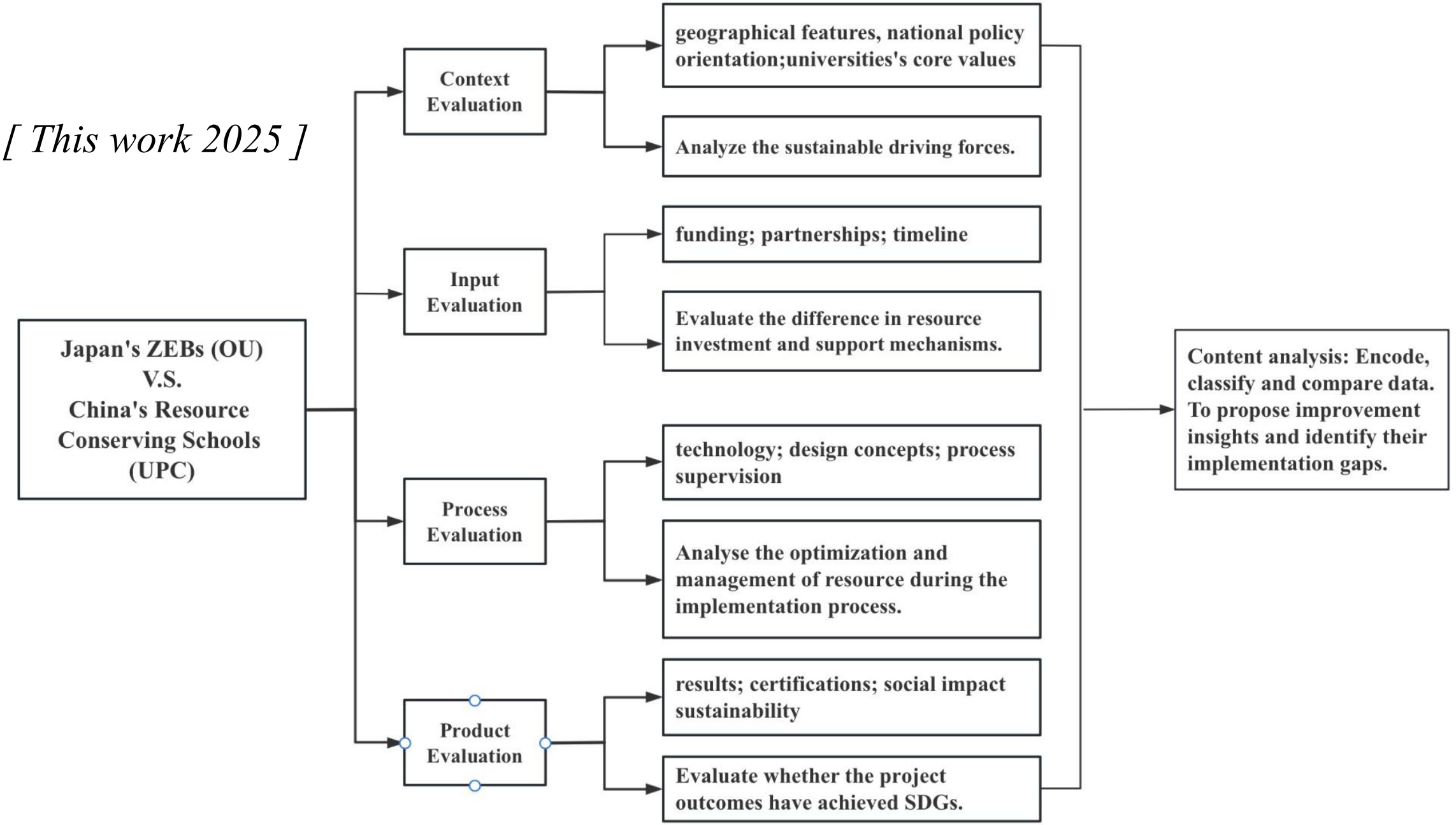
Methodology

This study employs the CIPP (Context, Input, Process, Product) evaluation model to conduct a comparative analysis of OU and UPC.

Using content analysis, secondary data such as official reports, campus policies, and public documents were analyzed to assess policy orientation, institutional priorities, and implementation gaps in sustainable campus development.

(The Methodology Flowchart can be found on the next page.)

