

SUSHIJA Framework: A New Paradigm for Scoping Reviews

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Abstract

This paper presents the SUSHIJA (Scoping, Updated, Systematic, Holistic, Interpretive, Joint, and Adaptive) Framework for conducting scoping reviews in an innovative manner. The framework is developed to address limitations of traditional scoping reviews. The SUSHIJA framework has several inclusive features such as Artificial Intelligence (AI) driven automation of literature reviews and data extraction, critical appraisal of the involved literature, iterative thematic mapping of the included articles, and even a living review component to extract and synthesize new studies in real-time. SUSHIJA framework also considers stakeholder input and incorporates visual tools.

Keywords

SUSHIJA framework, scoping reviews, systematic reviews, critical appraisal, ai-driven automation, thematic mapping, stakeholder engagement, living review, evidence synthesis

Scoping reviews have become a fundamental tool for synthesizing and mapping existing literature, particularly when exploring broad or complex research topics. They offer an adaptable framework for identifying research gaps, informing policy, and guiding future investigations (Arksey & O'Malley, 2005; Levac et al., 2010). Scoping reviews are a form of evidence synthesis designed to map the breadth and nature of research activity in a given field (Arksey & O'Malley, 2005; Levac et al., 2010). Systematic reviews focus on answering narrowly defined questions using strictly appraised evidence. However, scoping reviews are exploratory in nature and aim to clarify key concepts, identify knowledge gaps, and inform research agendas across broad and evolving domains. This methodology is especially useful when study designs, populations, or outcomes are too



diverse to allow for quantitative synthesis or meta-analysis. The rationale for scoping reviews lies in their ability to capture the landscape of research, and guide future systematic reviews. It also provides stakeholders with a structured overview of the evidence base where definitive conclusions may not yet be possible.

However, as research becomes increasingly interdisciplinary and data sets grow larger, traditional scoping review methodologies face significant limitations in flexibility, efficiency, and stakeholder engagement. These challenges include the lack of continuous updates, limited use of technology for data extraction, and inconsistent stakeholder involvement in shaping the review process (Peters et al., 2015; Tricco et al., 2018).

The SUSHIJA (Scoping, Updated, Systematic, Holistic, Interpretive, Joint, and Adaptive) Framework was developed to address these limitations and advance the field of scoping reviews. The rationale behind each element of the framework's name reflects its core principles and methodological innovations:

- “Scoping” underscores the framework’s commitment to mapping wide-ranging literature in a comprehensive manner.
- “Updated” highlights its integration of a living review model to ensure that new evidence is continuously incorporated into the review process.
- “Systematic” emphasizes the balance between flexibility and rigorous search processes to incorporate structured quality appraisals to enhance the reliability of findings.
- “Holistic” refers to the framework’s ability to synthesize both qualitative and quantitative data to provide a well-rounded understanding of the literature.
- “Interpretive” captures the framework’s emphasis on thematic mapping and conceptual frameworks to deepen the synthesis of findings.
- “Joint” emphasizes stakeholder engagement through iterative consultations with both academic and non-academic actors to ensure that the review remains practically relevant.
- “Adaptive” reflects the framework’s flexibility in addressing diverse research needs and evolving methodologies.

Making use of existing models such as the Arksey and O’Malley (2005) model and the PRISMA-ScR Guidelines (Tricco et al., 2018), SUSHIJA includes progressive aspects, such as artificial intelligence (AI) supported data extraction, reiterative refinement of research questions, ongoing stakeholder engagement, and updating via a living review framework (Elliott et al., 2017; O’Mara-Eves et al., 2015a; O’Mara-Eves et al., 2015b). Further, the model highlights the importance of tiered synthesis of data and layer the synthesis of data and increase the interpretability and communication of findings through data visualization (Dixon-Woods et al., 2006; Peters et al., 2020).

This body of work presents SUSHIJA as an innovative, adaptable, and effective framework for conducting scoping reviews and an adaptable tool for meeting changes in research practices.

Literature Review

Over the years, scoping review methodologies have changed considerably to best serve differing research needs. The earliest relevant example is the Integrative Review (Whittemore & Knafl, 2005), which seeks to synthesize theoretical and empirical literature to provide a well-rounded understanding of complex research topic areas. Although integrative reviews were not initially termed as scoping reviews, their ability to incorporate varying forms of evidence means it will have relevance to multidisciplinary research. When examining many forms of potential evidence, the challenges of synthesizing this evidence are immense and require varied methods of synthesis which can limit its overall accessibility as a form of scoping review.

Evidence Mapping (Katz et al., 2003) was one of the first to introduce a visually driven methodology whereby tasks related to potential evidence could be completed similar to mapping and subsequently to looking at trends and identifying gaps around visual outputs like heat maps. Evidence mapping is successful for scoping review and provides an overview (particularly at a broad research area), however, the use of visualizations to represent outputs can package more complicated relationships too simplistically, and required technical skills can limit use to those with specialized skills in nature creating visual outputs.

The introduction of Realist Reviews (Pawson et al., 2004) had a shift towards understanding ‘mechanisms’ related to interventions. Realist reviews are interested in some of the context that surround studies, and the ‘why’, ‘what’ and ‘how’ interventions achieve particular outcomes. This approach has applicability for policy formed research and assists in providing a more reasonable unpacking and understanding of ‘causation’ and the ‘mechanisms’ that contribute. Realist evaluation has complexity which requires a level of resource and skill to undertake, so there may be limitations without the required training. Critical Realist Review is an orientation, which adds more elements of contextual consideration for interventions, but similarly to realist approaches, it requires considerable theoretical knowledge and training. It is also a resource intensive methodology.

The Arksey and O’Malley (2005) Framework has established itself as the foundation of scoping reviews and offers a flexible five-stage approach, which includes: defining research questions, identifying studies, selecting studies, charting data, and reporting results. This flexibility allows for broad exploration of the literature without needing to rigorously assess quality; thus, the five-stage framework is adaptable. However, it is critiqued for not providing more rigor to the synthesis of data and not including critical appraisal to appraise poses issues with the robustness of findings.

Similarly, Narrative Reviews (Greenhalgh et al., 2005) focus on synthesizing literature through a description, often used where depth of understanding of the literature is necessary, and are useful for complex topics, as they provide rich descriptions of

understanding through storytelling; however, subjectivity and bias exist due to lack of systematic rigor.

