

## **Typologies of expected and idealised futures of the environmental impact assessment (EIA) practice: A Q-method analysis**

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There is good retrospective understanding of how the environmental impact assessment (EIA) practice developed and became a global driver of sustainable development since inception in the 1960s. These EIA practice contributions are, however, largely subject to a relatively static world. Recognised by global megatrends that present as risks and challenges for social, technological, economic, environmental and political dimensions of the future world, the 21<sup>st</sup> century is phenomenally different from the EIA founding period. This changing context is giving rise to novel obligations for the practice including climate change, social well-being, green economic development, sustainable finance and investment taxonomies. This paper proposes that exploring the future of EIA in these changing contexts are crucial for its continued implementation and influence. Applying Q-methodology, this research prompted the visioning of the future EIA practice. It involved EIA practice, agents and academia across emerging and developed economies. The findings revealed typologies of perspectives and differentiation between expected and idealised futures of the EIA practice; as well as consensus and plausible future-proofing of EIA against the critical definers of a changing future.

Keywords: Environmental Impact Assessment; Q-methodology; global megatrends; future EIA; development

## 1. Introduction

This research is situated within the context of significant transformations in Environmental Impact Assessment (EIA) practice since its inception in the 1960s (Morrison-Saunders et al., 2015; Retief, 2010). Literature and practice have good grasp on EIA's past developments and realisations, coupled with a clear understanding of its challenges and weaknesses. As a policy instrument, EIA is adapting to contemporary socio-economic complexities and increasing expectations to respond to a range of issues including extreme climate events, human rights concerns, environmental justice, sustainability considerations, financial innovation, and life cycle assessments (Enríquez-de-Salamanca, 2021) - matters that were largely beyond the EIA scope a few decades ago. Concurrently, a world that is developing with equal considerations for prosperity, human well-being and environmental factors remains elusive; hence the intended outcomes of EIA are not manifesting. This highlights the need to re-evaluate EIA practice's future trajectory. The problem statement for this research asked what is expected and what is idealised for the future EIA – alongside these changing contexts and novel EIA obligations. This research aimed to explore the future for EIA practice – and likely a differentiation between *expected* and *ideal* futures for EIA practice.

## 2. Methodology

In scientific and policy fields, while quantitative research is common, there is a growing need for a broader approach incorporating holism, systems thinking, and interdisciplinary integration. Q-methodology offers an interpretative approach that facilitates the exploration of diverse perspectives through quantification. While relatively uncommon, Q-methodology has been utilised across complex topics including democracy (Dryzek, 1993), sustainability (Barry & Proops, 1999), EIA public participation (Webler, 2001; Simpson, 2013) and pluralism in EIA practice (Van Staden & Retief, 2022). Q-methodology is implemented in five steps:

**Table 1: Five steps of the Q-methodology**

<b>Step 1</b>	<b>Develop concourse.</b> A two-step approach was adopted, integrating both primary (interviews) and secondary sources (media, political statements, commentary, literature).
<b>Step 2</b>	<b>Reduce concourse to Q-set.</b> A 16-cell filtering matrix (based on Dryzek & Berejikian 1993) was developed to compose the final Q-set of 40 statements (see Annexure 1).
<b>Step 3</b>	<b>Establish P-set.</b> Given the research aim of exploring the future EIA, respondents needed to be actively engaged in EIA practice.
<b>Step 4</b>	<b>Perform Q-sort according to a 'Condition of Instruction'.</b> Forced distribution was applied and two Conditions of Instructions (CoIs) were provided: CoI 1: "The future EIA, I think...." CoI 2: "The future EIA, I hope...."
<b>Step 5</b>	<b>Q-analysis.</b> Q-sorting yielded 40 q-sorts for each CoI. Exploratory factor analysis was applied with PCA factor extraction which enabled the novel bootstrapping analysis.

## Limitations

1. Most respondents were unfamiliar with Q-methodology. To mitigate any results uncertainty, the interpretation combined statistical analysis with Q-methodologist guidance and researcher discretion.
2. Although multiple approaches were applied to ensure reliability, certain aspects of Q-methodology flexibility such as the absence of manual rotation, may affect repeatability.

## 3. Results

The same factor identification and analysis were applied to CoI 1 (expected future EIA) and CoI 2 (ideal future EIA). Results are summarised in Table 2, with the Q-analysis of both CoI 1 and CoI 2 delivering acceptable solutions (Watts & Stenner, 2012). Figure 1 shows the analysis output in a clustered heatmap chart that is the basis of interpreting the typologies of perspectives.