[This work 2025]



Context Evaluation: Policy Background

Japan

Japan released *Building Energy Conservation Law* aims to achieve universal ZEB by 2030. Specific quantitative and qualitative definitions for ZEB certification.

	QUALITATIVE DEFINITION	QUANTITATIVE DEFINITION
ZEB	Buildings that have reduced annual primary energy use to net zero (usage minus generation)	Buildings that have achieved net energy saving of 100% or more by combining 50% or higher energy saving and energy creating
Nearly ZEB	Buildings that have reduced annual primary energy use to nearly zero by using renewable energy	Buildings that have realized net energy conservation of 75% or higher by combining 50% or higher energy saving and energy creating
ZEB Ready	Buildings that use advanced architectural designs that aim to be ZEBs, with an exterior capable of high thermal insulation and highly efficient, energy-saving equipment	Buildings that have reduced primary energy consumption by 50% or more
ZEB Oriented	Buildings that aim to be ZEB Ready, with an exterior of high performance, highly efficient, energy-saving equipment, and measures for achieving further energy saving in place	Buildings that have realized net energy conservation of at least 40% in office buildings and 30% in hotels with a floor space of 10,000m^2 or more and have adopted a promising but untested technology that enables significant energy savings

China

China launched the “Green Campus” initiative and issued *Evaluation Guidelines for Resource Conserving Schools*. The guidelines combine a scoring system with qualitative descriptions.

4 评价指标分类和方法

4.1 节约型学校评价指标分为管理评价指标和资源利用水平指标两类。

4.2 节约型学校的管理评价指标内容和要求见 5.1，管理评价指标计分方法见附录 A，计分标准满分为 100 分，得分在 90 分以上（含 90 分）的学校符合节约型学校的管理评价要求。

4.3 节约型学校的资源利用水平指标见 5.2，计算方法参见附录 B，各项指标均达到同类可比先进水平的学校符合节约型学校的资源利用水平评价要求。

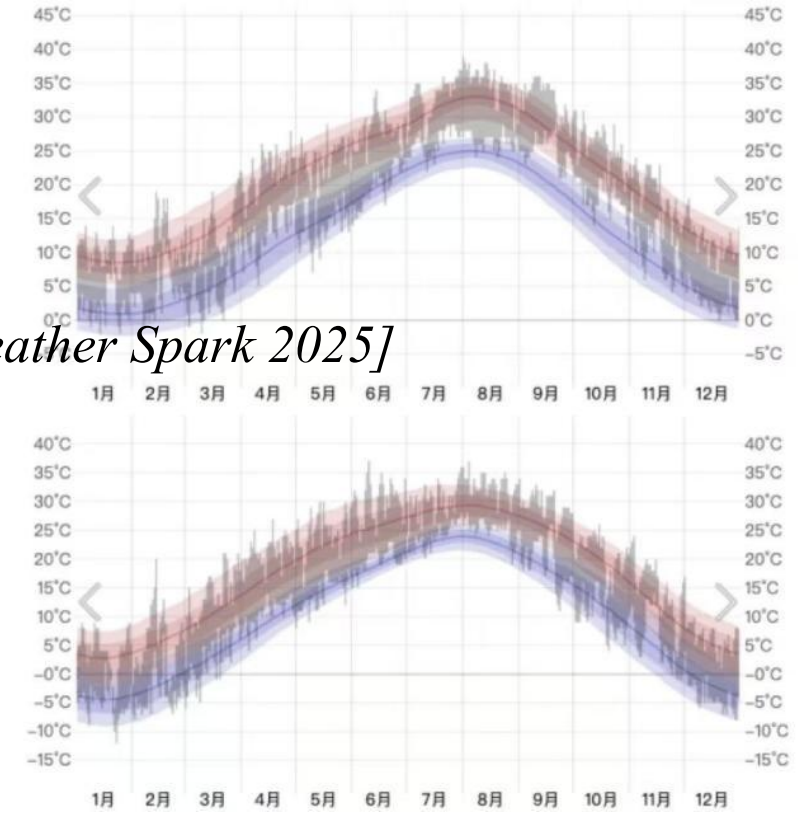
4.4 管理评价和资源利用水平评价同时符合要求的学校为节约型学校。

Core values: OU prefers “sustainable”, “sustainability”. While UPC uses “Green Campus”, where “可持续发展” (SD) often refers to teacher professional development rather than campus sustainability.

[This work 2024]

Geographical factors: Both Osaka and Qingdao are rich in renewable resources but face significant heating and cooling demands.

