# Integrated futures approach to ensure the Backcasting as a Strategic Approach for Realizing Saudi Vision 2030: The Art of How

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## Abstract

*This study examines the application of backcasting as a strategic planning tool for achieving Saudi Vision 2030 goals. The research aims to explore how backcasting contributes to urban sustainability, compare it with forecasting techniques, and analyze its integration potential with other futures methods. A comprehensive literature review focused on futures studies methodologies and their application in the context of Saudi Vision 2030. The findings highlight the effectiveness of backcasting in addressing complex challenges and its potential for integration with other futures methods to create robust strategies for Vision 2030 realization. Key challenges identified include stakeholder conflicts and resource constraints. The study concludes that backcasting offers a promising approach to realizing Saudi Vision 2030, particularly when combined with participatory methods and adaptive planning strategies.*

**Keywords:** *Backcasting, Forecasting, Saudi Vision 2030, Futurology, Sustainable Development.*

## Introduction

Backcasting significantly contributes to achieving sustainability goals in urban areas by enabling a goal-oriented, problem-solving approach that addresses complex challenges. It begins with envisioning a desirable sustainable future and works backward to identify the necessary policies, actions, and interventions to achieve that vision. This method addresses systemic urban issues, such as environmental degradation and socio-economic inequalities, by fostering long-term planning, stakeholder collaboration, and innovative solutions. Additionally, backcasting accommodates uncertainties and externalities, offering flexibility to explore alternative pathways toward sustainability transitions. Backcasting emerged as a viable alternative energy planning method during the 1970s. Those predictions of the time indicated an age with increasing energy demand, and needing to increase energy production capacity dramatically. With the threat of energy crises and a growing awareness of environmental concerns, this future was considered extremely problematic and undesirable. (1). Like other types of normative futures, a representation of the future created through backcasting may not be deemed desirable by everyone in every way. The study's focus on sustainable development may lead to the adoption of sustainable futures instead of desirable future. Numerous studies on backcasting utilize this term. However, this term also faces the problem of uncertainty: Who is sustainable and for whom?? Sustainable from what perspective? The futures that were created through backcasting are referred to as 'target-fulfilling' future in this thesis. Instead of traditional forecasting, cast casting is a unique feature. This technique involves predicting future desired conditions and setting out steps to achieve those steps, rather than simply taking actions from a collection of current methods projected into the future. (2).

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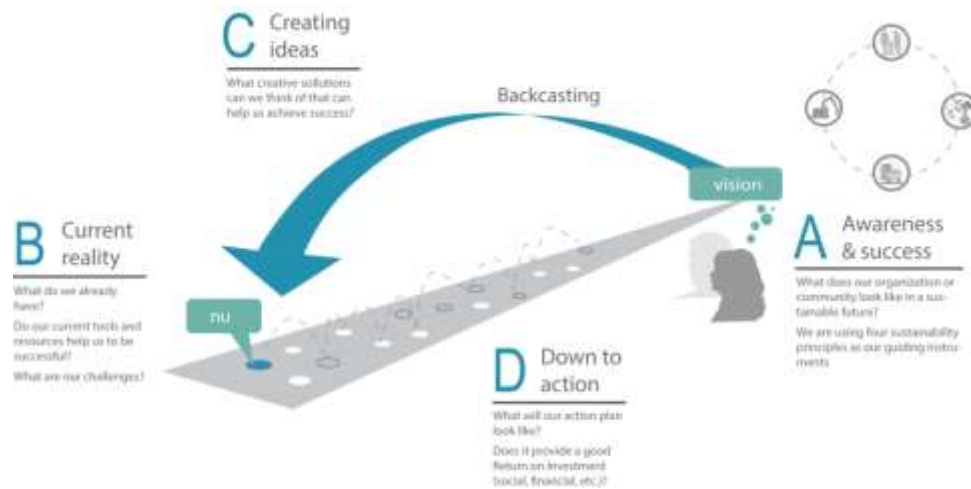[2] Faculty of Architecture and Design, Department of Architecture, Prince Sultan University -Riyadh, KSA, Email: zabdallah@psu.edu.sa. https://orcid.org/0009-0004-2652-4109

