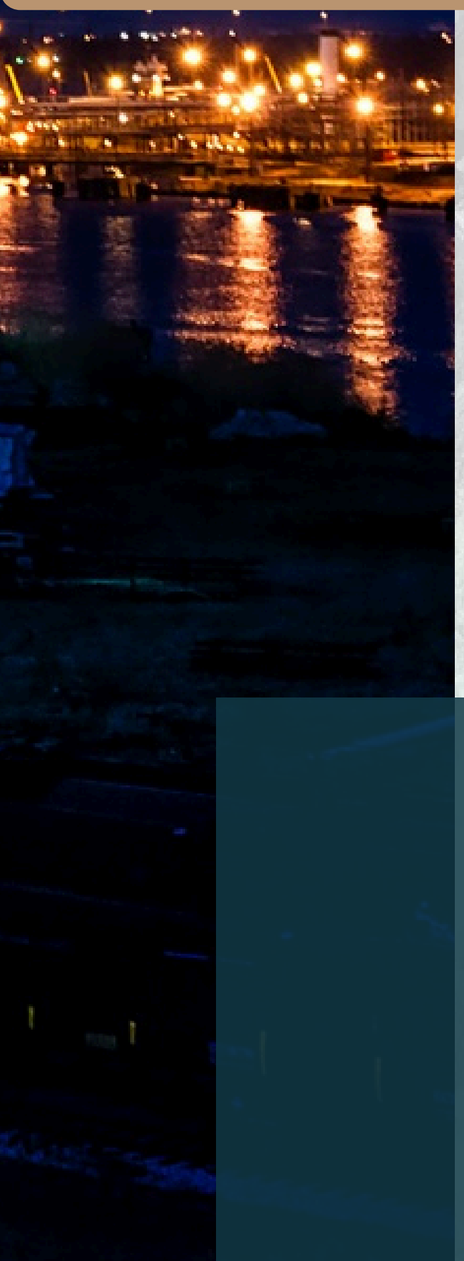
ISM

RESEARCH METHODOLOGY INTERPRETIVE STRUCTURAL MODELING (ISM)

AGENDA OVERVIEW

Information



What is ISM?

Interpretive Structural Modeling (ISM) is a methodological tool designed to help individuals and groups analyze and understand the relationships among various elements within a complex system. Developed by J. Warfield in the 1970s, ISM allows for the creation of a structured model that illustrates these relationships in a clear and hierarchical manner, aiding in strategic planning and decision-making.

Interpretive Structural Modeling

Interpretive

- Interpret, judge, decide
- Relations/ no relations between factors

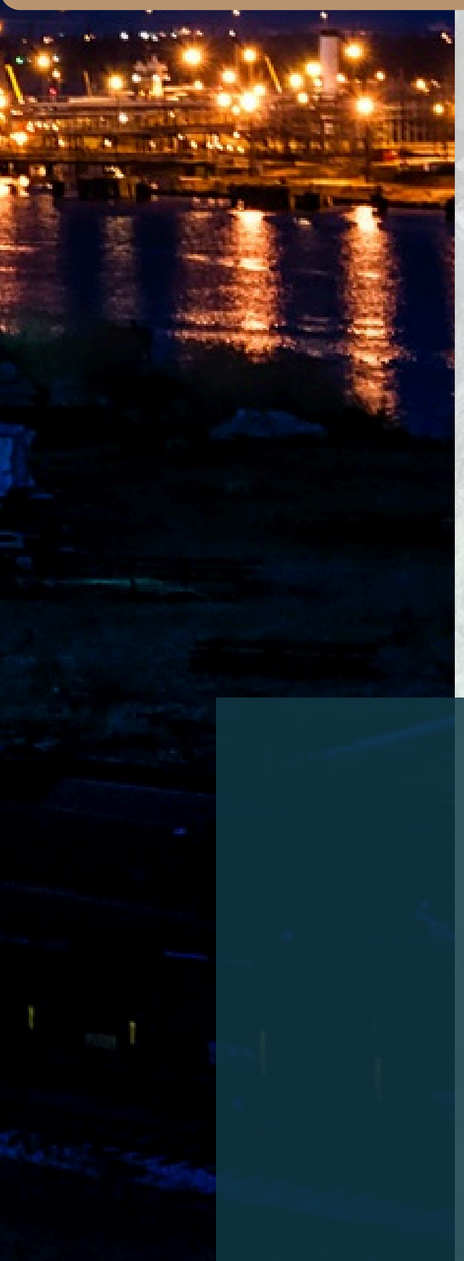
Structural

- Transform complex problem
- Simple & visual structure

Modelling

- Represent in a model
- Digraph

Information



KEY CONCEPTS OF ISM:

- Interpretive Structural Modeling (ISM) is a method used to analyze complex systems by identifying relationships among variables. It helps in understanding the hierarchy of barriers and their interdependencies.

PURPOSE OF APPLYING ISM:

- ISM is applied to identify and analyze barriers hindering the adoption of green business models.
- It helps in understanding the root causes of challenges faced in sustainability initiatives within the construction sector.

Steps of ISM:

1 2 3 4 5 6 7

STEP 1

Identification of variables affecting the system under consideration

STEP 2

Development of a structural self-interaction matrix(SSIM) which depicts dependence among all possible pairs of elements by choosing a contextual relationship showing which elements influence others

STEP 3

Reachability matrix is developed from the SSIM and the matrix is checked for transitivity. The transitivity of the contextual relation is a basic assumption made in ISM. It states that if a variable X is related to Y and Y is related to Z, then X is necessarily related to Z

STEP 4

Classification of variables based on their driving and dependence power using MICMAC (Matriced'Impacts croises-multipication applique'and classment) analysis

STEP 5

The reachability matrix obtained in step 4 is partitioned into different levels

STEP 6

Based on the relationships given above in the reach-ability matrix, a directed graph is drawn and the transitive links are removed

STEP 7

The ISM model developed in step 6 is reviewed to check for conceptual inconsistency and necessary modifications.