Moreover, Critical Interpretive Synthesis (Dixon-Woods et al., 2006) was introduced as a more interpretive approach which has addressed how new theoretical insights can be produced from pre-existing data. The architecture of methodology allows for greater flexibility working with complex and multifaceted research questions, making it very adaptable. However, this approach is time-consuming and involves considerable interpretive resources and expertise, which may inevitably impact its use by researchers working with time constraints or limited resources. Furthermore, Levac et al. (2010) build on the Arksey and O'Malley framework and provide refinements specifically regarding iterative development of research questions and stakeholder engagement. These refinements ultimately have made the scoping review more relevant to needs. Engaging stakeholders in the scoping review adds to the research being based on real-world problems, and the iterative aspect allows the researcher to adapt throughout the scoping review; on the other hand, this method is much more time-consuming and complex, which can be challenging for researchers that have rigid timelines or are working in resource-limited environments.

By 2015, the Umbrella Review Approach (Aromataris et al., 2015) was introduced as a way of synthesizing findings from multiple reviews – both scoping and systematic. This approach is valuable when there are too many previous reviews and adds value by accepting an overarching conclusion from several bodies of work. However, it can only be used in areas where there are already non-reviewed previous reviews of appropriate quality and may require researchers to accept overly simplified conclusions when synthesizing findings from multiple different studies.

The Joanna Briggs Institute (JBI) Guidelines (Peters et al., 2015) are likely among the most supported approaches to scoping reviews, with significant rigor built into the approach which can include critical appraisal as optional, intent to comprehensively search for literature, and systematic data extraction. The JBI Guidelines presented a structured approach, and there are notable gains in rigor from using these guidelines, in fact, they are perhaps a most notable source of accepting rigor across disciplines. However, their structure can become too rigid when conducting a more exploratory approach, or the wish to use scoping reviews in a project when limited time or capacity may become limiting.

The introduction of the Literature Search and Study Selection Using Infrastructure and Automation to deliver a Technology-Enhanced scoping Review (O'Mara-Eves et al., 2015a) has improved the efficiency of the scoping review process by using artificial intelligence (AI) to support the literature search, study selection and data extraction. Through undertaking AI-based support of these approaches, the methodological workload of manually undertaking these processes are greatly reduced and offers notable efficiencies for scoping reviews of high scale. However, these insights are provided by

layering highly technical processes onto methodological scoping review approaches, and there will remain a risk of introducing bias into the automated process of literature searches and review, and the additional technological infrastructure required may limit the approach if researchers do not have access to such infrastructure.

Over time, a feature of the Thematic scoping Review approach was deliberately focused to analyse and summarize qualitative data into nuanced themes (Nowell et al., 2017). The Thematic approach can offer substantive promise for categorizing significant amounts of qualitative data in disciplines heavily reliant on qualitative research. However, thematic analysis may become a burden in labour share if the scoping review does not have sufficient rigor, which easily raises questions about the interpretation and ultimately, offers little to no scalability and relies on acceptable methodological rigor should engagement become larger or complex.

The PCC Framework was developed with the aim of providing an alternative to PICO Framework for developing research questions to emphasize population, concept and context (Peters et al., 2020). The PCC Framework is more flexible for broader research questions and suitable for projects involving complex populations and contexts. This flexibility is also the main weakness of the Framework for narrow research questions, as greater variety can lead to diminishing focus in a scoping review. The PRISMA-ScR checklist was developed to enhance the transparency and consistency of reporting of scoping reviews, and the results from using the PRISMA-ScR Checklist have led to improved reporting of scoping reviews (Tricco et al., 2018). The con of PRISMA-ScR is that the guideline is intended as a reporting guideline and should not be viewed as a methodology. The guideline enhances the transparency and consistency, and reproducibility of scoping reviews, but does not provide any details about conducting a scoping review.

The Rapid Scoping Review Methodology represents a methodology for undertaking scoping reviews in pressure full environments (Stevens et al., 2018). The purpose of this methodology is to increase speed for scoping reviews by shortening the scoping review process through novel tools like database search reduction and modified selection and extraction. Rapid scoping review methodology is best practice for scoping reviews where there are limited resources or time.

Living Scoping Reviews provided the concept of presenting a living update on an ongoing basis or as evidence becomes available (Iannizzi et al., 2023). Living scoping reviews provide greater relevance for the practice or planned project in fast-paced fields such as health care or technology field and assist with presenting the most current issues or best practices. Living scoping reviews often come with the cost of needing resources every time research is conducted to keep it current. Living scoping reviews are challenging to follow through with consistently over time. Moreover, a mixed methods scoping reviewers offer a combination of and qualitative and quantitative approaches to enhance richness to further examine complex topics (Shepherd et al., 2023). The mixed

methods design allows for a well-rounded synthesis of data. However, it is resource intensive as it requires expertise in quality and quantitative methodologies. Overview of different scoping review methodologies is given in [Table 1](#).

Table 1

Overview of Scoping Review Methodologies

Methodology	Steps in Scoping Review Process	Strengths	Weaknesses
Integrative Review (Whittemore & Knafelz, 2005)	<ol style="list-style-type: none"> 1. Defining research questions. 2. Identifying empirical and theoretical literature. 3. Synthesizing diverse data types. 4. Providing a comprehensive understanding. 	Bridges theoretical and empirical knowledge; Useful in multidisciplinary research.	Can be difficult to integrate diverse evidence types; Requires advanced skills.
Evidence Mapping (Katz et al., 2003)	<ol style="list-style-type: none"> 1. Defining research questions. 2. Identifying relevant studies. 3. Mapping data visually (e.g., heat maps). 4. Synthesizing findings to highlight trends and gaps. 	Easy to identify gaps and trends visually; Useful for broad topics.	Visualizations may oversimplify complex relationships; Requires technical skills.
Realist Review (Pawson et al., 2004)	<ol style="list-style-type: none"> 1. Defining the research question based on realist principles. 2. Identifying relevant studies. 3. Study selection based on contextual relevance. 4. Charting data focusing on mechanisms and outcomes. 5. Synthesizing findings emphasizing context and mechanisms. 	Focuses on understanding underlying mechanisms and contextual influences.	More complex and resource-intensive; Requires expertise in realist evaluation.
Arksey and O'Malley Framework (Arksey & O'Malley, 2005)	<ol style="list-style-type: none"> 1. Identifying the research question. 2. Identifying relevant studies. 3. Study selection. 4. Charting the data. 5. Collating, summarizing, and reporting the results. 	Flexible and exploratory; Can cover a wide range of literature.	Lack of critical appraisal; Limited guidance on data synthesis.
Narrative Review (Greenhalgh et al., 2005)	<ol style="list-style-type: none"> 1. Defining research questions. 2. Identifying relevant studies. 3. Synthesizing data narratively. 4. Reporting findings in narrative format. 	Provides a rich, descriptive understanding of the literature.	Lacks the rigor of systematic methods; Prone to bias.
Critical Interpretive Synthesis (Dixon-Woods et al., 2006)	<ol style="list-style-type: none"> 1. Defining research questions with an interpretive focus. 2. Identifying relevant studies. 3. Study selection based on conceptual relevance. 4. Synthesizing data by critically interpreting and generating new insights. 	Produces new theoretical insights from existing data; Adaptable.	Requires a high level of interpretative expertise; Resource-intensive.