**Figure 1. The Backcasting Process**

Source: http://www.thenaturalstep.org/www/wp-content/uploads/2015/02/backcasting-ENG.png, Accessed Feb. 2024

Saudi Vision 2030 represents an ambitious plan to transform Saudi Arabia's economy and society, necessitating innovative planning approaches that can address long-term objectives while navigating uncertainties (3). Backcasting has emerged as a powerful tool within the field of futures studies, offering a goal-oriented methodology that contrasts with traditional forecasting techniques (1). This research paper explores the application of backcasting in realizing Saudi Vision 2030, examining its strengths, challenges, and potential for integration with other futures methods.

*Understanding Bakcasting in the Perspective of Futures Studies*

Futures studies is a field of study that examines the intersectionality of trends, uncertainties, and aspirations to determine and shape potential futures. It operates in a range of domains, such as time, geography, and sectoral focus. Futures studies consider short-term changes, medium-to-long-lasting strategies, and long-run goals. From local and global concerns to technological, environmental, economic and social domains (Sectoral), its scope varies widely. A structured approach to comprehend and influence the future is provided by these studies that balance exploratory questions with normative inquiries into "what should happen" and "how". (4)

Futures studies aim to predict change, encourage flexibility, and provide guidance. They assist decision-makers in navigating uncertainty, identifying potential opportunities, and developing practical plans.' One of the most potent methodologies for normative futures studies is backcasting. Backcasting is a method that starts with establishing definite goals for the future and then moves towards achieving them, resulting in backward planning for sustainability or implementation of transformative projects like Saudi Vision 2030. (5) Futures studies offer a robust approach to managing complex issues by utilizing both backcasting and alternative approaches like scenario planning, trend analysis, and the Delphi method. This combination keeps aspirations clear and grounded in practice enabling leaders to create effective, adaptable solutions that reflect long-term societal values.

Choosing the approach that best fits particular goals and challenges is important while considering different approaches in futures studies based on specific context and resources. The method of choice must account for the difficulty associated with the tools while maintaining a balance between simplicity and complexity. (6) The use of participatory methods is essential for integrating diverse viewpoints and reaching a

consensus on future strategies. The selection process must balance methodological rigor with practical constraints such as time, expertise, and budget to ensure effective and feasible approaches.

**Table 1. Appropriate Tools and Methods of Futures Studies According to the Scenario and Goals Targeted**

| *Scenarios* | Goals | Tools and Methods: |
|---|---|---|
| *Policy and Governance* | Inform decision-making, anticipate societal changes, and engage stakeholders. | • Scenario Planning<br>• Delphi Method<br>• Systems Mapping<br>• Horizon Scanning |
| *Urban Sustainability* | Achieve sustainable development and resilience. | • Backcasting: Defines sustainable urban futures and creates pathways to achieve them.<br>• Geospatial Analysis<br>• Trend Analysis<br>• Stakeholder Workshops. |
| *Technology and Innovation* | Forecast technological trends, assess risks, and identify opportunities. | • Technology Road mapping<br>• Horizon Scanning<br>• Trend Impact Analysis<br>• Critical Futures Thinking |
| *Environmental and Climate Studies* | Mitigate risks, enhance resilience, and promote adaptation. | • Environmental Modeling<br>• Scenario Planning<br>• Backcasting: Works backward from desired environmental outcomes.<br>• Participatory Visioning |
| *Education and Academia* | Shape learning for future challenges and explore research frontiers | • Visioning<br>• Trend Analysis<br>• Delphi Method<br>• Scenario Narratives |
| *Business and Industry* | Identify market opportunities, anticipate risks, and maintain competitive advantage. | • Scenario Planning<br>• SWOT Analysis with Foresight<br>• Trend Spotting<br>• Backcasting: Develops strategies to meet long-term corporate sustainability goals. |