Steps of ISM:

Real-World Applications:

- ISM has been used to study barriers to adopting green practices in the construction sector.
- It helps policymakers and industry stakeholders in developing targeted interventions to overcome identified barriers.

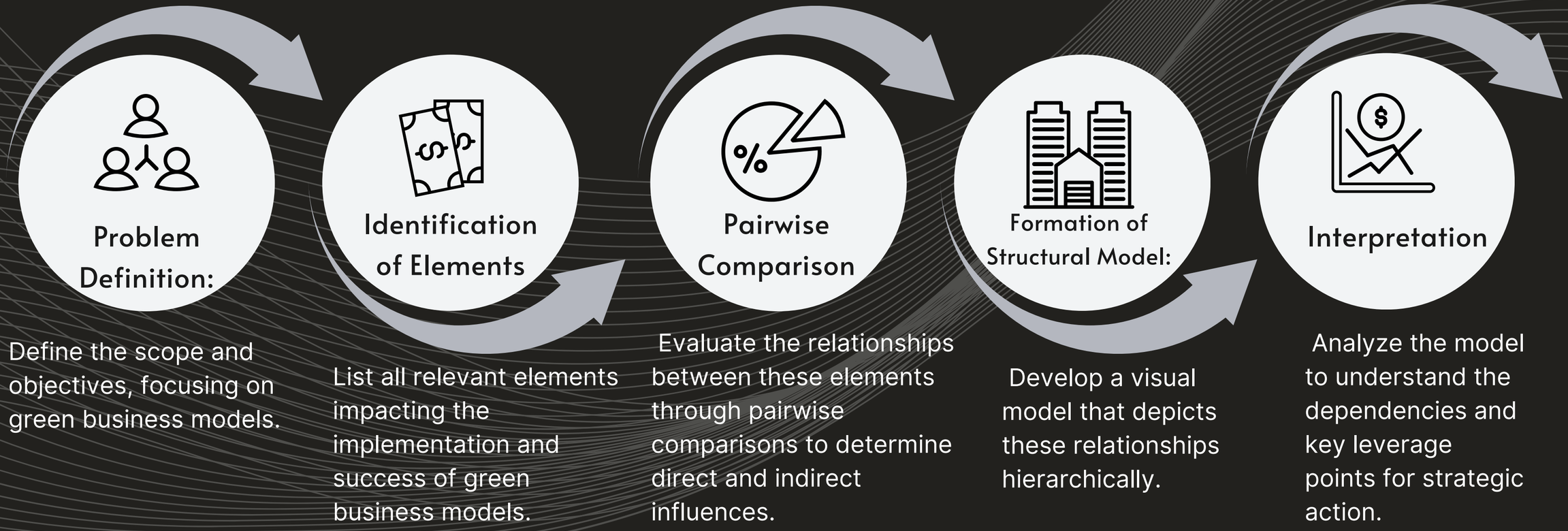
Benefits of ISM:

- Provides insights into complex systems and relationships.
- Identifies critical barriers and their root causes.
- Facilitates strategic decision-making for sustainable development.

ISM Framework

ISM is particularly valuable for green business models as it helps identify and prioritize the critical factors that can either facilitate or hinder the adoption and scaling of sustainable practices. By understanding these relationships, businesses can develop more effective strategies to promote sustainability.

ISM Framework for Green Business Models Purpose and Importance:



ISM:

ISM applications

- Awuzie, B.O.; Abuzeinab, A. (forthcoming) Understanding the Moderating Effect of Governance Functions on the Impact of Communication on Sustainability Implementation Performance in Higher Education Institutions in ‘Sustainability in higher education: Strategies, performance and future challenges’(Book Chapter).

[HTML] Barriers to MNEs green business models in the UK construction sector: An ISM analysis

A Abuzeinab, M Arif, MA Qadri

Journal of cleaner production, 2017 · Elsevier

Abstract

The environmental and economic benefits of green business models (GBMs) are considerable if current barriers can be identified and ways of overcoming them developed. In this study, barriers to GBMs are identified by conducting a qualitative study. Nineteen semi-structured interviews were conducted with selected UK construction sector experts from academia and industry and the results were obtained by applying thematic analysis. Five major categories of barriers emerged: government constraints; financial constraints;

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[HTML] Modelling organisational factors influencing sustainable development implementation performance in higher education institutions: An interpretative structural …

BO Awuzie, A Abuzeinab

Sustainability, 2019 · mdpi.com

Globally, higher education institutions (HEIs) have continued to record varied sustainable development (SD) implementation performances. This variance has been attributed to the presence of certain organisational factors. Whereas previous studies have successfully identified the factors influencing SD implementation performance in HEIs, few studies have attempted to explore the relationship between these factors and the influence of such a relationship on the management of SD implementation in HEIs. This is the