**Table 2: Q-analysis results**

CoI 1: Expected future EIA						
No. of factors			3			
Factor 1			Factor 2		Factor 3	
No. of respondents	13	No. of respondents	13	No. of respondents	6	
Variance	15.8%	Variance	15.5%	Variance	9%	
Composite reliability	98%	Composite reliability	98%	Composite reliability	96%	
SE <sup>1</sup>	0.14	SE	0.14	SE	0.20	
Collective explained variance: 41.2% <sup>2</sup>						
CoI 2: Ideal future EIA						
No. of factors			2			
Factor 1			Factor 2			
No. of respondents	33	No. of respondents			6	
Variance	39.3%	Variance			7.1%	
Composite reliability	99%	Composite reliability			96%	
SE	0.09	SE			0.02	
Collective explained variance: 46.4%						

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<sup>1</sup> Smaller SEs are advantageous (Watts & Stenner, 2012).

<sup>2</sup> Collective variance above 35% is considered a sound solution (Watts & Stenner, 2012).

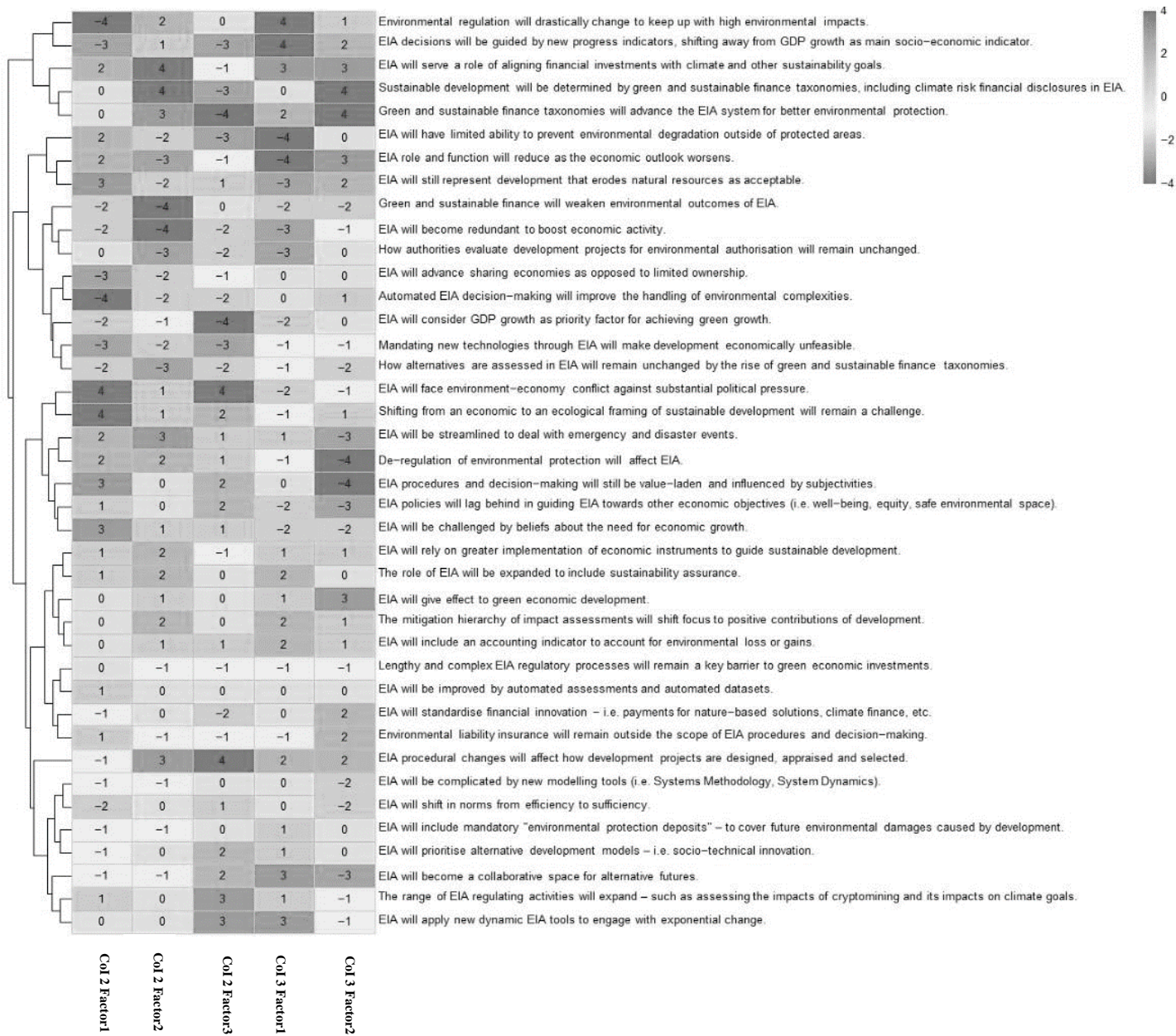


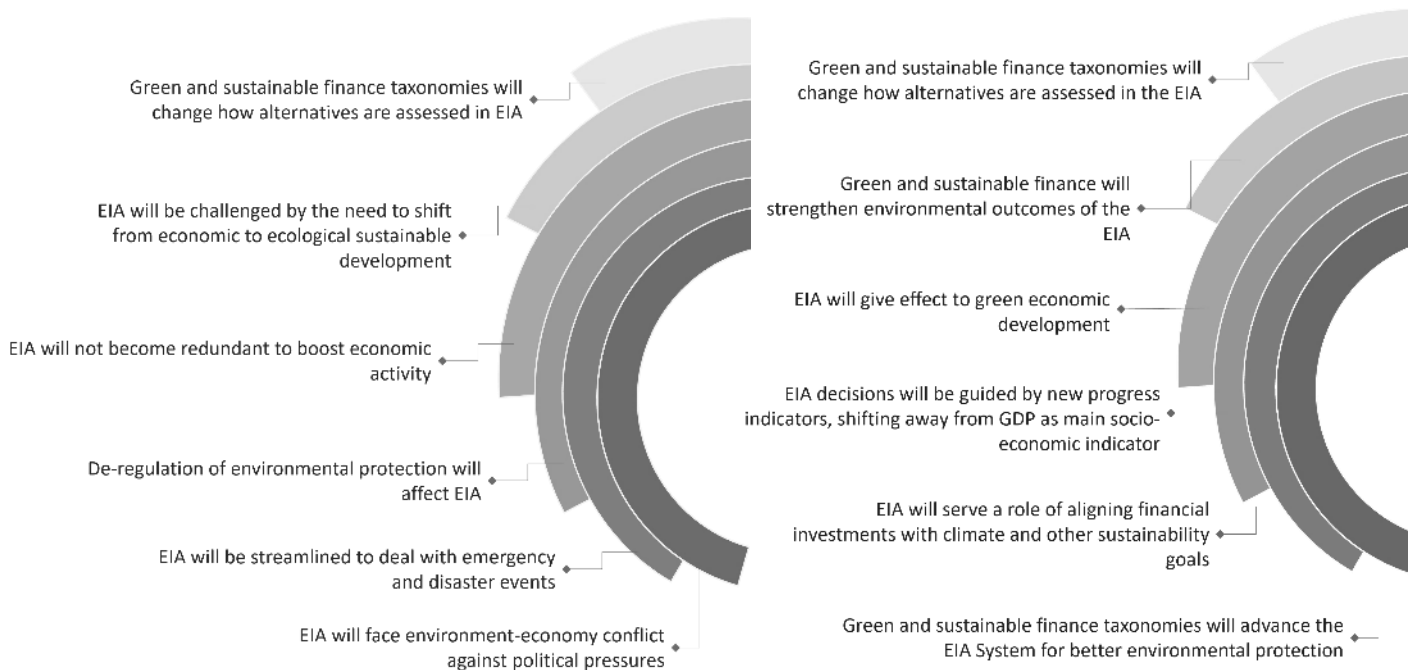
Figure 1: Clustered Heat Map Chart as basis of interpreting typologies of perspectives

## Discussion and Conclusion

The typologies of perspectives reveal a critical differentiation but also consensus between the *expected* and *idealised* EIA futures.

Despite its prominence, the expected future outlook suggests EIA as a conflicted policy instrument that must adapt to a rapidly changing world. This aligns with previous research highlighting risks for EIA as it is increasing incompatible with real-world application (Morrison-Saunders & Arts, 2021; Morgan, 2012; Lawrence, 1997). Political pressure remains a significant obstacle to EIA functionality, emphasising the need for instrument advancement in order for EIA practice to remain effective (Bailey, 1997; Enríquez-de-Salamanca, 2021). The expected loss of EIA influence, particularly in its role in environmental protection, re-affirms findings in literature (Sadler & Verheem, 1996; Wood, 2003; Jay et al., 2007). In contrast, the ideal future EIA reaches its full potential amidst complexity and global megatrends. This ideal encourages alternative, integrated approaches to environmental protection that consider environmental and social values as integral components of development.

The consensus overlap or ‘shared visions’ across the *expected* and *ideal* future EIA are summarised respectively:



**Figure 2: Consensus views on the expected future EIA (left) and ideal future EIA (right)**

The following conclusions draw focus to areas in Figure 2 where EIA practice change appears plausible:

1. Consensus across the differentiated typologies suggest engaging and aligning with novel finance instruments (i.e., environmental finance, finance taxonomies) to shift EIA from an end-of-decision making policy instrument to integrate with economic and social systems. How EIA will contribute to sustainable development through financial system alignment remains under-described (Cashmore et al., 2007). These potential solutions must however, as emphasised by Fischer (2019; 2022), be based on foundations of strong sustainability and political will.