Source: Authors

*Challenges in Implementing Backcasting for Urban Sustainability*

The focus of backcasting has been on discovering solutions for various topics, such as river basins, transportation and mobility, converting companies into sustainable ones, sustainable technologies, and sustainable system innovation, since the 1990s. The emphasis on sustainability has transformed towards participatory backcasting, which involves the participation of a diverse group. This trend is evident in both theory and practice. Certain individuals have argued that backcasting's unique properties make it suitable for sustainability applications. Its primary focus is on utilizing the desired or range of sustainable futures as a foundation for studying their potential, feasibility, and possible paths to achieve them. Due to its limited range of options, forecasting is often more successful than backcasting, which can hinder creative expression. (7) More importantly, forecasting relies on what is known today--but that knowledge is always imperfect and things change over time. Otherwise, the main challenges in implementing backcasting for urban sustainability include Complexity of Urban Systems, Stakeholder Conflicts, Uncertainty and Externalities, Resource Constraints, and Monitoring and Evaluation.

*Difference between Forecasting and Backcasting Approaches*

Backcasting involves creating a sustainable future vision and planning follow-up activities. It also includes developing strategies leading to that future. The backcasting study should aim to generate future or realistic scenarios when the most reliable predictions, models, and estimates are unlikely to achieve visions. This requires careful consideration of these factors. Moreover, it highlights the significance of exploring the means to reach that future, selecting the appropriate measures and actions to take, and measuring the effects of different measures using models and regular forecasting tools. (8)

Forecasting is used to predict a likely state of affairs, while backcasting is employed to construct essentially predicting an acceptable future. Backcasting and forecasting are distinct techniques used in creating city visions. While Forecasting involves predicting future scenarios based on current trends and data. It extrapolates existing patterns to anticipate likely outcomes, which can limit transformative change by adhering to current trajectories. (9) Backcasting, on the other hand, starts with envisioning a desired future state and works backward to identify the steps needed to achieve that future. This method is normative and proactive, focusing on creating pathways to achieve specific goals rather than predicting what might happen if current trends continue.

**Table 2. Comparison Between Forecasting on Five Levels**

|  | **Forecasting** | **Backcasting** |
|---|---|---|
| **1.Philosophical view** | Causality<br>Determinism<br>Context of justification | Causality & teleology<br>Partial indeterminacy<br>Context of discovery |
| **2. Perspective** | Dominant Trends<br>Likely futures<br>Possible marginal adjustments<br>How to adopt trends | Societal problem in need of solution<br>Desirable futures<br>Scope of human choice<br>Strategic decisions;<br>Retain freedom of action |
| **3. Approach** | Extrapolate trends into the future;<br>sensitivity analysis | Define interesting futures;<br>Analyse consequences, and conditions for these futures to materialise |
| **4. Method** | Various econometric models | Partial &conditional extrapolations<br>Highlighting interesting polarities and technological limits |

Source: (11).

As a reflection on Saudi Vision in 2023 between backcasting and forecasting, Saudi Vision 2030 has made significant progress in 2023, with 87% of its initiatives either completed or on track. The focus has been diversifying the economy, expanding the private sector, and creating a robust financial system. Key sectors like mining, energy, and logistics have seen substantial growth, contributing to a diversified economic landscape. The unemployment rate has dropped significantly, and non-oil GDP now accounts for half of the total GDP. (10) Backcasting techniques have been used to refine demographic data, aiding in planning and decision-making aligned with Vision 2030 goals.