[Source: Weather Spark 2025]

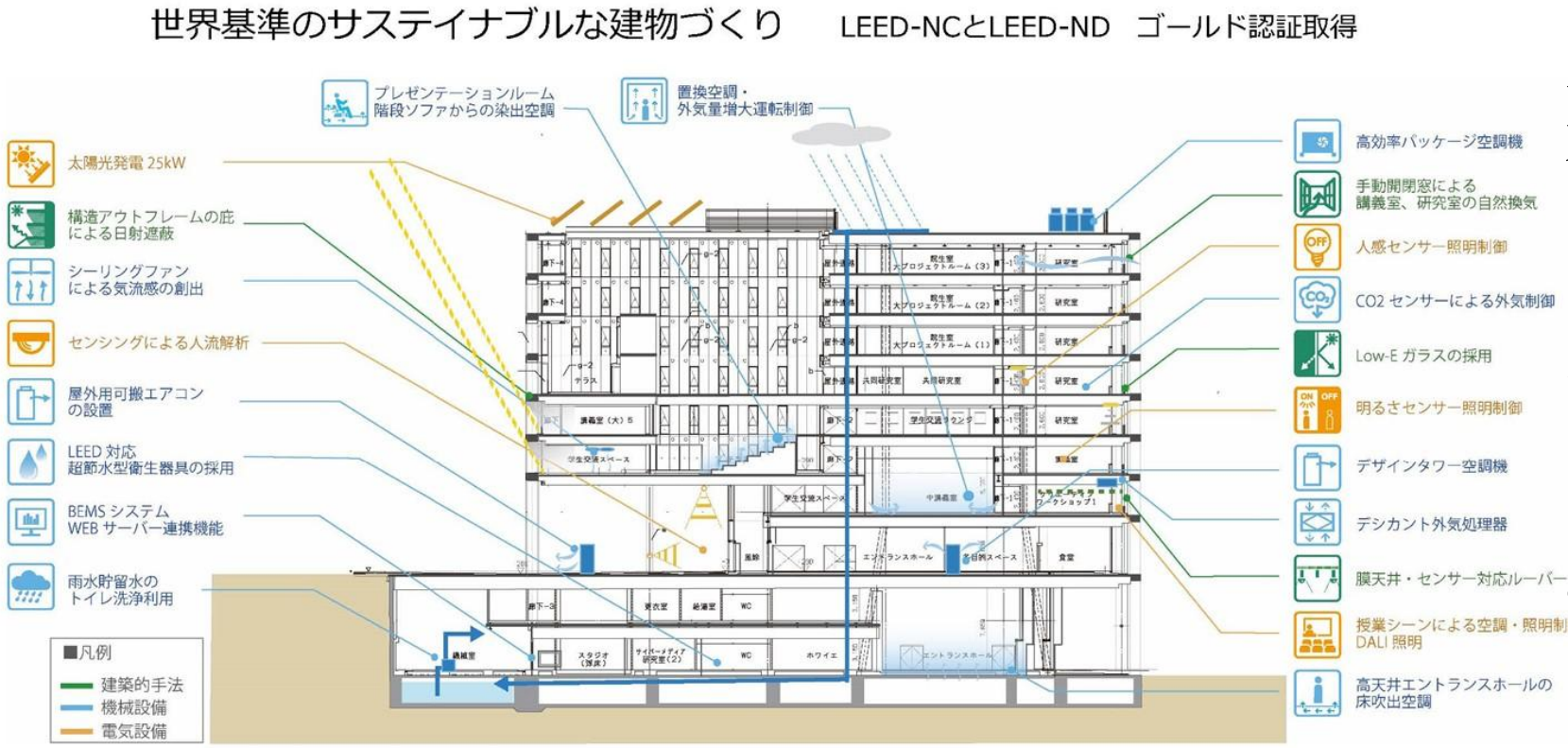


The daily temperature range (gray bars) and 24-hour high (red dots) and low (blue dots) temperatures.The upper is Osaka and the other is Qingdao.

Input Evaluation

	OU	UPC
Funding	Not publicly data, relies on industry collaboration.	Public in annual reports. The total funds from 2009 to 2015 exceeded 3 billion.
Partnerships	Companies lead commercialization; government supports with policies.	State-owned companies dominate; government provides direct funding.
Timeline	OU follows a gradual, standards-based certification process from 2017~2025 (planned)	UPC completed most work in a compact timeframe before receiving final certification, from 2005~2017.