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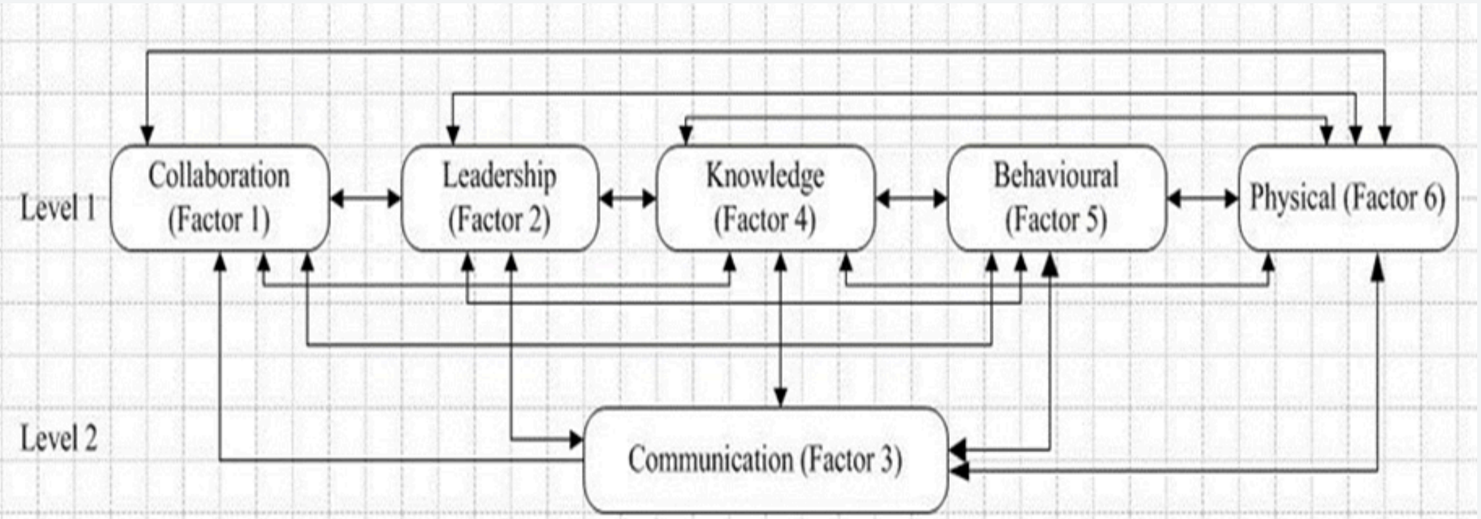
ISM Application



Explanation of the ISM Model Levels in the Model UK:

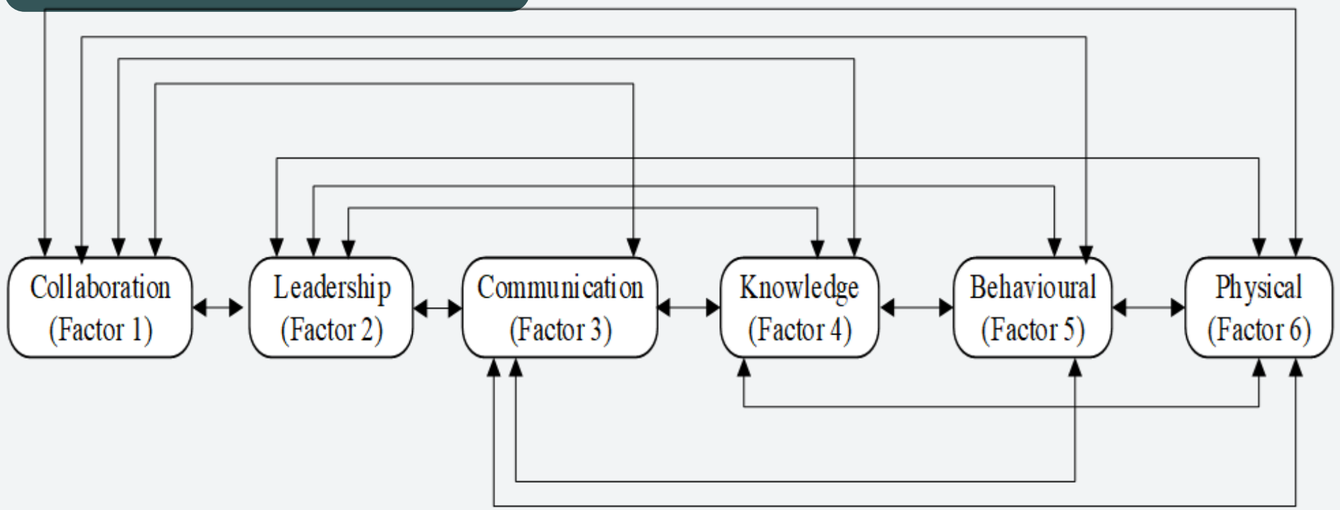
- **Level 1: Contains factors that are primarily influenced by other factors but do not influence any other factors significantly.**
- **Factors at Level 1: Collaboration (Factor 1), Leadership (Factor 2), Knowledge (Factor 4), Behavioral (Factor 5), Physical (Factor 6)**
- **Level 2: Contains factors that have a foundational influence on other factors.**
- **Factors at Level 2: Communication (Factor 3)**

Application to Green Business Models in the UK ISM Structure :

Using the ISM methodology and this model, a similar approach can be applied to analyse green business models in the UK. For instance:

1. Communication (Factor 3): Could represent the dissemination of information and awareness about green practices.
2. Collaboration (Factor 1): Involves partnerships between businesses, government, and community groups.
3. Leadership (Factor 2): Represents the role of visionary leaders in driving green initiatives.
4. Knowledge (Factor 4): Relates to understanding sustainable practices and technologies.
5. Behavioral (Factor 5): Involves changes in consumer and business behaviors towards sustainability.
6. Physical (Factor 6): Represents the tangible infrastructure and resources required for green business practices.