*Methods*

This study employed a comprehensive literature review methodology to examine backcasting in the context of futures studies and its application to Saudi Vision 2030. The research process involved the following steps: systematic theoretical review, case study analysis, comparative analysis, and finally synthesis and integration. The main aim of adopting this methodology is to provide a comprehensive exploration of

backcasting as a strategic approach for realizing Saudi Vision 2030, grounded in both theoretical understanding and practical insights. The research methodology organized as the following consequent stages as Figure 2.
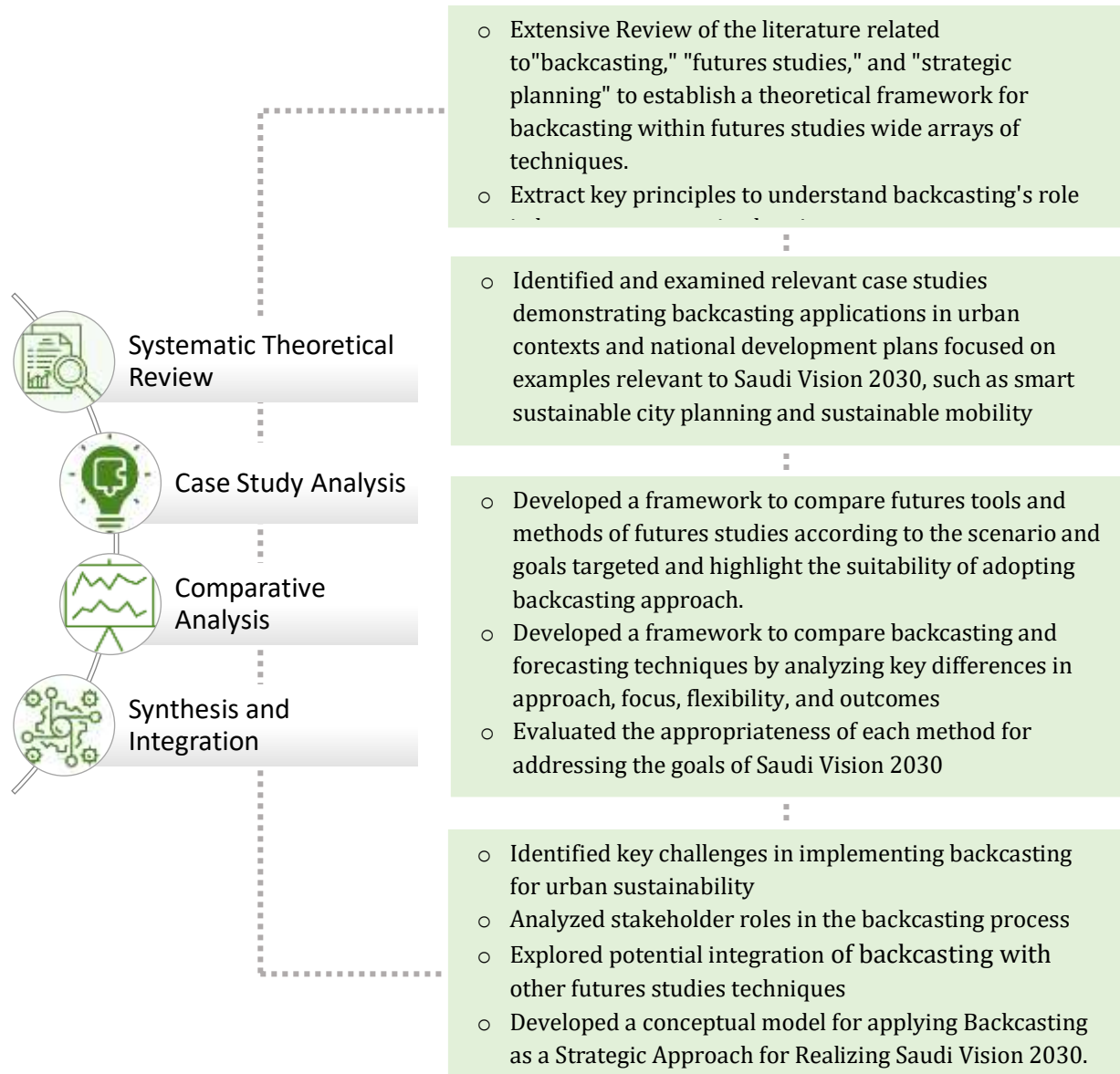