Methodology	Steps in Scoping Review Process	Strengths	Weaknesses
Levac, Colquhoun, and O'Brien Enhancements (Levac et al., 2010)	<ol style="list-style-type: none"> 1. Iterative development of research questions. 2. Identifying relevant studies. 3. Stakeholder consultation. 4. Study selection. 5. Charting data. 6. Synthesizing and reporting findings. 	Integrates stakeholder input; Allows iterative refinement of research questions.	More complex and time-consuming compared to simpler scoping reviews.
Umbrella Review Approach (Aromataris et al., 2015)	<ol style="list-style-type: none"> 1. Defining overarching research questions. 2. Identifying scoping and systematic reviews. 3. Synthesizing evidence across reviews. 4. Reporting trends, gaps, and themes. 	Synthesizes findings from multiple reviews for higher-level conclusions.	Limited to topics where prior reviews exist; May lead to oversimplification.
Joanna Briggs Institute (JBI) Guidelines (Peters et al., 2015)	<ol style="list-style-type: none"> 1. Defining research objectives and questions. 2. Comprehensive search for relevant literature. 3. Applying inclusion/exclusion criteria. 4. Critical appraisal (optional). 5. Data extraction. 6. Reporting and dissemination of findings. 	Rigorous and structured process; Applicable across disciplines.	Can be rigid for exploratory research; Time-intensive.
Technology-Enhanced Scoping Reviews (O'Mara-Eves et al., 2015a)	<ol style="list-style-type: none"> 1. Defining research questions. 2. Using AI for search and study selection. 3. Automated data extraction. 4. AI-assisted synthesis. 5. Reporting findings with visualizations. 	Increases efficiency and reduces manual workload in data processing.	Requires access to advanced technology; May introduce bias through automation.
Thematic Scoping Review (Nowell et al., 2017)	<ol style="list-style-type: none"> 1. Defining research questions. 2. Identifying relevant studies. 3. Synthesizing data by identifying key themes. 4. Reporting findings around central ideas. 	Useful for organizing large amounts of qualitative data into meaningful themes.	Can become subjective if not rigorously conducted; Labour-intensive.
CC Framework (Peters et al., 2020)	<ol style="list-style-type: none"> 1. Defining research questions based on population, concept, and context. 2. Identifying relevant studies. 3. Study selection. 4. Charting and synthesizing data based on population, concept, and context. 	Suitable for broad research questions; Flexible compared to PICO.	May lack focus when applied to narrow, specific research questions.
PRISMA-ScR (Tricco et al., 2018)	<ol style="list-style-type: none"> 1. Setting objectives and defining research questions. 2. Identifying relevant studies with transparent search strategies. 3. Applying eligibility criteria. 4. Collecting, charting, and synthesizing data. 	Improves transparency and consistency in reporting; Widely adopted.	Focuses on reporting rather than guiding the actual review process.

Methodology	Steps in Scoping Review Process	Strengths	Weaknesses
	5. Reporting findings following PRISMA-ScR checklist.		
Rapid Scoping Review Methodology (Stevens et al., 2018)	<ol style="list-style-type: none"> Streamlined definition of research questions. Limited database search for relevant studies. Rapid study selection and data extraction. Minimal data charting. Quick synthesis and reporting. 	Efficient in time-constrained environments; Ideal for limited resources.	May lack comprehensiveness due to rapid procedures; Potentially excludes relevant studies.
Living Scoping Reviews (Iannizzi et al., 2023)	<ol style="list-style-type: none"> Defining research questions. Continuously searching for new evidence. Updating study selection and synthesis. Reporting findings with ongoing updates. 	Provides continuously updated findings; Highly relevant in rapidly changing fields.	Requires ongoing resource investment; Difficult to maintain consistency over time.
Mixed Methods Scoping Review (Shepherd et al., 2023)	<ol style="list-style-type: none"> Defining research questions for both qualitative and quantitative data. Identifying relevant studies. Collecting data from both qualitative and quantitative sources. Synthesizing data comprehensively. 	Combines qualitative and quantitative data for a richer understanding.	Complex data synthesis; Requires expertise in both qualitative and quantitative methods.

Limitations of Existing Scoping Review Methodologies

Although various approaches to conduct scoping reviews have emerged, they remain limited in scope and effectiveness, credibility, and applicability.

Absence of Structured Guidance for Synthesis

The Arksey and O'Malley (2005) Framework remains the first generation framework for scoping review methodology but has been criticized for the limited support it offered for synthesis of data as it relates to the effectiveness of the scoping process. While the approach offered a framework to identify and map literature, there was no strong internal process support for critical synthesis, and often superficial or cursory conclusions occurred when synthesis (Daudt et al., 2013). In contrast, systematic reviews elucidate deeper, theoretical conclusions and are able to synthesize literature more effectively. The enhancements proposed by Levac et al. (2010) improved the original Arksey and O'Malley framework by increasing clarity around the process but fails to address the synthesis gap inherent in the original process.

Resource and Time Intensive

Multiple approaches to scoping reviews including [Levac et al. \(2010\)](#) Enhancements and JBI Guidelines ([Peters et al., 2015](#)) also require considerable resources and time. Systematic review type searches and engaging stakeholders are both important processes in scoping reviews but are often exceedingly time consuming in fairly normal research environments. Time sensitive ([Tricco et al., 2018](#)) approaches to research make these types of scoping reviews so much less feasible on time. Continuous updating in Living Scoping Reviews ([Iannizzi et al., 2023](#)) also increases the burden imposed on researchers and the resources required to conduct a scoping review well. Even for relationships to biomedical fields, this is an excessive burden to impose as new studies appear daily. The application of this approach (i.e., Living Scoping Reviews) involves constantly added time and energy to ensure that the scoping review remains relevant.