ISM Application



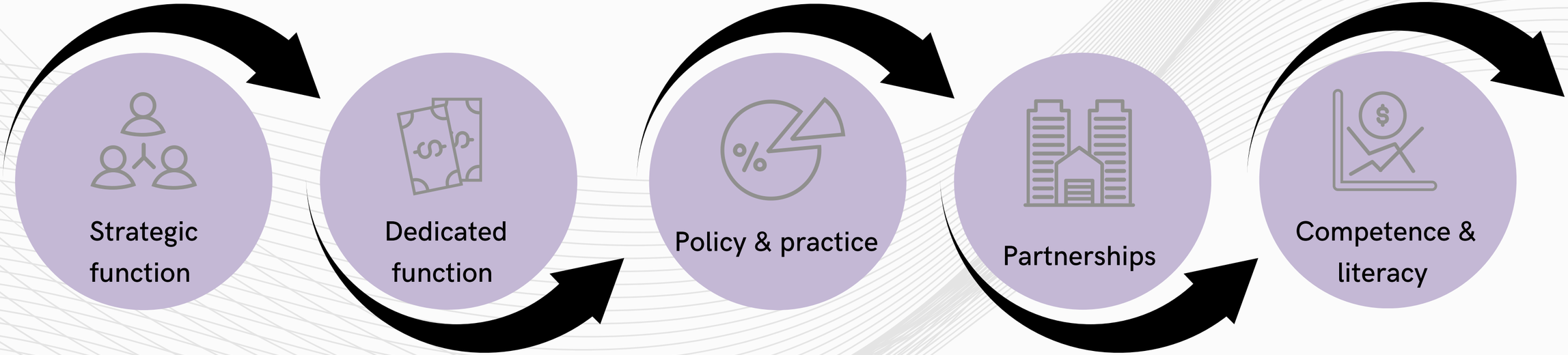
Explanation of the ISM Model Levels in the Model UK:

- **Collaboration (Factor 1): Placed at the leftmost end of the model, indicating it might be the starting point or an influential factor in the framework.**
- **Leadership (Factor 2): Directly linked to Collaboration (Factor 1) with an arrow pointing from Collaboration to Leadership, suggesting that Collaboration influences Leadership.**
- **Communication (Factor 3): Connected to Leadership (Factor 2) with an arrow pointing from Leadership to Communication, implying that Leadership affects Communication.**
- **Knowledge (Factor 4): Linked to Communication (Factor 3) with an arrow pointing from Communication to Knowledge, indicating that Communication impacts Knowledge.**
- **Behavioural (Factor 5):Connected to Knowledge (Factor 4) with an arrow pointing from Knowledge to Behavioural, suggesting that Knowledge influences Behavioural.**
- **Physical (Factor 6): Positioned at the rightmost end and connected to Behavioural (Factor 5) with an arrow pointing from Behavioural to Physical, indicating that Behavioural impacts the Physical factor.**

Application to Green Business Models in the Africa ISM Structure :

- **Collaboration (Factor 1):**Encouraging collaboration can help pool resources, share knowledge, and create synergies that promote sustainable practices.
- **Leadership (Factor 2):**Leaders who are committed to sustainability can influence their organizations and partners to adopt green practices, ensuring alignment with environmental goals.
- **Communication (Factor 3):**Effective communication strategies can help in educating the market, influencing consumer behavior, and fostering a culture of sustainability.
- **Knowledge (Factor 4):**Investing in research and development, training, and education can help in creating a knowledgeable workforce capable of implementing GBMs.
- **Behavioural (Factor 5):**Encouraging sustainable behavior through incentives, policies, and cultural shifts can lead to the successful adoption of GBMs.
- **Physical (Factor 6):** Investing in green technologies, sustainable infrastructure, and eco-friendly processes is necessary to implement and scale GBMs.

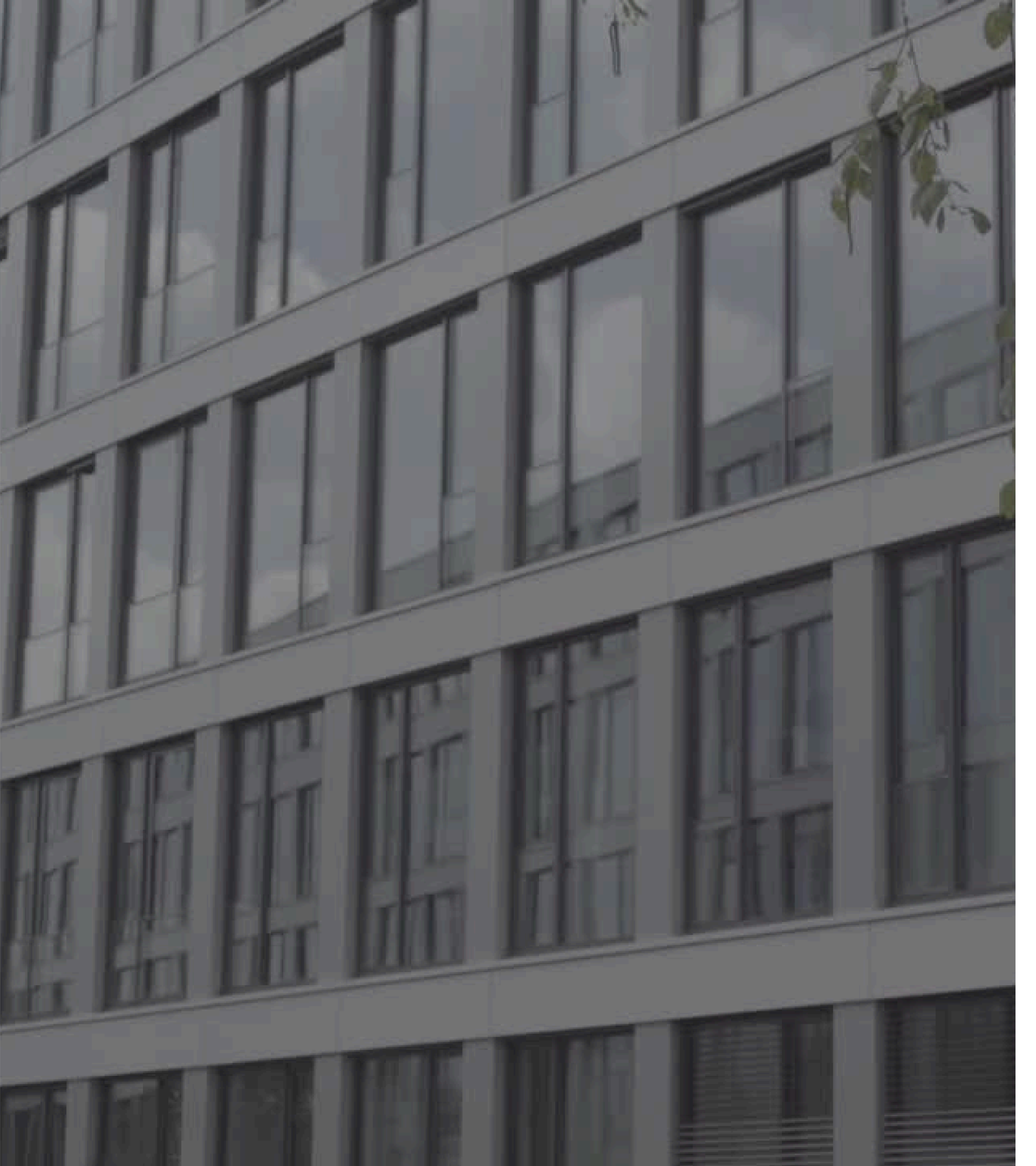
ISM translation: Higher Education context