2. Green and sustainable finance taxonomies are considered as potential change drivers in how EIA alternatives are assessed. Implementation remains novel; emerging yet cautious indications from EIA literature do frame benefits such as increased transparency and reduced subjectivity (Dusík & Bond, 2022; Vu, 2022).
3. Real-world challenges are stemming from economic and political systems' policy and decision-making models. These systems remain central to shaping the future of EIA practice. Proposed changes in development models, advocating for deeper integration of social and environmental considerations, could facilitate a collaborative approach. This collaborative space ideal aligns with the recognition that complex ecological, economic, and social issues cannot be addressed solely through science (Dietz et al., 2003; Spangenberg, 2011) – a potential solution to the expectation of EIA losing its influence. It also supports the notion that EIA should strive for greater integration, collaboration, and adaptability, possibly through adaptive governance (Bice & Fischer, 2020).

This research aimed to explore typologies of expected and idealised futures of EIA practice by Q-methodology analysis. In outcome, this research suggested specific focus areas where EIA practice change appears plausible, within the context of global megatrends. It emphasised the need for practice to futureproof in order to ensure its relevance in shaping future environmental outcomes.

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## Annexure 1

### Q-set of 40 Statements

Statement#	Statement
Statement 1	EIA will rely on greater implementation of economic instruments to guide sustainable development.
Statement 2	EIA will consider GDP growth as a priority factor for achieving green growth.
Statement 3	EIA will become a collaborative space for alternative futures.
Statement 4	The range of EIA regulating activities will expand to include, for example, the assessment of the effects of crypto-mining and its impact on climate goals.
Statement 5	Sustainable development will be determined by green and sustainable finance taxonomies, including climate risk financial disclosures in EIA.
Statement 6	EIA will serve to align financial investments with climate and other sustainability goals.
Statement 7	EIA will be streamlined to deal with emergency and disaster events.
Statement 8	The mitigation hierarchy of impact assessments will shift focus to positive contributions of development.
Statement 9	De-regulation of environmental protection will affect EIA.
Statement 10	EIA procedures and decision-making will still be value-laden and influenced by subjectivities.
Statement 11	Mandating new technologies through EIA will make development economically unfeasible.
Statement 12	Lengthy and complex EIA regulatory processes will remain a key barrier to green economic investments.
Statement 13	Green and sustainable finance taxonomies will advance the EIA system for better environmental protection.
Statement 14	EIA will include mandatory "environmental protection deposits" to cover future environmental damages caused by development.
Statement 15	EIA will include an accounting indicator to account for environmental losses or gains.
Statement 16	Environmental regulation will drastically change to keep up with severe environmental impacts.
Statement 17	EIA will give effect to green economic development.
Statement 18	EIA will apply new dynamic EIA tools to engage with exponential change.
Statement 19	EIA procedural changes will affect how development projects are designed, appraised and selected.
Statement 20	EIA will face environment-economy conflict against substantial political pressure.
Statement 21	EIA role and function will diminish as the economic outlook worsens
Statement 22	The role of EIA will be expanded to include sustainability assurance.
Statement 23	EIA decisions will be guided by new progress indicators, shifting away from GDP growth as main socio-economic indicator.
Statement 24	EIA will become redundant to boost economic activity.
Statement 25	EIA will still represent development that erodes natural resources as acceptable.
Statement 26	Shifting from an economic to an ecological framing of sustainable development will remain a challenge.
Statement 27	EIA policies will lag behind in guiding EIA towards other economic objectives (i.e. well-being, equity, safe environmental space).
Statement 28	How authorities evaluate development projects for environmental authorisation will remain unchanged.
Statement 29	EIA will prioritise alternative development models, i.e. socio-technical innovation.
Statement 30	EIA will standardise financial innovation, i.e., payments for nature-based solutions, climate finance, etc.
Statement 31	EIA will be challenged by beliefs about the need for economic growth.
Statement 32	EIA will advance sharing economies as opposed to limited ownership.
Statement 33	How alternatives are assessed in EIA will remain unchanged by the rise of green and sustainable finance taxonomies.
Statement 34	EIA will have limited ability to prevent environmental degradation outside of protected areas.
Statement 35	EIA will be complicated by new modelling tools (i.e., systems methodology, system dynamics).
Statement 36	EIA will shift in norms from efficiency to sufficiency.
Statement 37	Environmental liability insurance will remain outside the scope of EIA procedures and decision-making.
Statement 38	EIA will be improved by automated assessments and automated datasets.
Statement 39	Automated EIA decision-making will improve the handling of environmental complexities.
Statement 40	Green and sustainable finance will weaken environmental outcomes of EIA.