Absence of Option for Critical Appraisal

Most of the scoping review methods, such as the [Arksey and O'Malley \(2005\)](#) Framework and Realist Review ([Pawson et al., 2004](#)), do not include critical appraisal, being specifically focused on mapping the breadth of the literature. This is often consistent with the fact that scoping reviews are exploratory and therefore appropriate; however, it enables the proliferation of low-quality studies to be included in the scoping review and bias the findings together ([Peters et al., 2015](#)). Of particular note, the Joanna Briggs Institute (JBI) Guidelines ([Peters et al., 2015](#)) do provide an option for critical appraisal which would strengthen the claims or conclusions. Nevertheless, there is no clear or standardized approach to appraisal in most of the review frameworks, and appraising and thus including only relevant literature of high quality can be quite a challenge, particularly in the social sciences where the quality of studies can differ in regard to validity and trustworthiness ([Pham et al., 2014](#)).

Complexity and Expertise

Approaches, such as Critical Realist Reviews ([Pawson et al., 2004](#)) and Critical Interpretive Synthesis ([Dixon-Woods et al., 2006](#)), engage more deeply in theoretical and contextual factors, but require considerable expertise in realist review or interpretative synthesis methodologies, and therefore, it is less likely that general researchers or those without training would apply this knowledge to scoping review processes. These approaches also limit the capacity for scoping reviews to be completed in fields where this approach is not widespread ([Wong et al., 2013](#)). For example, while the realist reviews have been very useful in evaluating the ongoing/policy for healthcare evaluations, their complexity has led them to not be as easily or frequently applied outside of specialist teams.

Challenges in Data Visualization

Frameworks such as Evidence Mapping (Katz et al., 2003) and Technology-Enhanced Scoping Reviews (O'Mara-Eves et al., 2015a) utilize visual methods (see heat maps) to present the findings of research reports/evidence. In addition to facilitating data use and providing accessibility, visual methods may mask complexity, which may not take into account the extent of unknowns, particularly in interdisciplinary research. For example, in environmental science, where multiple variables interact in biological, ecological, and social systems, visual methods may not effectively account for complex interactions between variables (Roux et al., 2006). Additionally, the technical skills needed to make the visualizations themselves creates a barrier to use, even among researchers, who may lack the data visualization expertise

Stakeholder Engagement Challenges

Frameworks such as the Consultative Approach (Munn et al., 2018) and the Levac Enhancements to Scoping Reviews (Levac et al., 2010) propose to engage stakeholders throughout the scoping review process. While stakeholder engagement brings practical relevance to the review process, it can indeed add complexities in the scoping review process, such as in management of conflicting views between stakeholders, or the length of the scoping review timeframes. In addition, stakeholder engagement may enhance stakeholder perspectives to the detriment of academic rigour in the review process (Oliver et al., 2014). Stakeholders may, for example, seek specific studies that link to policy or engagement implications, and in so doing run the risk of making bias in the process.

Inconsistent Application Across Disciplines

Flexible frameworks, such as the PCC Framework (Peters et al., 2020) and PRISMA-ScR (Tricco et al., 2018) were designed to accommodate different contexts of research. However, inconsistent application across disciplines has resulted in various degrees of rigour. For example, although the PRISMA-ScR checklist is meant to be a more transparent reporting system, there is no guidance to the scoping review process itself, often leading to variability in conducting a scoping review. Since the application of scoping in research is a newer practice in areas such as education, the inconsistency across disciplines may have implications for less consistent approach, a different approach or understanding of scoping review methodology, or poor scoping quality purpose.

Balancing Speed With Rigor in Rapid Scoping Reviews

As "Rapid Scoping Reviews" (Garritty et al., 2021) are designed for speed and quick-turn-around, it is a perfect fit for a situation like a public health emergency. But part of being fast often involves a compromise between comprehensive and rigor. A good comparison

is the rapid reviews done at the start of the pandemic, many of which excluded gray literature, and restricted their searches to a limited number of databases to represent the literature accurately (Haby et al., 2016). Although rapid scoping reviews provide timely knowledge, they indeed may miss significant studies, which in fact adds strength to the breadth and depth of the reviews.

Working With Complex, Multi-Disciplinary Information

“Cross-disciplinary Scoping Reviews” (Munn et al., 2018) refer to reviews that try to come together across fields within a broad topic to discuss some complex issues. While trying to synthesise the information across the landscape might offer some level of the holistic view, maintaining coherence remains challenging due to the number of different disciplines the material is taken from. A reality of multi-disciplinary scoping reviews involves conflicting terminology, methodology and epistemological stances. For example, in studies involving sustainability, the ecological paradigm may conflict with social paradigm, and in both situations the way forward is interaction/negotiation if friends, but often other issues appear during cross disciplinary synthesis to argue that merging/discussing is mutually exclusive (Berkes et al., 2008).

Recommendations for Improvement

The developing landscape of scoping review methodologies offers several opportunities for further enhancements especially in the areas of synthesis, stakeholder engagement, and the integration of technology. The recommendations provided below seek to address existing limitations of scoping reviews and improve their rigor, efficiency, and impact.

Incorporating Critical Appraisal Into Scoping Reviews

Most scoping reviews simply measure and map the literature without determining the quality of included studies. Including a critical appraisal step in scoping reviews could enhance the rigor of research reviews. For example, organizations such as Joanna Briggs Institute (JBI) Guidelines (Peters et al., 2015), and PRISMA-ScR (Tricco et al., 2018) suggest optional appraisal process to weed out low-quality studies, and employing this across reviews would ensure that findings are based on high quality, relevant studies. Future contributions to scoping reviews should still be able to provide comprehensive mapping of the literature while including studies that are more methodologically rigorous to improve the trustworthiness of scoping reviews conclusions.

Productive Uses of Technology and Automation Tools

Recent advancements in artificial intelligence and machine learning have the potential to improve the efficiency of scoping reviews. For example, Technology-Enhanced Scoping

Reviews (O'Mara-Eves et al., 2015a) have been proposed to utilize AI in automated screening of literature and return data extraction to researchers, which in turn reduces the researchers'/examiners' workload. Hence, although AI automation tools may be considered for increased efficiency and productivity of scoping reviews, it is important to remind readers and future scoping review researchers regarding the limitations of available AI, machine learning, or automated tools, especially for complex qualitative data synthesis and contextual understanding of findings to reproduce the depth, thickness, or accuracy of the reviews. Researchers should broaden their incorporation of these technological approaches for larger scale data management and synthesis of qualitative method studies, while remaining cognizant of specific limitations (i.e., limited qualitative synthesis capabilities).