Systematic Theoretical Review

Case Study Analysis

Comparative Analysis

Synthesis and Integration

o Extensive Review of the literature related to"backcasting," "futures studies," and "strategic planning" to establish a theoretical framework for backcasting within futures studies wide arrays of techniques.
o Extract key principles to understand backcasting's role

o Identified and examined relevant case studies demonstrating backcasting applications in urban contexts and national development plans focused on examples relevant to Saudi Vision 2030, such as smart sustainable city planning and sustainable mobility

o Developed a framework to compare futures tools and methods of futures studies according to the scenario and goals targeted and highlight the suitability of adopting backcasting approach.
o Developed a framework to compare backcasting and forecasting techniques by analyzing key differences in approach, focus, flexibility, and outcomes
o Evaluated the appropriateness of each method for addressing the goals of Saudi Vision 2030

o Identified key challenges in implementing backcasting for urban sustainability
o Analyzed stakeholder roles in the backcasting process
o Explored potential integration of backcasting with other futures studies techniques
o Developed a conceptual model for applying Backcasting as a Strategic Approach for Realizing Saudi Vision 2030.

**Figure 2. Research Methodology Consequent Stages**
Source: Authors

## Results and Discussion

*Backcasting vs. Forecasting in Saudi Vision 2030 Context*

The analysis revealed significant differences between backcasting and forecasting approaches in planning for Saudi Vision 2030. While forecasting extrapolates current trends to predict likely futures, backcasting starts with the desired future state outlined in Vision 2030 and works backward to identify necessary steps for achievement. (11) This distinction makes backcasting particularly suitable for addressing the complex challenges and transformative goals of Vision 2030.The suitability is according to Starting Point, Approach, Focus, and Flexibility.
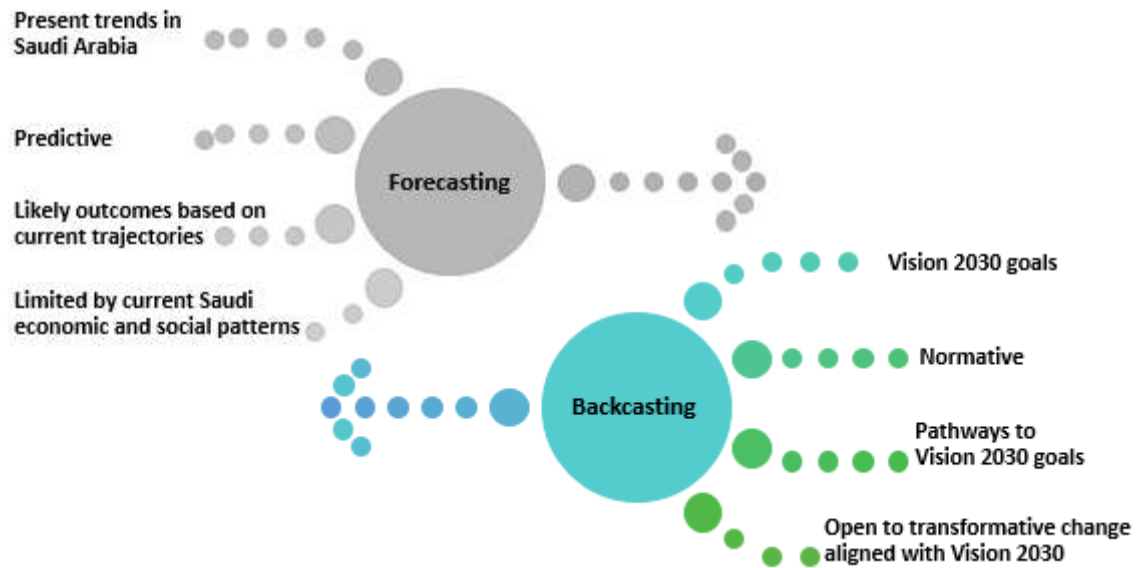
**Figure 3. Key Differences between Forecasting and Backcasting in Saudi Vision 2030 Context**