Process Evaluation: OU



Design concepts: Compact buildings, shared community spaces, but lacks green spaces.

Technology: Focus on advanced (e.g.: Low emissivity double glass) and international certificated equipment (e.g.:LEED-compliant water saving sanitary fixtures).

Process supervision: Clear phased targets, but progress not shared.

Process Evaluation: UPC

Design Concepts: Modular zones, more greenery but separated functions.

Technology: Low-cost and practical solutions, supplemented by economical and administrative means.

Process supervision: No clear timeline, but has released annual financial report and work plan every year.

Product Evaluation

	OU	UPC
Results	Achieved an eco-friendly and ecologically diverse building/campus environment;	
	42% energy savings; Highlighted innovation but neglected economic benefits	24.99% lower energy use; Costs were saved during the process.
Certifications	7 Japanese domestic certifications and 3 international certifications	5 Chinese domestic certifications
Social impact sustainability	Established a long-term industrial cooperation for technical innovation and shared, but limited public involvement.	Improved students' awareness, but few long-term industry partnerships and limited public involvement.

Disscussion

Cultural Differences in the Interpretation of Sustainability

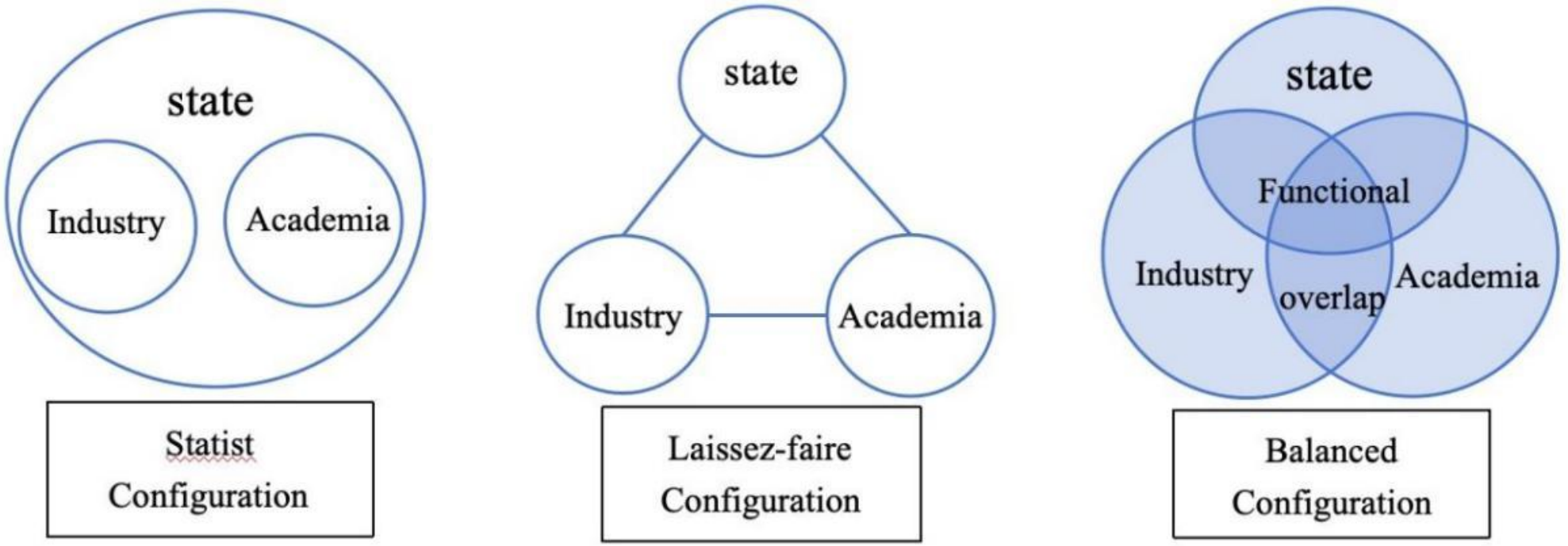
Tian (2007) pointed out that “Sustainable Development” is not a universal concept. OU aligns with international standards, emphasizing sustainability through advanced technologies. In contrast, UPC focuses on “Green Campus”, prioritizing natural harmony with human. These differences reflect the cultural and semantic divergence of “sustainability” in English and Chinese and shape their policy orientation.

