

# Cultural Design and Sustainable Architecture: Impact on SDG-11 and Urban Development

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**ABSTRACT:** This article aims to explore the relationship between cultural design and sustainable architecture, and how it contributes to the progress of Sustainable Development Goal 11 (SDG-11), which is to make cities and human settlements inclusive, safe, resilient, and sustainable. A systematic review of forty-five published journal articles from 2009 to 2023 was conducted, following the PRISMA guidelines. The articles were retrieved from various databases, such as Scopus, Web of Science, PubMed, Google Scholar, and other reliable journals. The research methodology consisted of identification, screening, eligibility, inclusion, data analysis and data synthesis. The results were presented using descriptive statistics, thematic analysis, and meta-analysis. The findings revealed that cultural design and sustainable architecture have a positive impact on SDG-11, as they enhance the social, environmental, and economic aspects of urban development. The article also discusses the challenges and opportunities for integrating cultural design and sustainable architecture in the context of SDG-11. The article concludes with some recommendations for future research and practice.

**KEYWORDS:** Cultural design; Environmental dimensions; SDG-11; Sustainable architecture, Sustainable urban development

## I. INTRODUCTION

Sustainable development is a global challenge that requires collective action from all stakeholders, including governments, civil society, the private sector, and academia. The United Nations (UN) has adopted the 2030 Agenda for Sustainable Development, which consists of 17 Sustainable Development Goals (SDGs) and 169 targets, to address the economic, social, and environmental dimensions of sustainable development [1]. Among the SDGs, SDG-11 is to make cities and human settlements inclusive, safe, resilient, and sustainable. This goal recognizes the importance of urbanization as a driver of development and innovation, as well as a source of environmental and social problems [2][3][4][5][6][7].

One of the key aspects of SDG-11 is to promote sustainable architecture, which is defined as "the design and construction of buildings that minimize the negative environmental impact and maximize the positive social impact" [8]. Sustainable architecture aims to reduce the consumption of energy, water, and materials, to

enhance indoor and outdoor environmental quality, and to improve the health and well-being of the occupants and the community [9][10]. Sustainable architecture also involves the consideration of cultural factors, such as the local context, identity, values, and traditions, that influence the design and use of buildings [11][12][13][14][15][16][17]. Cultural design is defined as "the process of creating products or services that reflect and respect the cultural diversity and heritage of the users" [18]. Cultural design can enhance the aesthetic, functional and emotional aspects of sustainable architecture, as well as foster social cohesion and cultural diversity [19][20][21][22][23].

However, there is a lack of comprehensive and systematic studies on the relationship between cultural design and sustainable architecture, and how it contributes to the progress of SDG-11. Therefore, this article aims to fill this gap by conducting a systematic review of forty-five published journal articles from 2008 to 2022, following the PRISMA guidelines [24]. The research questions are:

- i. What are the main themes and trends in the literature on cultural design and sustainable architecture?
- ii. How does cultural design and sustainable architecture impact the social, environmental, and economic aspects of SDG-11?
- iii. What are the challenges and opportunities for integrating cultural design and sustainable architecture in the context of SDG-11?

The article is organized as follows: Section 2 presents the literature review on cultural design and sustainable architecture; Section 3 describes the research methodology; Section 4 reports the results using descriptive statistics, thematic analysis, and meta-analysis; Section 5 discusses the findings; Section 6 provides some recommendations and conclusion.

## **II. LITERATURE REVIEW**

### **2.1 Cultural Design**

Cultural design is a concept that emerged in the late 20th century, as a response to the globalization and homogenization of design practices and products [18]. Cultural design emphasizes the importance of respecting and reflecting the cultural diversity and heritage of the users, as well as the local context and environment, in the design process and outcome [13][25][15][26]. Cultural design can be applied to various domains, such as product design, service design, graphic design, interaction design, and architectural design [18].

Cultural design has several benefits for both the users and the designers. For the users, cultural design can enhance their satisfaction, engagement, identity, belonging, and well-being, as they can relate to the products or services that match their cultural values and preferences [18]. For designers, cultural design can foster their creativity, innovation, and social responsibility, as they can explore new perspectives and solutions that address the needs and expectations of diverse users [13][25][15][27].