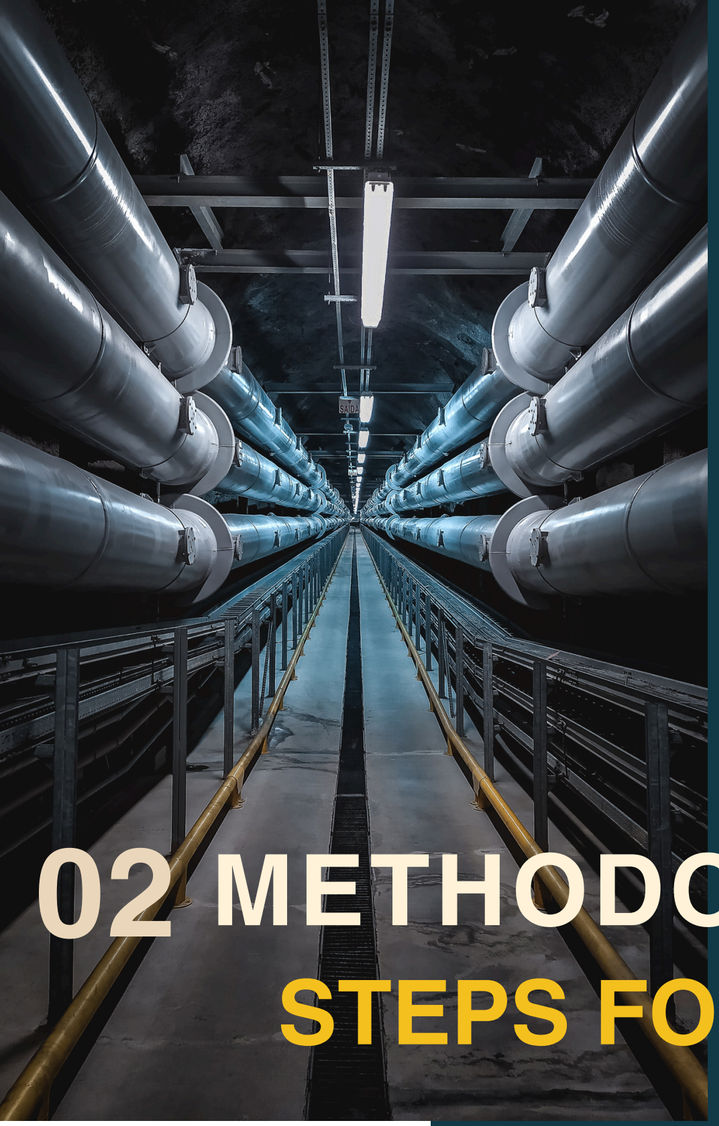


CASE STUDY: OVERCOMING BARRIERS TO GREEN BUSINESS MODELS IN CONSTRUCTION USING ISM

01 Background:

A research team conducted a study to identify and address barriers hindering the adoption of green business models (GBMs) in the construction industry. The objective was to understand the complex relationships among various barriers and develop targeted strategies for promoting sustainability.





02 METHODOLOGY

STEPS FOR ISM

Identification of Variables:

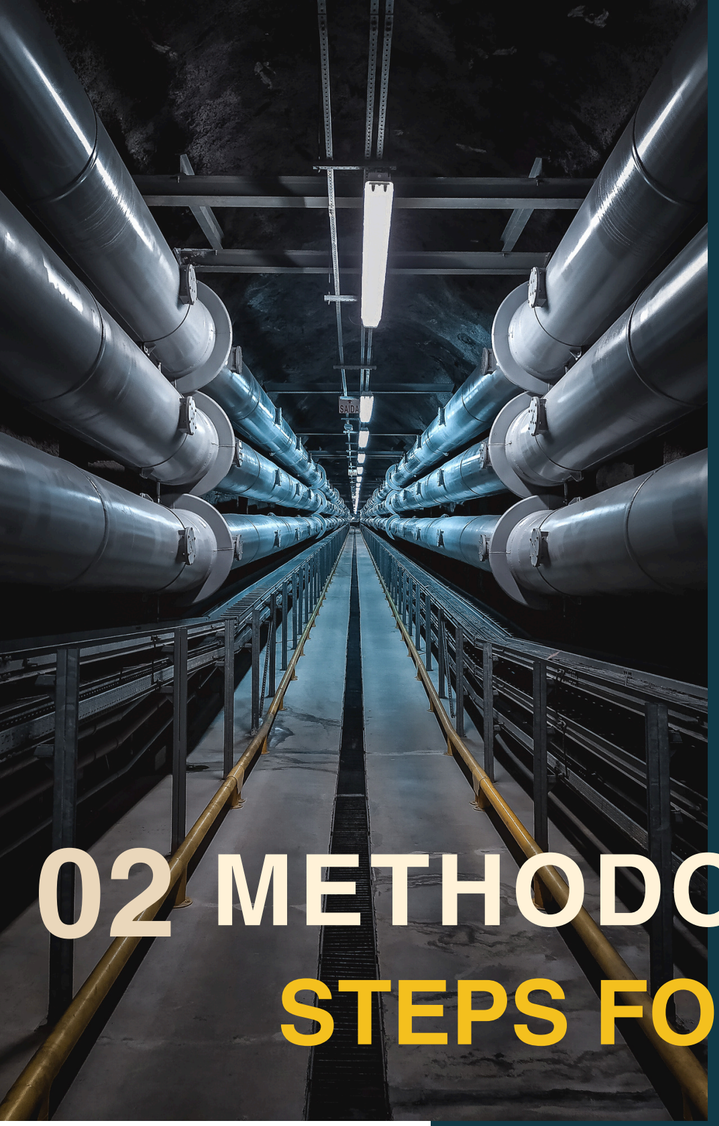
The research team identified key variables including government constraints, financial limitations, industry inertia, and lack of awareness.