The Development of a Standardized Synthesis Framework

A significant limitation in current methods for conducting scoping reviews is the absence of a standardized synthesis framework for the data. Frameworks for scoping reviews outlined by Arksey and O'Malley (2005) and later modified by Levac et al. (2010) do not provide extensive guidance on developing a synthesis of data. To address this issue, a standardized synthesis framework should be developed that directs researchers in mapping disparate data while allowing the synthesis of a more in-depth and analytical review. This would help narrow the gap between scoping reviews and systematic reviews by more effectively highlighting knowledge gaps, study progression or trends, and the quality of evidence being reviewed.

The Broader Use of Living Scoping Reviews

Living reviews, Living Systematic Reviews (Elliott et al., 2017) are an adaptable approach for keeping the review to date, especially in areas where the evidence base is rapidly evolving over time like healthcare and technology. The adaptation of living systematic reviews to living scoping reviews is a newer approach; however, it is still limited in its application due to the resources required to continuously update a review. To increase broader use of living scoping reviews, automation tools and effective data-tracking systems could augment the living reviews and quickly update the review to keep it current. Funding agencies and organizations could consider the allocation of their resources towards supporting living reviews, particularly in areas of research with rapidly changing evidence bases.

Increased Stakeholder Engagement and Governance

Engaging stakeholders through the process of adaptation ensures that the scoping review is relevant in real-world settings. Both the traditional and Consultative Approach frameworks (Munn et al., 2018) highlight the impact of involving stakeholders, with the caveat

that it is occasionally cumbersome and time consuming and finding a balance can be challenging to orchestrate. More formal or efficient models, pre-existing stakeholder panels or consultations via video conference could streamline this approach without compromising stakeholder engagement. However, it is pertinent to recognize that even these approaches require vigorous management skills to mediate different opinions or balance perspectives with scientific reliability. Guidelines should be developed to manage stakeholder contributions to conflict of interest and integrity of the review process.

Adoption of Visual Synthesis for Better Communication

There is room for enhancement in scoping reviews' communication tools, especially with the usage of visual aids to offer the findings in meaningful ways to non-academic audiences. Examples of such techniques, including Evidence Mapping (Katz et al., 2003) and Data Visualizations in Scoping Reviews (Peters et al., 2020), have demonstrated how visual tools, such as heat maps and network diagrams, can communicate trends and gaps in the field effectively. Future modes are encouraged to adopt such visualizing tools, with attention to ensuring that they are not oversimplifying complex relationships. Visual tools, when utilized intentionally, can act as a bridge between academic literature and on-the-ground policy implementation by articulating actionable insights.

Hybrid Approaches Combining Systematic and Scoping Reviews

Hybrid models that synthesize systematic and scoping review approaches (e.g., Systematic Search and Synthesis Scoping Reviews: Levac et al., 2010; Munn et al., 2018) have opportunities ahead. Given the academic rigour of a systematic review such as search protocols and critical appraisal, conducting reviews in a systematic manner, allows for the flexibility of scoping review designs. While hybrid models offer promising opportunities, it must contend with a model that balances comprehensiveness with the exploratory aspects of scoping reviews, namely that hybrid approaches must regard each methodology's goals. Proposing hybrid models can offer methodological robustness, while still allowing for the qualities of flexibility needed to conceptualize broad research questions.

Interdisciplinary Collaboration for Cross-Disciplinary Scoping Reviews

Scoping Reviews in cross discipline design often grapple with navigating various methodologies and epistemologies, Interdisciplinary Scoping Reviews (Munn et al., 2018) would welcome deeper collaboration, to ensure synthesis and interpretation is achieved across disciplines the evidence scoping review is based across multiple fields. Throughout the process of synthesis, clear guidelines would support collaboration across distinct terminologies, research methodologies, and findings coded into meaningful conclusions.

This is especially value in sustainability science to view environmental, social, economic and policy perspective.

SUSHIJA Framework: A Novel Approach to Scoping Reviews

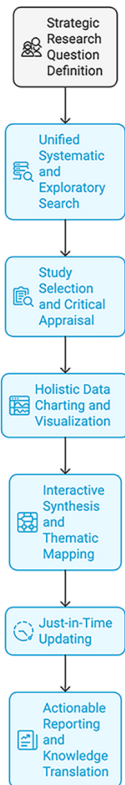
The SUSHIJA Framework combines the strengths of existing methodologies but addresses some limitations, including concerns about the lack of synthesis, critical appraisal, and stakeholder engagement. The Framework provides a progressive balance of achievable flexibility and methodological rigor, while using advanced technology to engage stakeholders and increase efficiency. By integrating systematic review elements with the exploratory nature of scoping reviews, SUSHIJA produces findings in a rigorous, actionable, and timely manner. The Framework is adaptable to the type of research and scalable for the level of resources. Steps in the process of executing SUSHIJA framework are given below (See [Table 2](#) and [Figure 1](#)).

Table 2

Key Components and Innovations of the SUSHIJA Framework: Steps, Descriptions, Addressed Limitations, and Borrowed Concepts

Step	Description	Addressed Limitation	Borrowed Concept (Citations)
Strategic Research Question Definition	Broad, strategic questions defined through consultation with stakeholders (virtual panels and expert groups).	Enhances stakeholder engagement, ensures practical relevance, and aligns questions with real-world needs.	Levac et al. (2010) , Munn et al. (2018) , Peters et al. (2015) .
Unified Systematic and Exploratory Search	Combines systematic search across predefined databases with exploratory techniques, using AI-driven automation for broader and more comprehensive results.	Balances the need for thoroughness with time and resource efficiency, capturing both established and emerging literature.	Levac et al. (2010) , O'Mara-Eves et al. (2015a) , Garritty et al. (2021) .
Study Selection and Critical Appraisal	Includes a critical appraisal of studies using standardized tools but does not exclude studies based on quality alone; findings are weighted based on quality.	Ensures rigorous synthesis while maintaining comprehensive coverage by including lower-quality studies with caution.	Peters et al. (2015) , PRISMA-ScR (Tricco et al., 2018) , Arksey and O'Malley (2005) .
Holistic Data Charting and Visualization	Uses advanced visual tools (e.g., evidence maps, heat maps, network diagrams) and AI for automated data extraction and presentation of complex data.	Improves clarity in data interpretation, enhances accessibility for non-academic audiences, and avoids oversimplification.	Katz et al. (2003) , Peters et al. (2020) , O'Mara-Eves et al. (2015a) .