However, cultural design also faces some challenges and limitations. One of the main challenges is to balance between the preservation and innovation of culture, as well as between the universal and specific aspects of culture [18]. Another challenge is to avoid stereotyping, essentializing, or appropriating culture, which may lead to misunderstanding, discrimination, or

exploitation of the users [13][25][27][26]. Moreover, cultural design requires a deep understanding of the cultural context and a participatory approach that involves the users and other stakeholders in the design process [21][19][20][22][23][18].

Some examples of cultural design in the architectural domain are:

- i. The Guggenheim Museum Bilbao in Spain, which is designed by Frank Gehry to reflect the industrial history and cultural identity of the city [28].
- ii. The National Museum of African American History and Culture in Washington D.C., which is designed by David Adjaye to represent the African American heritage and experience through its form, material, and symbolism [29].
- iii. Jean Nouvel designed the Louvre Abu Dhabi in the United Arab Emirates to harmonize with the desert landscape and Islamic culture through its dome structure and light effects [30].

### **2.2 Sustainable Architecture**

Sustainable architecture is a concept that emerged in the late 20th century, as a response to the environmental crisis and social problems caused by conventional architecture practices and products [31][10]. Sustainable architecture aims to minimize the negative environmental impact and maximize the positive social impact of buildings throughout their life cycle [8]. Sustainable architecture follows some principles and strategies, such as passive design, renewable energy, water efficiency, waste management, biophilic design, adaptive reuse, and life cycle assessment [31][10].

Sustainable architecture yields numerous advantages for both the environment and society. Concerning the environment, it plays a pivotal role in mitigating greenhouse gas emissions, curtailing resource consumption, minimizing pollution generation, and alleviating biodiversity loss associated with buildings [8]. On the societal front, sustainable architecture contributes to enhancing the health, comfort, productivity, and overall happiness of both occupants and the community at large [31][10].

Nevertheless, sustainable architecture encounters several challenges and constraints. A primary challenge lies in striking a delicate balance between the performance and cost of sustainable buildings,

as well as navigating the intricate interplay between the technical and humanistic facets of sustainable design [9][10]. Additionally, overcoming barriers and resistance originating from the market, policy frameworks, educational systems, and cultural norms pose another formidable challenge, impeding the widespread adoption and diffusion of sustainable architectural practices and products [8]. Furthermore, the holistic and interdisciplinary nature of sustainable architecture demands a comprehensive approach that considers the diverse dimensions and stakeholders involved in building projects [9][10].

Some examples of sustainable architecture are:

i. The Eden Project in Cornwall, UK, was designed by Nicholas Grimshaw to highlight the diversity and interdependence of plants and people through its biomes and exhibits [32].

ii. The Pearl River Tower in Guangzhou, China, was designed by Skidmore, Owings & Merrill to achieve net-zero energy consumption through its aerodynamic shape, wind turbines, solar panels, and other technologies [33].

iii. The Bullitt Centre in Seattle, USA, which is designed by Miller Hull Partnership to achieve the Living Building Challenge certification, the most rigorous standard for sustainable buildings, through its self-sufficient systems and biophilic features [34].

### **2.3. Cultural Design and Sustainable Architecture for SDG-11**

Cultural design and sustainable architecture are two concepts that share some common goals and values, such as human-centeredness, context-sensitivity, innovation, and social responsibility [11][12][13][14][15][16][17]. However, they also have some differences and tensions, such as the trade-off between cultural diversity and environmental efficiency, or the conflict between cultural preservation and social change [18]. Therefore, it is important to explore how cultural design and sustainable architecture can be integrated and aligned to support the progress of SDG-11, which is to make cities and human settlements inclusive, safe, resilient, and sustainable.

SDG-11 comprises ten targets and fifteen indicators that encompass diverse facets of urban development, including housing, transportation, public spaces, heritage, disaster risk reduction, air quality, waste management, and urban planning

[35][6][7]. The attainment of these targets and indicators can be facilitated through the integration of cultural design and sustainable architecture, amplifying the social, environmental, and economic efficacy of buildings and cities [36][37][38][39][40][41][42].

Cultural design, for instance, plays a pivotal role in advancing the inclusivity, safety, and resilience of urban communities by nurturing their cultural identity, diversity, and active participation [36][37][38][39][40][41][42]. Concurrently, sustainable architecture contributes to the enhancement of urban sustainability by mitigating ecological impact, fortifying resilience, and reducing disparities [43][3][4][6][7].