Source: Authors

The study highlights the distinct characteristics of forecasting and backcasting approaches when applied to Saudi Vision 2030. Backcasting offers several advantages for Saudi Vision 2030, including:

A goal-oriented, problem-solving approach that addresses complex challenges

Fostering long-term planning and stakeholder collaboration

Accommodating uncertainties and externalities, offering flexibility to explore alternative pathways

Enabling the creation of desirable sustainable futures and working backward to identify necessary policies and actions

These characteristics make backcasting particularly suitable for addressing the ambitious and transformative goals of Saudi Vision 2030, as it allows planners to envision the desired future state and work backwards to determine the steps needed to achieve it.

*Comparison of Three Backcasting Methodologies and suitability for Saudi Vision 2030 Context*

Backcasting is a planning approach where the desired future outcome is established first, and strategies are developed to achieve it. Scenario-based backcasting focuses on creating multiple pathways to a desired future, offering flexibility and fostering creativity but requiring significant resources and stakeholder involvement. Target-oriented backcasting emphasizes achieving a specific, measurable goal, making it straightforward to track progress but less adaptable to unexpected changes. Normative backcasting aligns plans with societal values, ensuring ethical and collective alignment, though it may lack specificity and face challenges in addressing conflicting priorities. Scenario-based approaches are ideal when exploring diverse options is critical, target-oriented methods work best for clear and actionable outcomes, and normative strategies are suited for goals rooted in societal or ethical considerations.

**Table 3. Comparing Three Backcasting Methodologies and Their Suitability for the Saudi Vision 2030 Context**

| Aspect | Robinson's Method | The Natural Step | Participatory Backcasting |
|---|---|---|---|
| Key Features | - Scenario development <br> - Impact analysis <br> - Pathway determination | - System conditions <br> - ABCD process <br> - Sustainability principles | - Stakeholder engagement <br> - Co-creation of visions <br> - Iterative process |
| Focus | Long-term sustainability | Ecological sustainability | Social learning and consensus |
| Strengths for Vision 2030 | - Comprehensive analysis <br> - Adaptable to complex systems | - Clear sustainability framework <br> - Systematic approach | - Inclusive decision-making <br> - Builds local capacity |
| Challenges in Saudi Context | - Data-intensive <br> - May require extensive expertise | - May need adaptation to local context <br> - Potential resistance to external framework | - Time-consuming <br> - Potential for conflicting interests |
| Suitability for Vision 2030 | High - aligns with comprehensive planning needs | Moderate - useful for environmental goals | High - supports stakeholder buy-in |

Source: Authors

This part provides a comparative analysis of three prominent backcasting methodologies and their potential application in the Saudi Vision 2030 context. Each method has its unique strengths and challenges when considered for implementation in Saudi Arabia's national development plan.