Institutional Structures Shaping Different Sustainability Practices

OU relies on collaboration with companies, with the government acting as a coordinator. While UPC is heavily influenced by a government-led model, reflecting the economic legacy of northern China and state-owned industries. These differences can be explained by the Triple Helix model of U-I-G proposed by Etzkowitz and Leydesdorff (1995), with Japan following the balanced configuration (Noriko and Kenichi, 2020) and China following the statist configuration(Zhuang Tao, et al., 2021).

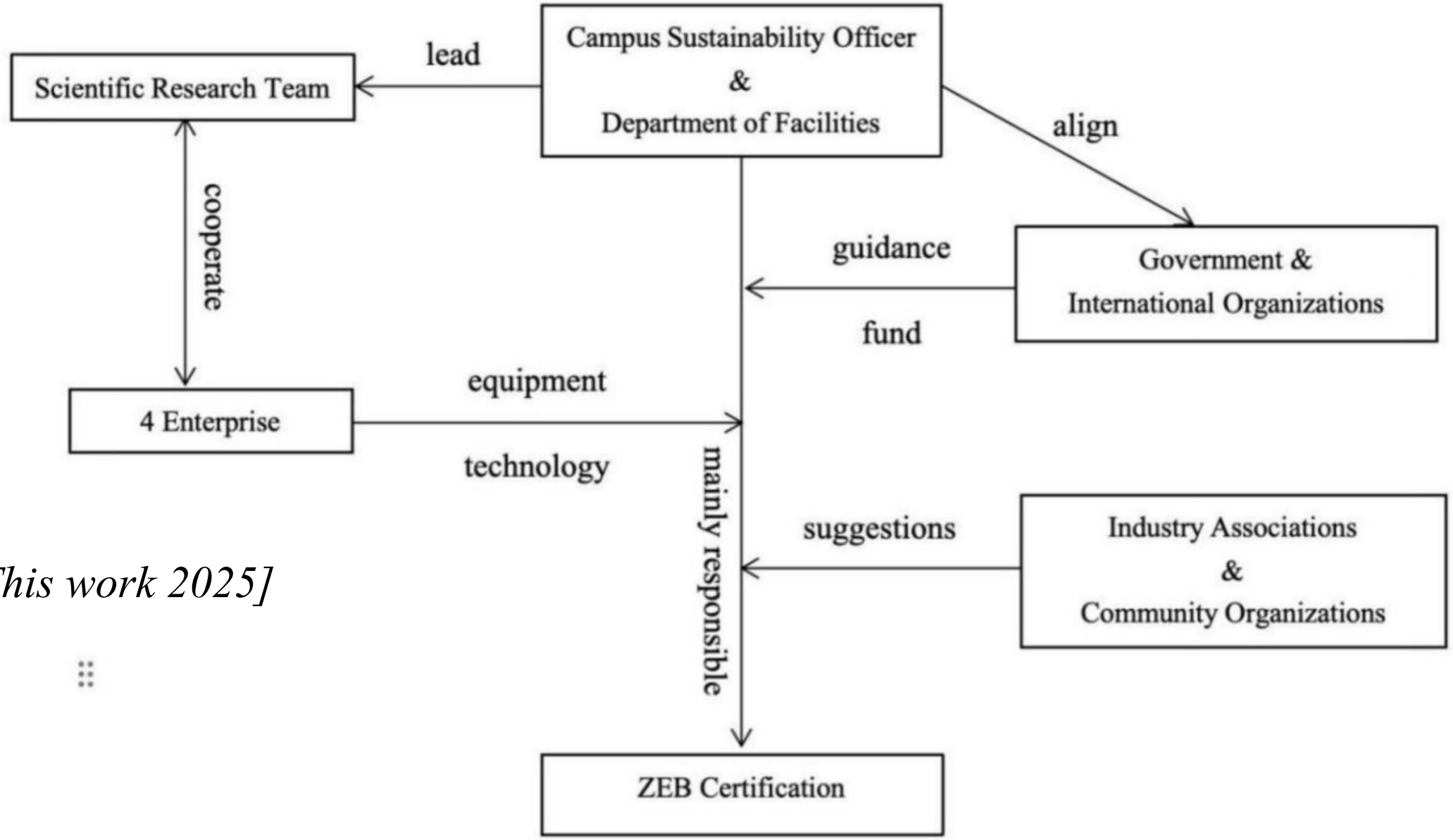
What is Triple Helix Model of U-I-G?