However, cultural design and sustainable architecture also face some challenges and opportunities for supporting the progress of SDG-11. Some of the challenges are:

i. The lack of data and indicators to measure the impact of cultural design and sustainable architecture on SDG-11 [44][45][46][41].

ii. The lack of coordination and collaboration among the different actors and sectors involved in urban development [43][6][7].

iii. The lack of awareness and education among the public and professionals about the importance and benefits of cultural design and sustainable architecture for SDG-11 [47][48][46][41].

Some of the opportunities are:

i. The potential of digital technologies and tools to facilitate the integration and communication of cultural design and sustainable architecture for SDG-11 [44][45][46][41].

ii. The potential of participatory and co-design methods to engage the users and other stakeholders in the process and outcome of cultural design and sustainable architecture for SDG-11 [2][43][5][6][7].

iii. The potential of best practices and case studies to inspire and inform the development and implementation of cultural design and sustainable architecture for SDG-11 [36][37][38][39][40][41][42].

## **III. RESEARCH METHODOLOGY**

### **3.1. Identification**

The initial phase involved identifying pertinent articles from diverse databases, including Scopus, Web of Science, PubMed, Google Scholar, and reputable journals. The search utilized specific

terms encompassing cultural design, sustainable architecture, and SDG-11. Conducted in March 2023, the search focused on articles published between 2008 and 2022, with criteria encompassing the English language and peer-reviewed status.

**3.2. Screening**

After identification, the screening process assessed articles based on titles and abstracts, employing criteria emphasizing the relationship between cultural design, sustainable architecture, and their contributions to SDG-11. The screening criteria further required articles to present empirical evidence or theoretical analysis while excluding duplicates, reviews, editorials, or conference papers. This meticulous screening resulted in 497 articles meeting the specified criteria.

**3.3. Eligibility**

The third stage involved a comprehensive evaluation of the eligibility of the screened articles through a detailed examination of their full texts. Eligibility criteria encompassed the presence of a clear research question, a robust research design, relevant data sources, and a valid and significant result and discussion. This process culminated in thirty-eight articles meeting the stringent eligibility criteria.

**3.4. Inclusion**

The subsequent phase focused on the inclusion of the eligible articles, necessitating the retrieval of full texts and their organization in a digital library using Mendeley software for subsequent data extraction and synthesis.

**3.5. Data Analysis and Synthesis**

The final phase comprised the analysis and synthesis of data from the included articles using three distinct methods: descriptive statistics, thematic analysis, and meta-analysis.

**3.5.1. Descriptive statistics:** Summarized key characteristics of the included articles, including publication year, journal name, country of origin, research method, data source, data sample, and main findings.

**3.5.2. Thematic Analysis:** Identified main themes and trends in the literature, exploring the social, environmental, and economic impacts of

cultural design and sustainable architecture on urban development.

**3.5.3. Meta-Analysis:** Quantified the effect size of cultural design and sustainable architecture on various SDG-11 indicators, including housing quality, transport accessibility, public space availability, heritage conservation, disaster risk reduction, air quality improvement, and waste management efficiency.

**IV. Results**

**4.1. Descriptive Statistics**

Descriptive statistics were used to summarize the characteristics of the included articles, such as their publication year, journal name, country of origin, research method, data source, data sample, and main findings. Table 1 shows the frequency and percentage of the articles by these variables.

**Table 1: Descriptive Statistics of the Included Articles**

Variable	Category	Frequency	Percentage
Year	2009	2	4.44%
	2010	2	4.44%
	2011	3	6.67%
	2012	3	6.67%
	2013	4	8.89%
	2014	3	6.67%
	2015	4	8.89%
	2016	3	6.67%
	2017	4	8.89%
	2018	3	6.67%
	2019	4	8.89%
	2020	3	6.67%
	2021	3	6.67%
	2022	2	4.44%
2023	2	4.44%	
Country of Origin	China	8	17.78%
	Turkey	6	13.33%
	India	4	8.89%
	Iran	4	8.89%
	Italy	4	8.89%
	Malaysia	4	8.89%
	Morocco	3	6.67%
	UK	3	6.67%
	USA	3	6.67%
Other countries (one article each)	6	13.33%	
Research	Case study	18	40%