Step	Description	Addressed Limitation	Borrowed Concept (Citations)
Interactive Synthesis and Thematic Mapping	Utilizes thematic mapping and conceptual frameworks, with iterative refinement informed by stakeholder feedback and emerging data.	Deepens synthesis by organizing findings thematically, ensuring that insights remain aligned with practical needs.	Arksey and O'Malley (2005), Levac et al. (2010), Dixon-Woods et al. (2006).
Just-in-Time Updating (Living Review Component)	Continuously updates the review using AI-driven tools to monitor and incorporate new evidence, maintaining relevance in rapidly evolving fields.	Ensures that the review remains current, minimizing the time and resource burden typically associated with manual updates.	Elliott et al. (2017), Garritty et al. (2021), Peters et al. (2020).
Actionable Reporting and Knowledge Translation	Delivers practical outputs, such as policy briefs, summaries, and interactive visualizations, in addition to traditional academic publications.	Expands the accessibility and real-world impact of findings, ensuring applicability to both academic and non-academic audiences.	Munn et al. (2018), Peters et al. (2015), Katz et al. (2003).

Figure 1*Steps in SUSHIJA Framework*

Strategic Research Question Definition

The first step involves defining broad and strategic research questions developed during collaborative engagement with both academic and non-academic stakeholders, including policymakers and practitioners. While partnerships with stakeholders increase the chances of producing findings relevant to practice, the SUSHIJA Framework acknowledges that working in teams can be difficult for all parties when opinions and perceptions are diverse. The Framework does provide suggestions for balancing equity between stakeholder views and achieving increased input from stakeholders; thus, maintaining both practical relevance and methodological rigor.

To operationalize this engagement in a scalable and cost-efficient manner, we propose a structured stakeholder model adapted from the NIHR INVOLVE framework (National Institute for Health and Care Research, n.d.). This model integrates: Phased virtual consultations to reduce logistical burden while ensuring timely feedback; Predefined

decision rules to guide inclusive and equitable decision-making; Prioritization matrices that assist researchers in translating stakeholder input into practical review directions. These tools collectively enable researchers to embed stakeholder involvement without overwhelming resources. Moreover, the model mandates conflict-of-interest disclosure protocols to address concerns about bias and influence (Oliver et al., 2014). Such procedural safeguards ensure that stakeholder contributions enhance the methodological integrity of the scoping review. This approach also addresses stakeholder involvement (Munn et al., 2018). It maximizes the potential for findings to be practical (Levac et al., 2010). It further incorporates strategies that account for multiple viewpoints.

Unified Systematic and Exploratory Search

The SUSHIJA Framework utilized a combined strategy of systematic and exploratory searches (two-tiered searching). The first search consists of systematic searching of initially defined databases, then undertaking an exploratory search for more emergent and gray literature. In order to maximize participant efficiency, the combination will utilize technology and Artificial Intelligence (AI) to assist with the heavy lifting; however, the Framework may control and warrant the use of AI. For certain activities, AI may ignore subtle and qualitative data and the Framework advises review and consideration from a human perspective. It addresses the need to balance methodological rigor with typological flexibility (Levac et al., 2010). It also seeks to maximize efficiency (O'Mara-Eves et al., 2015a) while maintaining covert supervision of AI to prevent oversimplification.

Study Selection and Critical Appraisal

SUSHIJA includes a critical appraisal step using standardized appraisal and visualization tools, such as the JBI Critical Appraisal Tools. The inclusion of a study should not be caused only by the quality of a study, but rather the lowest quality studies will be weighted and a comparative synthesis will occur. This allows conclusions taken from high quality evidence without excluding lower quality studies from the inclusivity of other potential balanced studies. Statements are made with explicit ways to bring lower quality studies into synthesis.

The SUSHIJA Framework adopts a tiered critical appraisal strategy to address the heterogeneity of included literature that would span across empirical studies, conceptual papers, and theoretical commentaries. Empirical studies are evaluated by using the appropriate JBI Critical Appraisal Checklists (Peters et al., 2015), while non-empirical works are assessed by using a structured rubric based on conceptual clarity, theoretical contribution, and coherence (Dixon-Woods et al., 2006). Each study is categorized into quality tiers (e.g., high, moderate, low) and documented in a quality matrix. Rather than excluding studies, SUSHIJA applies a sensitivity-aware synthesis. High-tier studies are prioritized during thematic development, while lower-tier studies are used to enrich

context but are flagged to prevent undue influence. Additionally, we annotate findings to indicate how conclusions may shift under different quality thresholds to offer a transparent and reflexive approach that supports analytical rigor and practical use by applied researchers. It addresses the need for rigorous quality appraisal (Peters et al., 2015). It ensures comprehensiveness through inclusive methods (Arksey & O'Malley, 2005). It also provides explicit guidance on how to integrate lower-quality studies into synthesis.

Holistic Data Charting and Visualization

Data charting includes both quantitative and qualitative data charting with an emphasis on higher visual tools of the evidence map, thematic heat map, and network diagram as visualizations, thus maintaining an emphasis of important emerging finding without compromising clarity. While increasing communication of complex relationships are communicated through these accounting systems, the framework provides recommendations in circles of caution and avoiding oversimplifying complex processes through visual representations. AI tools can assist in quick automated visualization of evaluating miles, but researchers must be cautious to avoid artful visualizations that could be misleading. This approach addresses the need to simplify communication and transfer of findings for students (Peters et al., 2020). It draws on AI credentials to improve efficiency (O'Mara-Eves et al., 2015a). It also directly confronts the challenge of handling oversimplification in complex data (Katz et al., 2003).

Shared Synthesis and Potential Mapping

SUSHIJA introduces the mapping of multiple studies into thematically categorized sections for findings. Thematic findings derived from multiple studies are synthesized through qualitative analysis by utilizing themed software mapping and thought-reviewed studies. These combined themes support the development of an organizing conceptual framework, refined through iterative stakeholder feedback and strategized validation. This process further incorporates ties from community-based integration designs to address barriers at the management level within the situatedness of studies (Levac et al., 2010). The organizational framework allows a working combined synthesis, iterative refinements of feedback from potential construction connections throughout the premise of either dynamic instability or situations evolving.