*Challenges in Implementing Backcasting for Saudi Vision 2030*

The study identified several key challenges in implementing backcasting for Saudi Vision 2030: *Complexity of urban and economic systems in Saudi Arabia, Stakeholder conflicts between traditional and progressive elements, Uncertainty in global energy markets and their impact on Saudi economy, Resource constraints in diversifying the economy,* and *Monitoring and evaluation difficulties in tracking progress towards Vision 2030 goals.*
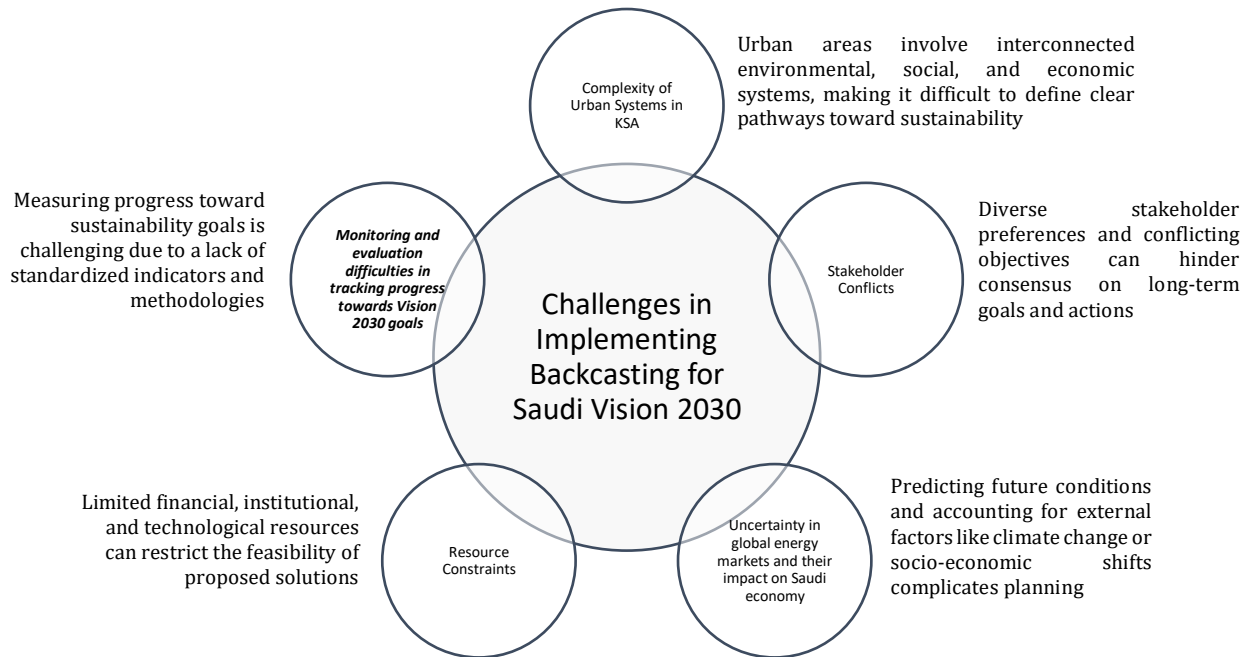
**Figure** Error! No text of specified style in document.**. Challenges in Implementing Backcasting for Urban Sustainability**

Source. Authors

These challenges highlight the need for adaptive and integrative approaches when applying backcasting in the Saudi context. Compared to other studies, our findings emphasize the importance of addressing systemic complexities and stakeholder dynamics unique to Saudi Arabia's socio-economic landscape. (12)

*Stakeholder Role in Backcasting for Saudi Vision 2030*

Stakeholders play a crucial role in the backcasting process for Saudi Vision 2030. Their involvement contributes to:

Defining shared goals aligned with Saudi cultural values and economic aspirations

Identifying feasible pathways considering local constraints and opportunities

Enhancing implementation through trust-building and commitment across diverse sectors.

These findings align with previous research emphasizing the importance of participatory approaches in national development planning. (1) However, our study further highlights the need for structured stakeholder engagement throughout the backcasting process to ensure long-term success in the Saudi context**.** (13)

*Integration Potentials of Backcasting with Other Futures Methods for Vision 2030*

The research revealed significant potential for integrating backcasting with other futures studies methodologies to strengthen Saudi Vision 2030 implementation. This integration can enhance decision-making processes by combining normative goal-setting with explorative scenario planning. For instance, the application of backcasting in smart sustainable city planning within Saudi Arabia demonstrates how this

approach can be effectively combined with technological foresight methods to support Vision 2030's urban development goals. (5)