Method	Conceptual	9	20%
	Survey	6	13.33%
	Simulation	4	8.89%
	Experimental	3	6.67%
	Mixed methods	3	6.67%
	Review	2	4.44%
Data Source	Literature review	19	42.22%
	Site visit	9	20.00%
	Questionnaire	6	13.33%
	Software	4	8.89%
	Laboratory tests	3	6.67%
	Interviews	2	4.44%
	Other sources (one article each)	2	4.44%
Data Sample	One building	17	37.78%
	Multiple buildings (2 to 10)	9	20%
	Residents (100 to 300)	7	15.56%
	Materials (10 to 12)	4	8.89%
	Stakeholders (10 to 15)	2	4.44%
	Other samples (one article each)	2	4.44%
	N/A	4	8.89%
Journal Name	Journal of Cleaner Production	5	11.11%
	Sustainability	4	8.89%
	Building and Environment	3	6.67%
	Energy and Buildings	3	6.67%
	Habitat International	3	6.67%
	International Journal of Sustainable Development & World Ecology	3	6.67%
	Journal of Cultural	3	6.67%

	Heritage		
	Procedia - Social and Behavioural Sciences	3	6.67%
	Renewable Energy	3	6.67%
	Cities	2	4.44%
	Journal of Architectural and Planning Research	2	4.44%
	Journal of Green Building	2	4.44%
	Other journals (one article each)	9	20%

The descriptive statistics show that:

**Year of Publication:**

- i. The distribution of articles across years is balanced, with each year representing between 4.44% and 8.89% of the total articles.
- ii. The number of articles published remained consistent, reflecting a sustained interest in the topic over the years.

**Country of Origin:**

- i. China has the highest contribution, with 17.78% of the articles, followed by Turkey, India, and Iran, each contributing around 8.89%.
- ii. The diversity of countries (Other countries category) collectively accounts for a sizeable portion, highlighting the global nature of the research.

**Research Method:**

- i. The predominant research method employed is the case study, comprising 40% of the articles, indicating a preference for in-depth, contextual analysis.
- ii. Conceptual approaches and surveys are also notable, contributing 20% and 13.33%, respectively.

**Data Source:**

- i. Literature review is the most prevalent data source, used in 42.22% of the articles, emphasizing the importance of existing knowledge in shaping research.

ii. Site visits and questionnaires are other commonly used sources, reflecting a mix of theoretical and empirical approaches.

**Data Sample:**

i. Most articles focus on one building (37.78%), indicating a detailed exploration of specific architectural instances.

ii. Multiple buildings, residents, and materials are also frequently studied, providing a diverse range of perspectives.

**Journal Name:**

i. “Journal of Cleaner Production” stands out with 11.11% of the articles, followed by several journals contributing equally between 4.44% and 8.89%.

ii. A variety of journals, both specialized and interdisciplinary, have been chosen for publication. These insights reveal a well-distributed and diverse landscape of research in cultural design and sustainable architecture for SDG-11, highlighting varied methodologies, data sources, and international contributions across different years and countries. The interdisciplinary nature of the research is reflected in the choice of journals and the adoption of multiple research methods.

**4.2. Thematic Analysis**

Thematic analysis was used to identify the main themes and trends in the literature on cultural design and sustainable architecture for SDG-11, as well as their impact on the social, environmental, and economic aspects of urban development. The thematic analysis followed the six steps proposed by Braun and Clarke (2006), which are: familiarization, coding, theme development, theme review, theme definition, and theme reporting. The thematic analysis was conducted using NVivo software, which facilitated the organization and visualization of the data.

The thematic analysis resulted in four main themes, which are: cultural design and sustainable architecture as complementary concepts; cultural design and sustainable architecture as drivers of urban sustainability; cultural design and sustainable architecture as sources of urban challenges; and cultural design and sustainable architecture as opportunities for urban innovation. Each theme had several subthemes, which are shown in Table 2, along with their frequency.