Development of SSIM (Structural Self-Interaction Matrix):

- A matrix was created to represent the pairwise relationships and interactions among the identified variables. For example:
- Government Constraints -> Financial Limitations
- Financial Limitations -> Lack of Awareness
- Industry Inertia -> Government Constraints

Construction of Reachability Matrix (RM):

Using the SSIM, a reachability matrix was developed to understand the flow of influence and dependencies between barriers.



02 METHODOLOGY

STEPS FOR ISM

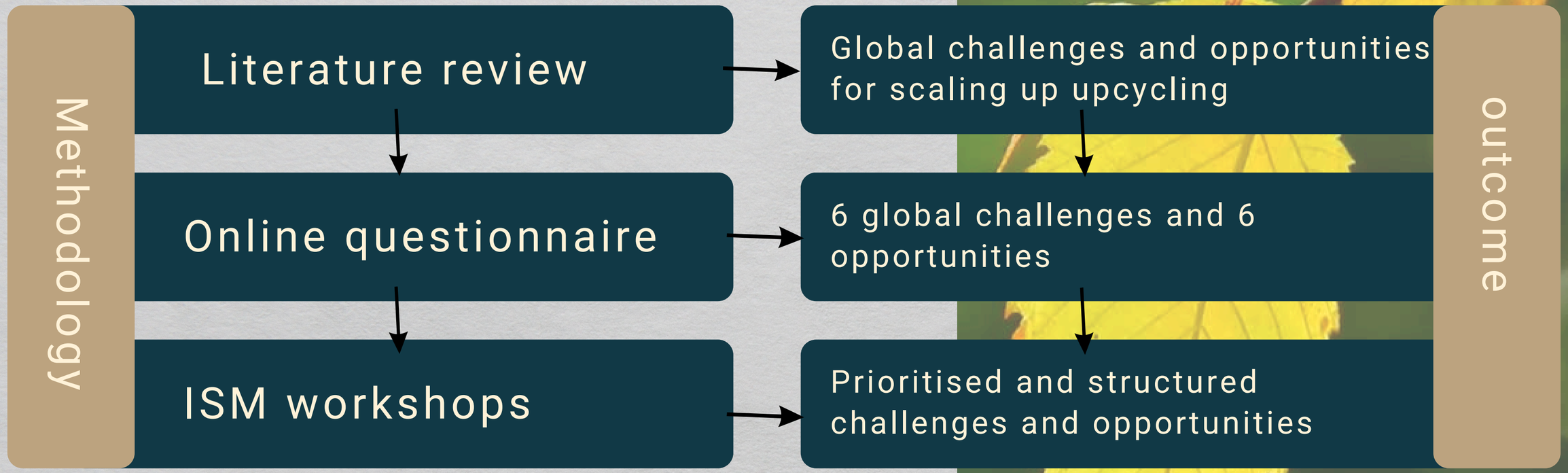
MICMAC (Matrice d'Impacts Croisés Multiplication Appliquée à un Classement) Analysis:

Variables were classified based on their driving and dependence power using MICMAC analysis. This helped in identifying critical barriers.

Interpretation and Analysis:

The ISM model was interpreted to identify key barriers and their impacts on the adoption of green business models.