Statist Configuration: Government-dominated.
Laissez-faire Configuration: Market-driven autonomy.
Balanced Configuration: Complementary functions, dynamic balance.



[Source: Ranga and Etzkowitz 2013]

How do these institutions co-work? OU



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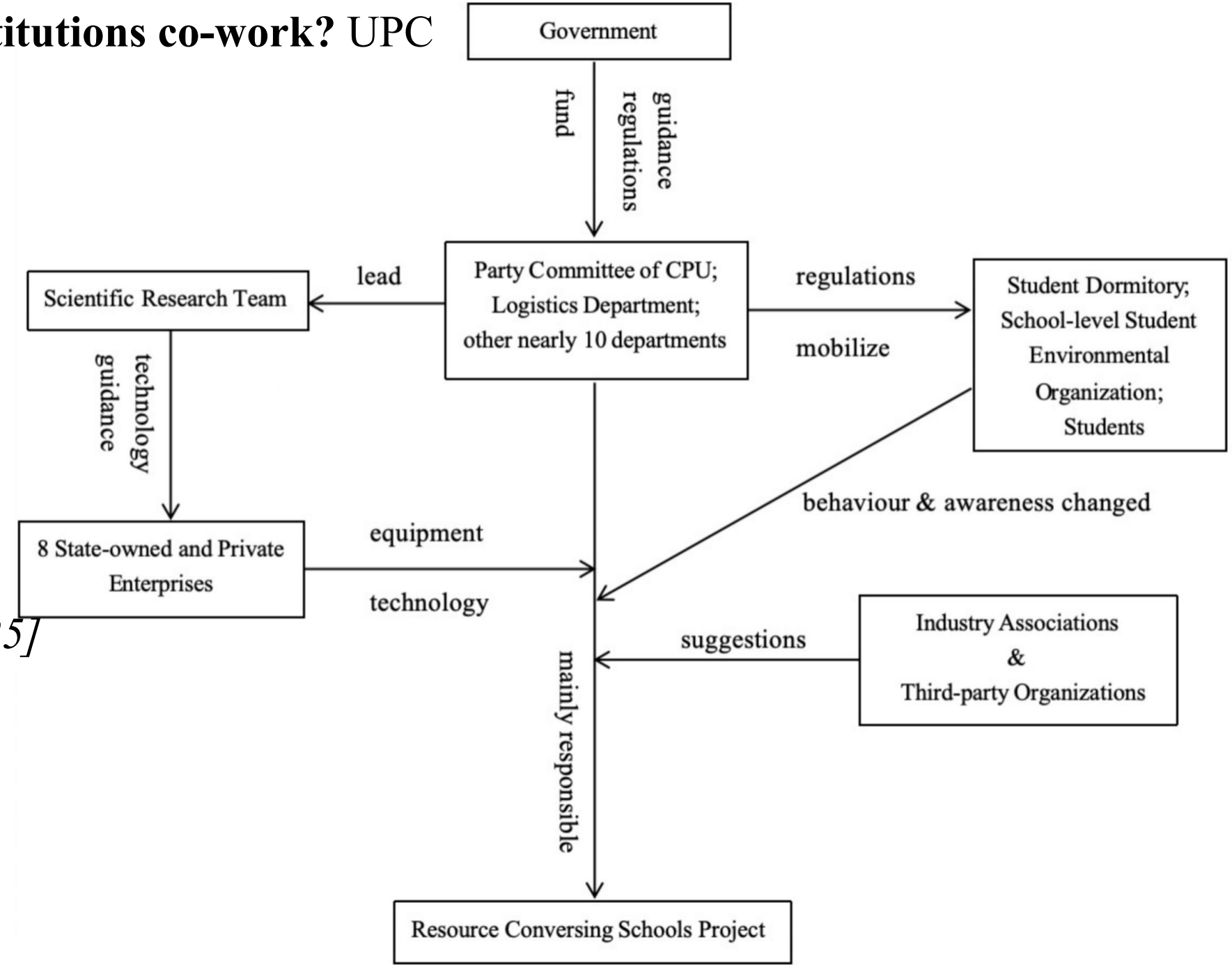
How do these institutions co-work? UPC



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Disscussion

Differences in Balancing Economic, Social, and Ecological Benefits

Different institutional configuration influence different outcomes: OU prioritize social and ecological benefits over economic return, as shown by their advanced equipment for international certifications with the help of technical companies. In contrast, UPC emphasizes cost-effectiveness and resource conservation, guided by national evaluation standards.