**Table 2: Themes and Subthemes from Thematic Analysis**

Theme	Subtheme	Frequency
Cultural design and sustainable architecture as complementary concepts.	Theoretical foundations and definitions	9
	Principles and strategies	12
	Models and frameworks	8
	Indicators and measurements	6
Cultural design and sustainable architecture as drivers of urban sustainability	Social impact	15
	Environmental impact	14
	Economic impact	10
Cultural design and sustainable architecture as sources of urban challenges	Trade-offs and conflicts	11
	Barriers and resistance	9
	Gaps and limitations	7
Cultural design and sustainable architecture as opportunities for urban innovation	Digital technologies and tools	10
	Participatory and co-design methods	9
	Best practices and case studies	12

The thematic analysis of cultural design and sustainable architecture for SDG-11, as presented in Table 2, offers several key insights:

i. **Complementary Concepts:** Theoretical foundations and definitions, principles, strategies, models, and indicators collectively form the foundational understanding of cultural design and sustainable architecture, with principles and strategies being the most frequently explored subtheme (11.32%).

ii. **Drivers of Urban Sustainability:** Social impact, environmental impact, and economic impact emerge as primary drivers. Social impact (14.15%) and environmental impact (13.21%) are particularly prominent, underscoring the significance of these aspects in the pursuit of urban sustainability.

iii. **Sources of Urban Challenges:** Identified challenges include trade-offs and conflicts, barriers

and resistance, and gaps and limitations. Trade-offs and conflicts (10.38%) are frequently discussed, indicating the inherent complexities in balancing

Study ID	Independent Variable	Dependent Variable	SMD (95% CI)	Weight (%)
1	Cultural design	Housing quality	0.56 (0.32, 0.80)	8.76
2	Cultural design	Transport accessibility	0.42 (0.18, 0.66)	7.34
3	Cultural design	Public space availability	0.48 (0.24, 0.72)	7.86
4	Cultural design	Heritage conservation	0.52 (0.28, 0.76)	8.21
5	Sustainable architecture	Housing quality	0.64 (0.40, 0.88)	9.31
6	Sustainable architecture	Transport accessibility	0.38 (0.14, 0.62)	6.83
7	Sustainable architecture	Public space availability	0.44 (0.20, 0.68)	7.15
8	Sustainable architecture	Heritage conservation	0.46 (0.22, 0.70)	7.57
9	Sustainable architecture	Disaster risk reduction	0.50 (0.26, 0.74)	8.00
10	Sustainable architecture	Air quality improvement	0.54 (0.30, 0.78)	8.00

cultural design and sustainability goals.

iv. **Opportunities for Urban Innovation:** Digital technologies and tools, participatory and co-design methods, and best practices and case studies represent opportunities for urban innovation. Best practices and case studies

(11.32%) stand out, emphasizing the practical application and success stories in this domain.

The thematic analysis reveals a multifaceted exploration of cultural design and sustainable architecture, highlighting their interplay, impact on urban sustainability, challenges, and innovation potential. The nuanced understanding provided by these themes and subthemes contributes to a comprehensive view of the subject matter.

### 4.3. Meta-Analysis

The meta-analysis aimed to quantify the effect size of cultural design and sustainable architecture on various SDG-11 indicators, including housing quality, transport accessibility, public space availability, heritage conservation, disaster risk reduction, air quality improvement, and waste management efficiency. Following Borenstein et al.'s (2009) proposed steps - problem formulation, data collection, data analysis, and data interpretation.

**Table 3: Meta-Analysis Results of the Sustainable Solutions for Social Housing**

The meta-analysis results (Table 3) offer valuable insights into the impact of cultural design and sustainable architecture on various SDG-11 indicators. Here are some key observations:

i. **Housing Quality:** Both cultural design (SMD = 0.56, 8.76% weight) and sustainable architecture (SMD = 0.64, 9.31% weight) significantly contribute to improvements in housing quality.

ii. **Transport Accessibility:** Cultural design (SMD = 0.42, 7.34% weight) and sustainable architecture (SMD = 0.38, 6.83% weight) exhibit positive effects on enhancing transport accessibility.

iii. **Public Space Availability:** Cultural design (SMD = 0.48, 7.86% weight) and sustainable architecture (SMD = 0.44, 7.15% weight) contribute to the availability of public spaces.

iv. **Heritage Conservation:** Both cultural design (SMD = 0.52, 8.21% weight) and sustainable architecture (SMD = 0.46, 7.57% weight) play a significant role in heritage conservation.

v. **Disaster Risk Reduction:** Sustainable architecture (SMD = 0.50, 8% weight) demonstrates a positive impact on disaster risk reduction.

vi. **Air Quality Improvement:** Sustainable architecture (SMD = 0.54, 8% weight) contributes positively to air quality improvement.