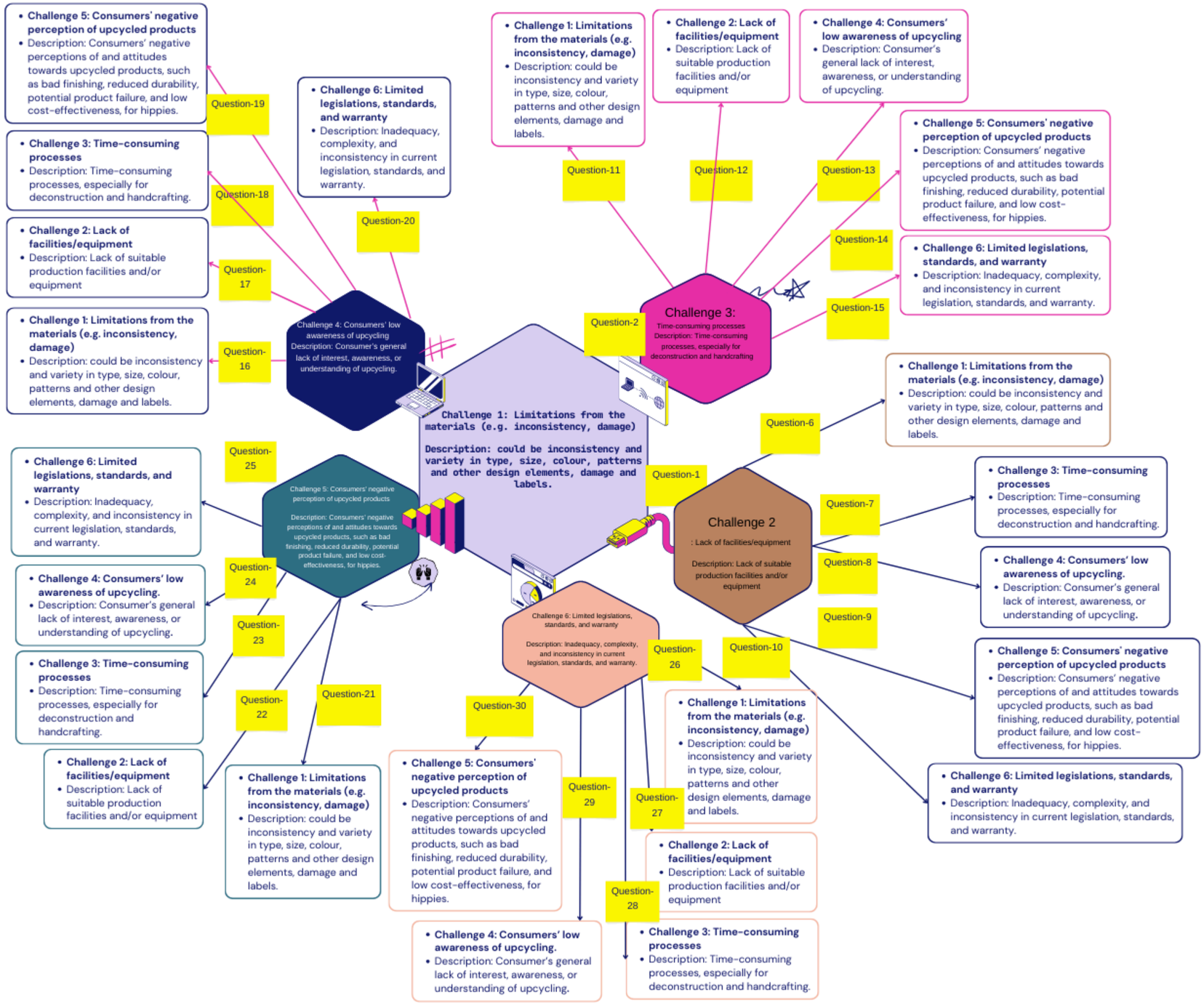
STUDY OVERVIEW



SIX KEY GLOBAL CHALLENGES FOR SCALING UP UPCYCLING BUSINESSES

NO	Challenges	Description
1	Limitations from the materials (e.g. inconsistency, damage)	Limitations from the materials such as inconsistency and variety in type, size, colour, patterns and other design elements, damage and labels.
2	Lack of facilities/equipment	Lack of suitable production facilities and/or equipment.
3	Time-consuming processes	Time-consuming processes, especially for deconstruction and handcrafting.
4	Consumers' low awareness of upcycling	Consumer's general lack of interest, awareness, or understanding of upcycling
5	Consumers' negative perception of upcycled products	Consumers' negative perceptions of and attitudes towards upcycled products, such as bad finishing, reduced durability, potential product failure, and low cost-effectiveness, for hippies.
6	Limited legislations, standards, and warranty	Inadequacy, complexity, and inconsistency in current legislation, standards, and warranty.

THE PROCESS OF 30 QUESTION IN ODERED TO COLLECT DATA



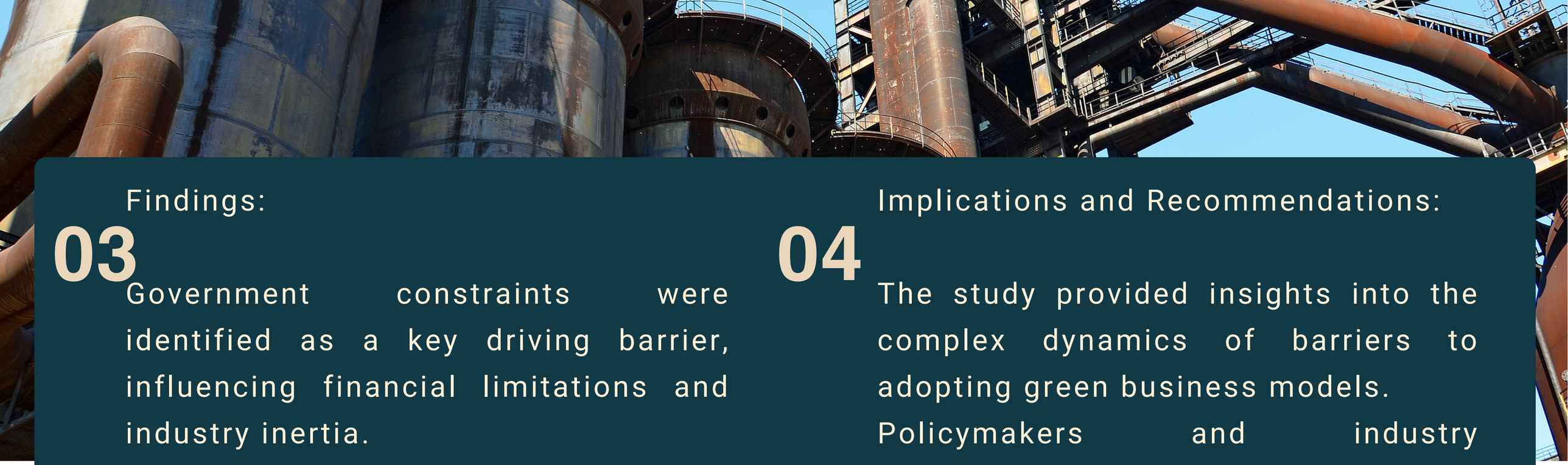
DATA COLLECTION PHASE

> Interviewing professionals, researchers, educators, and policymakers is essential for gathering data during the data collection phase. Through these interviews, we aim to identify the challenges within green business models (GBMs) and determine their benefits.

Interviewee profile.