Backcasting can integrate seamlessly with other futures studies methodologies to strengthen decision-making for Saudi Vision 2030, fostering a cohesive and adaptive planning approach. By combining normative methods like backcasting, which focus on achieving specific long-term goals, with explorative and predictive techniques, decision-makers can ensure that pathways are actionable and uncertainties are effectively addressed. This integration facilitates comprehensive planning by merging visionary aspirations with analyses of potential scenarios and trends, creating robust strategies tailored to future challenges. It also enhances stakeholder engagement by promoting collaboration across government, private sectors, and citizens, ensuring diverse perspectives and shared commitment to Vision 2030 objectives. Furthermore, it builds resilience by anticipating uncertainties and embedding flexibility into strategies, enabling adaptability to dynamic conditions. Ultimately, this integrated approach transforms aspirational goals into concrete, realistic steps, ensuring Vision 2030's ambitious targets are both achievable and impactful.

| Integration Approach | Purpose | How It Works | Example |
|---|---|---|---|
| **Scenario Planning** | Identify multiple pathways to Vision 2030 goals under various possible futures. | Use scenario planning to outline potential future contexts (e.g., high climate change impact). Apply backcasting within each scenario to determine how Vision 2030 targets can be achieved. | Explore renewable energy goals by considering scenarios like global oil price fluctuations. |
| **Trend Analysis** | Ground backcasting in realistic trajectories by leveraging historical and emerging trends. | Identify current trends in population growth, technology adoption, or resource consumption. Use backcasting to design actions that align with or counteract these trends. | Analyze urbanization trends to ensure urban sustainability targets are achievable. |
| **Delphi Method** | Gain expert consensus on critical steps and milestones. | Use the Delphi method to gather expert opinions on challenges and opportunities. Incorporate findings into backcasting exercises to refine pathways and priorities. | Seek expert input on milestones for achieving circular economy goals by 2030. |
| **Horizon Scanning** | Prepare for emerging trends and disruptions. | Use horizon scanning to identify weak signals and emerging issues (e.g., AI, climate tech). Adjust backcasting pathways to incorporate these developments proactively. | Monitor advancements in desalination technology to redefine water security goals. |
| **Systems Thinking** | Address interdependencies and feedback loops across sectors. | Combine systems thinking with backcasting to identify how actions in one area impact others (e.g., energy policy on economic diversification). | Develop backcasting strategies for mega projects smart city goals considering impacts on water resources. |
| **Visioning** | Align actions with the desired long-term outcomes. | Use visioning workshops to create a shared understanding of Vision 2030 aspirations. Apply backcasting to translate these visions into actionable strategies. | Engage communities to envision sustainable cities and backcast steps for green infrastructure. |

| Adaptive Policy-Making | Ensure strategies remain flexible under changing conditions. | Combine backcasting pathways with scenario-based adaptive policies that adjust to evolving realities. | Design adaptive policies for energy diversification, allowing adjustments based on market shifts. |
|---|---|---|---|

## Conclusion

This study demonstrates that backcasting offers a valuable approach for addressing the complex challenges and ambitious goals of Saudi Vision 2030. Its normative, goal-oriented methodology provides a framework for envisioning and working towards the desired future outlined in Vision 2030, complementing traditional forecasting techniques. The main findings include:

Backcasting's effectiveness in addressing the transformative goals of Saudi Vision 2030.

The importance of stakeholder engagement throughout the planning process, particularly in navigating Saudi Arabia's unique socio-economic landscape.

The potential for integrating backcasting with other futures methods for more robust planning and implementation of Vision 2030.

Limitations of this study include its reliance on secondary sources and the need for more empirical research on backcasting applications in the specific context of Saudi Arabia. Future research should focus on developing standardized methodologies for implementing and evaluating backcasting in Saudi urban and economic planning, as well as exploring its application in emerging areas such as renewable energy development and digital transformation aligned with Vision 2030 goals.

Practical implications of this research include the need for Saudi policymakers and planners to consider backcasting as a complementary approach to traditional planning methods, particularly for long-term sustainability and economic diversification goals. Additionally, the findings underscore the importance of developing adaptive planning frameworks that can accommodate the complexities and uncertainties inherent in Saudi Arabia's ambitious transformation agenda.

## Acknowledgments

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