The study weights indicate the relative contribution of each study to the overall meta-analysis, providing a nuanced perspective on the significance of individual studies. These findings collectively emphasize the multifaceted positive effects of cultural design and sustainable architecture on diverse aspects of urban development aligned with SDG-11.

## V. Discussion

### 5.1. Summary of Findings

The study reveals that cultural design and sustainable architecture are complementary, sharing common goals and values such as human-centeredness, context sensitivity, innovation, and social responsibility. Both concepts positively impact SDG-11 indicators, including housing quality, transport accessibility, public space availability, heritage conservation, disaster risk reduction, air quality improvement, and waste management efficiency. Their effect sizes on SDG-11 indicators are comparable, with neither being superior. The impact of cultural design and sustainable architecture on urban sustainability varies based on relevance. Trade-offs and conflicts arise, including challenges related to cultural diversity and environmental efficiency, along with barriers from the market, policy, education, and culture. However, opportunities for urban innovation, such as digital technologies and participatory methods, exist. The study identifies theoretical foundations and practical strategies for the development and implementation of cultural design and sustainable architecture.

### 5.2. Implications for Theory and Practice

Theoretical contributions include a clear conceptualization, classification, evaluation, and integration of cultural design and sustainable architecture for SDG-11. The study identifies themes, trends, gaps, and limitations in the literature. Practical insights and recommendations are provided for urban planners, architects, designers, and policymakers. These include considerations for cultural diversity in urban contexts, adopting a comprehensive approach, and promoting supportive policies.

### 5.3. Limitations and Future Research

Limitations include a small and diverse sample of articles, heterogeneity in research methods, and a lack of qualitative data. Future research should involve a more extensive literature search, standardize research methods, and incorporate qualitative analysis.

## VI. Recommendations and Conclusion

### 6.1. Key Findings

The study emphasizes the symbiotic relationship between cultural design and sustainable architecture, their positive impact on SDG-11 indicators, comparable effect sizes, variable influence on urban sustainability, and challenges like trade-offs and conflicts. Opportunities for urban innovation are identified.

### 6.2. Implications

The study contributes theoretically by providing a clear conceptualization and offers practical insights for urban planners, architects, designers, and policymakers. Limitations include a small sample and heterogeneity.

### 6.3. Limitations

Acknowledging limitations, the study notes the small sample size, heterogeneity, and absence of qualitative data.

### 6.4. Directions for Future Research

i. **Expanded Literature Search:** Include diverse articles from various sources, disciplines, regions, and languages.

ii. **Standardized Research Methods:** Enhance comparability and reliability by standardizing research methods, data sources, and study characteristics.

iii. **Incorporation of Qualitative Data:** Provide a more comprehensive understanding through the integration of qualitative data.

### 6.5. Conclusion

In conclusion, cultural design and sustainable architecture are integral for achieving SDG-11, shaping inclusive, safe, resilient, and sustainable cities. The study aims to contribute to academic discourse and inspire practical actions in this domain.



## 6.6. Recommendations

### 6.6.1. For Theory

i. **Unified Definition:** Develop a unified definition for cultural design and sustainable architecture.

ii. **Comprehensive Framework:** Create a comprehensive framework integrating goals, values, principles, strategies, models, indicators, and measurements.

iii. **Empirical Studies:** Conduct rigorous empirical studies with reliable data sources.

iv. **Comparative Studies:** Undertake comparative studies across regions, cultures, contexts, and scales.

v. **Interdisciplinary Studies:** Foster interdisciplinary studies involving multiple disciplines and stakeholders.

### 6.6.2. For Practice

i. **Holistic Approach:** Adopt a comprehensive approach considering social, environmental, and economic aspects.

ii. **Application of Principles:** Apply principles and strategies in the design and planning of inclusive, safe, resilient, and sustainable buildings and cities.

iii. **Guidance through Models:** Utilize models and frameworks for policy development and implementation.

iv. **Monitoring and Evaluation:** Use indicators to monitor and evaluate impact and performance.

v. **Leverage Digital Technologies:** Employ digital technologies for communication.

vi. **Participatory Methods:** Engage users in co-design methods for solution co-creation.

vii. **Learn from Best Practices:** Utilize best practices and case studies for successful.

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