Interdisciplinary synthesis involves challenges such as conflicting terminologies, divergent epistemologies and methodological fragmentation. To mitigate these, the SUSHIJA Framework introduces three strategies. First, shared terminology glossaries establish a common interpretive language across disciplines (Jahn et al., 2012). Second, role-based team structures comprising disciplinary leads and synthesis coordinators clarify responsibilities while respecting methodological diversity (Levac et al., 2010). Third, modular synthesis strategies allow qualitative, quantitative and mixed-method streams to be inte-

grated in parallel, maintaining coherence without enforcing convergence (Gough et al., 2012; Greenhalgh et al., 2005). Together, these innovations reduce coordination burdens and support rigorous interdisciplinary integration. This approach addresses the need to simplify rigorous synthesis of findings (Arksey & O'Malley, 2005). It also encourages iterative refinement through stakeholder validation (Levac et al., 2010).

Just-In-Time Updating (Living Review Component)

To facilitate active and timely developments in review updates, the SUSHIJA Framework allows us to create a living review component. Through automated tools, databases will continuously monitor relevant information with the aim of incorporating new evidence as it becomes available. Although a living review means that our work has a dynamic component and authorship may later accrue sufficient resources to manage ongoing updates, SUSHIJA acknowledges the required long-term investment of resources to continue living reviews. Furthermore, the authors of SUSHIJA provide notes to inform and prepare regimes to find sustainable funding and continued integrated updates to reviews eventually; as living review would still require ongoing maintenance.

To ensure realistic implementation of the living review component, the SUSHIJA Framework emphasizes scalability and sustainability. We recognize the challenges associated with technical complexity and resource demands. To address this, we recommend the use of open-access tools such as ASReview, Zotero and GitHub Actions which support literature tracking, data management and workflow automation with minimal training requirements. For long-term sustainability, we propose flexible update cycles such as quarterly or semi-annual updates instead of continuous real-time updates. This strategy allows research teams to balance methodological rigor with available personnel, time and funding resources. This approach addresses the need for a living, updated process in fast-moving fields (Elliott et al., 2017). It delegates potential update tasks to automated tools to extend efficiency (Garritty et al., 2021). It also notes the importance of sustaining incentives across all phases of participation.

Actionable Reporting and Knowledge Translation

In the final step, we focus on products that are rigorous enough for an academic community but utilizing also active and pragmatic for working policy and practical summaries, executive and policy briefs, and engaging types of interactive visualisation options as ways to move findings for stakeholders. Stakeholders, including decision-makers and focus partners, will continually shape and inform how evidence and findings will be reported and communicated to be usable and engaging in naturalistic settings, while the governing structure continues to protect rigor for science. This approach addresses the enhancement of knowledge translation and accessibility (Munn et al., 2018). It improves the communication and reporting of findings through visual modes (Peters et al., 2020).

It also maintains governance safeguards to balance stakeholder influence with scientific integrity.

Discussion

SUSHIJA Framework is a key advancement in the process of scoping reviews and addresses limitations previously known in the absence of critical appraisal, lack of structured synthesis, and lack of engagement with stakeholders. The SUSHIJA Framework represents the interface of a scoping review's exploratory scope with the systematic rigor found in systematic reviews, making it useful for both academic and practical research goals. In this section we will discuss implications of the novel features of the SUSHIJA framework, the contribution of this framework to the field, as well as potential limitations.

Stakeholder engagement in research has been advocated as a critical component to ensure research findings are relevant and translate into practice (Levac et al., 2010; Munn et al., 2018). The SUSHIJA Framework formalizes stakeholder engagement by way of a structured consultation with stakeholders at the pre-research question stage. The incorporation of a stakeholder consultation in this way, ensures that the research question posed is justifiable academically, but also achievable and responding to the identified issues faced by policymakers, practitioners, and other non-academic stakeholders. The virtual consultations offered, and the expert panel proposed as part of the framework don't add considerable burden to project stakeholder engagement and are considerably more feasible in ways further leveraged alongside potential resource constrained projects.

However, in contrast, while stakeholder engagement improves relevance and practicality to research findings, it can simultaneously introduce challenges. Potential competition for power or stake between scholar and stakeholder can complicate decision making, and lead to that bias in taking one context more than another into priority setting. The SUSHIJA framework offers some easy-to-follow guidelines, and methods, of managing stakeholder input with a recommendation that maintains a balance between practicality and scientific rigour. Future research may consider equitable way to leverage stakeholder engagement that reflect both a breadth of perspectives, and systemizing this stakeholder engagement breadth, without burdening the consuming time or resources to take these perspectives into consideration.

The SUSHIJA Framework's integration of AI automation within systematic and exploratory search strategies is one of its main innovative features. This double-mode features enables coverage both existing and emergent literature, which addresses one of the key weaknesses of scoping reviews that is simply inefficiency and incompleteness (Levac et al., 2010; O'Mara-Eves et al., 2015a). In short, the use of AI not only increases efficiency but also mitigates opportunities for human error in locating identified studies for screening.

Another significant strength is the inclusion of a critical appraisal step in the synthesis. To note, classic scoping reviews focus on mapping the landscape of past literature without a critical appraisal step for quality, and even though they can be reliable given the method is followed, the appraisal incorporated in the SUSHIJA Framework increases the reliability of the findings. The SUSHIJA Framework indicates intentionally including high-quality studies during synthesis with a caveat that the lower quality studies still remain in the final synthesis, though are factored into their weight during synthesis. This flexibility enables the researchers to keep a learning stance for all emerging literature, whilst ensuring that the conclusions made, are not driven erroneously by low quality available evidence.

Despite the benefits associated with the AI component, there are still important concerns regarding using AI on behalf of teams. AI promotes increased efficiency with searches but may falter in many subtleties of qualitative synthesis and analytic work. A human presence is still vital and necessary to assure that attention is given to complex relationships and deeper trends that may inform the qualitative synthesis. As AI continues to evolve, forward-thinking iterations of the SUSHIJA Framework will likely emerge that embraces increasingly sophisticated AI models that addresses deep qualitative analysis and synthesis.