Challenges and Adaptations in Evaluation Standards

Japan integrated ZEB concept with CASEBB[1], and encouraged universities to take the lead in promoting it to society. However, UPC relies on limited quantified and transparent guidelines, which is lower implementation difficulty but weaken long-term sustainability and global alignment. The international standards enhances precision but poses high costs and technical barriers, limiting their applicability in developing countries (He, et al., 2021).

1.CASEBB: Comprehensive Assessment System for Building Environmental Efficiency

Suggestions for Chinese Universities

1.**Establish a quantified and transparent evaluation system.**

Introducing international evaluation standards and data-driven evidence while maintaining policy flexibility to meet local needs.

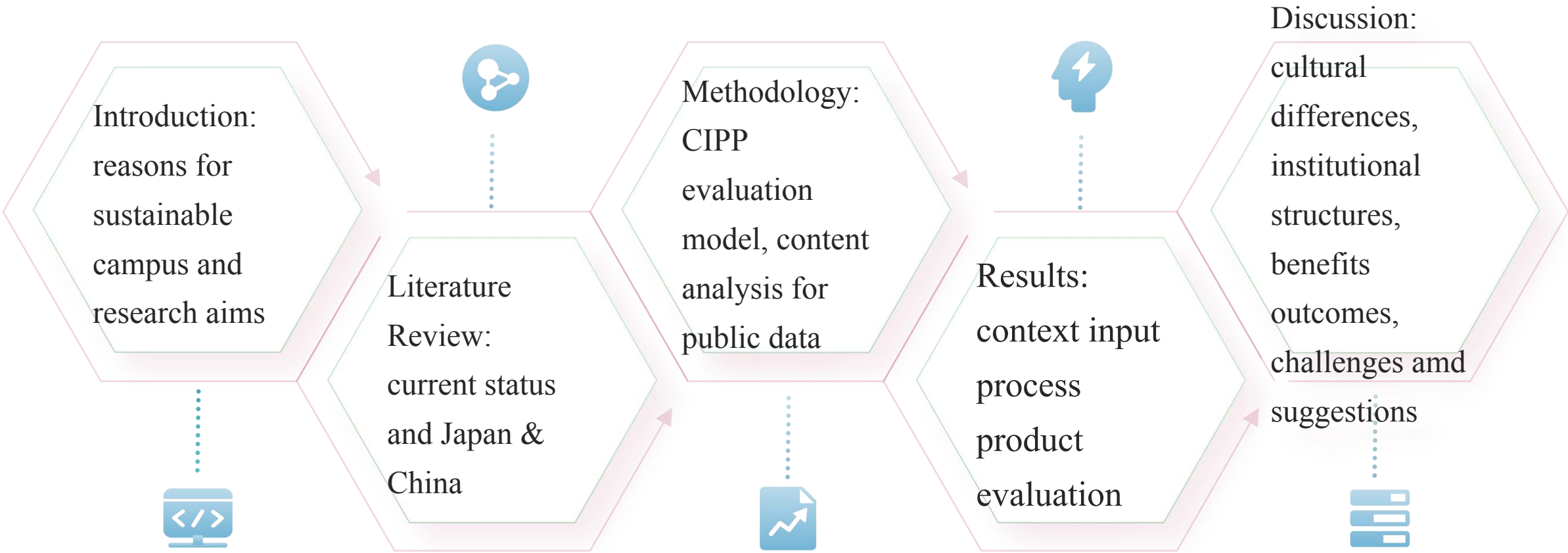
2.**Enhance data collection and technical capacity**

Investing in data collection and monitoring systems, fully adopting IoT systems for unified data collection and cloud-based processing.

3.**Promote university-industry collaboration and public engagement**

Encouraging universities to cooperate with tech companies, using campuses as testbeds for green technologies, and raise public awareness of sustainability through education and outreach.

Conclusion


Introduction: reasons for sustainable campus and research aims
Literature Review: current status and Japan & China
Methodology: CIPP evaluation model, content analysis for public data
Results: context input process product evaluation
Discussion: cultural differences, institutional structures, benefits outcomes, challenges amd suggestions