No	ID	Type of business	Job title	Years of experience	Size of company
1	A1	University	Professor	15	2500
2	A2	University	Professor	15	2500
4	AR1	Architects	Architect & director	20	6
5	AR2	Architects	Associate architect	20	6
6	AR3	Architects	Associate architect	14	110
7	AR4	Architects	Associate director architect	9	12
3	CS1	Consultancy	Freelance consultant	36	1
8	CS2	Property and construction consultancy	Environmental manager	5	350
9	C1	Contractors	Director	50	50
10	C2	Contractors	Sustainability manager	17	800
11	C3	Contractors	Senior sustainability manager	14	5000
12	C4	Contractors	Senior sustainability manager	12	6000
13	O1	Others – Property development	Construction director	36	16
14	O2	Others - Procurements	Sustainability manager	8	50
15	CL1	Clients/Local Authority	Capital programme director	40	10,000
16	CL2	Clients/University	Associate director operations & facilities	36	260
17	CL3	Clients/University	Building surveyor	20	245
18	CL4	Clients/Local Authority	Operational facilities manager	15	10,000
19	CL5	Clients/University	Environmental & sustainability officer	10	250

Interview with 19 people



03

Findings:

Government constraints were identified as a key driving barrier, influencing financial limitations and industry inertia.

Financial limitations had a significant impact on the lack of awareness about green business models.

Industry inertia was found to be interdependent with government constraints, highlighting the need for collaborative interventions.

04

Implications and Recommendations:

The study provided insights into the complex dynamics of barriers to adopting green business models.

Policymakers and industry stakeholders can use ISM findings to develop targeted policies and interventions.

Recommendations included clearer legislative guidance, financial incentives, and capacity building to address identified barriers.

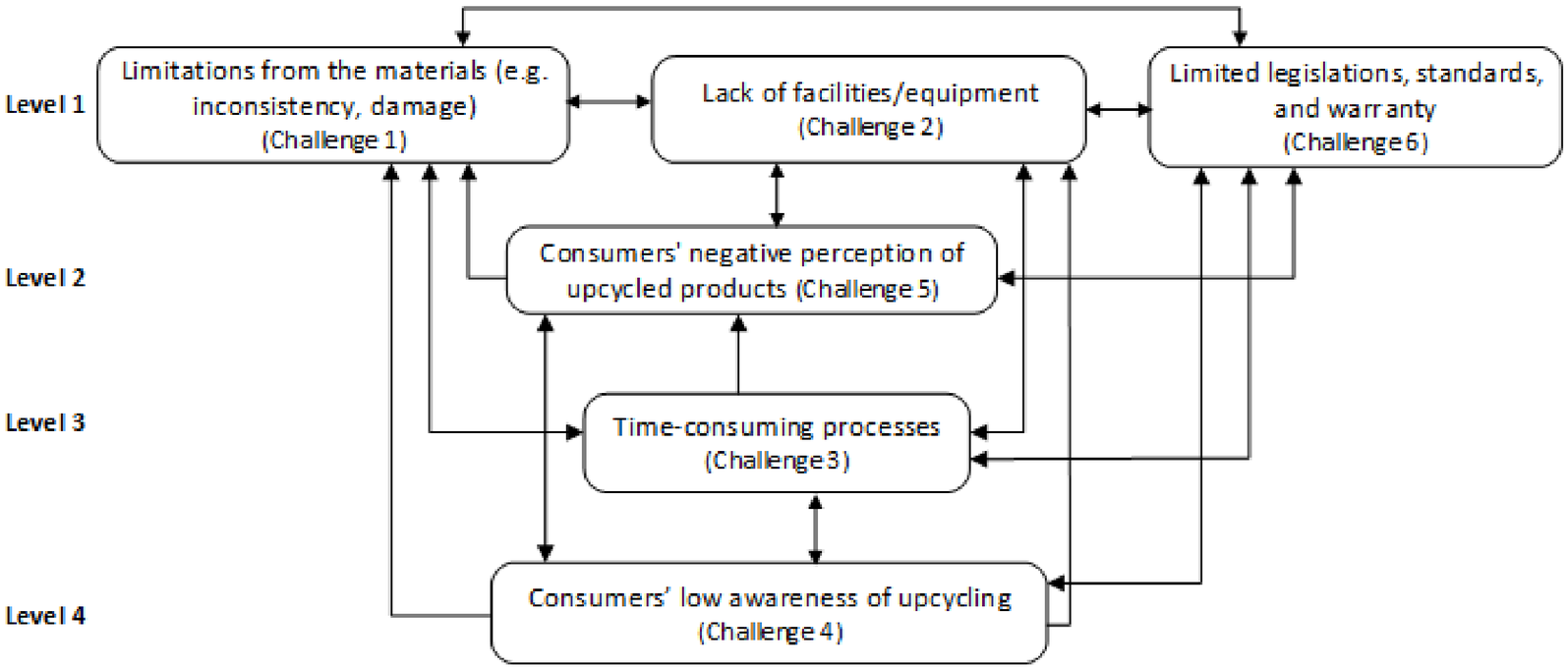
05

Outcome:

The application of ISM enabled the research team to develop actionable strategies for overcoming barriers and promoting the adoption of green business models in the construction sector. The findings contribute to advancing sustainability initiatives and driving transformative change within the industry.

NO	Challenges
1	Limitations from the materials (e.g. inconsistency, damage)
2	Lack of facilities/equipment
3	Time-consuming processes
4	Consumers' low awareness of upcycling
5	Consumers' negative perception of upcycled products
6	Limited legislations, standards, and warranty

FROM LIST TO VISAUL



Conclusion:

In conclusion, Interpretive Structural Modeling (ISM) is a powerful tool for understanding and overcoming barriers to green business models in the construction industry. By applying ISM, we can develop effective strategies for promoting sustainability and driving transformative change.

CALL FOR ACTION

ISM

THANK YOU