The Just-in-Time Updating element (Living Review) represents one of the most innovative aspects of the SUSHIJA Framework. This living, continuous updating process tackles a primary challenge for many scoping reviews, which is the potential to become outdated soon after publication, especially in rapidly changing sectors like healthcare and technology (Elliott et al., 2017). By utilizing automation, the SUSHIJA Framework significantly decreases the time and resources needed to do continuous updates and maintain the relevance of the findings over time.

However, sustaining a living review also requires a sustained expenditure of resources and coordinated efforts over the long term, which is not always an option for every research team. While automation can streamline the process of retrieving and interpreting the evidence, there is a human cost associated with ensuring that the review continues to be relevant as well. Institutions and funding partners should actively find avenues for logistical and financial support to allow of the continued use of living review over the long-term.

The SUSHIJA Framework also addresses one of the key challenges of scoping reviews: the complexity of relaying that data in an accessible way to both academic and non-academic audiences. Advanced visualizations ultimately support scoping reviews by allowing the findings to be summarized in accessible and interpretable ways using evidence maps, thematic heat maps, and network diagrams, to name a few. Visualizing trends and gaps in the literature, wheel identification of such trends and gaps might be obligations of policy makers and practitioners that do not have enough time or lived experience to comb through the data (Katz et al., 2003; Peters et al., 2020).

That said, there is the inherent risk of oversimplification of complex constructs when represented visually. The SUSHIJA Framework builds upon this challenge by emphasizing a cautious approach to representing visualizations paying close details to interdisciplinary literature, which considers interactions between construct complexities. There is a need for future research to explore how to refine use of visualization techniques to balance simplicity and depth without loss of the complexity on the underlying data.

Illustrative Demonstration Through Comparative Mapping

To show how SUSHIJA can be used, we present a comparison of its aspects with a current published scoping review on predictive analytics in healthcare social work (Kumar & Suthar, 2024). This detailed examination shows that SUSHIJA improves traditional review processes by focusing on rigor, getting all voices involved and making technology part of the process.

Table 3 shows that the original study relied on the Arksey and O'Malley approach while in SUSHIJA we created new steps such as asking stakeholders what questions to address, using evidence from online sources and from the stakeholders and testing AI tools for pre-screening articles. Other updates include flexible data charting, a levelled method of study evaluation and connecting with living review systems for ongoing changes. Table 3 presents a retrospective alignment between each SUSHIJA phase and the steps followed in our previous review (Kumar & Suthar, 2024). This mapping provides a transparent view of how SUSHIJA enhances methodological rigor, enables inclusive stakeholder engagement, and strengthens synthesis quality.

Table 3

Comparison Table: Published Review vs. SUSHIJA Framework

Step	Published Review (Kumar & Suthar, 2024)	SUSHIJA Framework (Proposed Method)	Description
1. Define Research Questions	Based on Arksey & O'Malley model; Three guiding research questions.	Co-developed with stakeholders by using prioritization matrices.	SUSHIJA adds stakeholder-driven alignment to strategic question formulation.
2. Identify Relevant Studies	Systematic search in Scopus using defined keywords.	Dual-layered: systematic + exploratory; includes grey and stakeholder-nominated sources.	Broader retrieval channels for a more inclusive evidence base.
3. Study Selection	Manual screening in Covidence; 67 full texts reviewed.	Semi-automated screening with tools like ASReview; AI-assisted deduplication.	Enhances efficiency and reduces manual bias.
4. Data Charting	Iteratively refined charting form used by reviewers.	Modular charting with shared glossaries and role-based assignments.	Promotes consistency and cross-team interpretability.

Step	Published Review (Kumar & Suthar, 2024)	SUSHIJA Framework (Proposed Method)	Description
5. Thematic Synthesis	Narrative thematic analysis aligned to research questions.	Thematic mapping with NVivo; quality-stratified synthesis.	Combines depth of insight with quality-weighted interpretation.
6. Stakeholder Engagement	Not included; Relevance inferred from literature.	Integrated throughout via phased consultations and structured decision rules by using NIHR INVOLVE framework (National Institute for Health and Care Research, n.d.)	<p>Converts inferred relevance into active stakeholder participation. For example, in a review on predictive analytics in healthcare social work the SUSHIJA framework would engage community health workers, policymakers and predictive analysts.</p> <ul style="list-style-type: none"> • Stakeholders co-identified research questions through a Delphi consensus process (Phase 1). • Contributed to design and prioritization (Phases 2–3). • Ranked themes via real-time tools (Phase 4). • Validated synthesized findings through structured feedback (Phase 5). • Co-developed infographic briefs and multilingual flyers (Phase 6). • Participated in evaluating impact and facilitated practical application of findings (Phase 7).
7. Critical Appraisal	Not performed; inclusion based on judgment.	Tiered appraisal using JBI tools and conceptual rubrics.	Adds rigor and transparency to evidence inclusion. For instance, the SUSHIJA framework retrospectively demonstrates how such critical appraisal could enhance synthesis. Empirical studies in that review such as evaluations of AI-enabled triage systems would be assessed by using the JBI checklist for analytical cross-sectional studies. It would focus on outcome measurement, sampling rigor and confounding control.

Step	Published Review (Kumar & Suthar, 2024)	SUSHIJA Framework (Proposed Method)	Description
8. Use of Technology	Covidence used; no automation in search or data extraction.	AI-supported search, screening and update (e.g., ASReview, Zotero, GitHub Actions).	<p>Conceptual articles would be evaluated by using a rubric that assesses theoretical coherence, conceptual clarity and practical relevance. If applied, high-tier empirical studies would shape conclusions on intervention effectiveness. Moreover, lower-tier conceptual contributions could enrich understanding of ethical and systemic barriers. This tiered synthesis model enables methodological inclusiveness without compromising analytical rigor.</p> <p>Introduces automation for scalability and reproducibility. Table 4 outlines the alignment between each SUSHIJA phase and its corresponding AI or automation tool.</p>
9. Updating Mechanism	Fixed review; No update mechanism.	Built-in living review model with periodic or event-based updates.	<p>Maintains currency of findings in evolving domains. In practice, the SUSHIJA framework can be implemented with minimal resources. A core team may include:</p> <ul style="list-style-type: none"> • A lead reviewer to coordinate all stages. • A part-time data analyst (approximately 10–15 hours/month) for managing tool outputs and updates. • A stakeholder liaison for periodic consultation (quarterly). • The model remains feasible even in resource-constrained academic or nonprofit settings by using freely available tools such as ASReview, Zotero and GitHub Actions.

Step	Published Review (Kumar & Suthar, 2024)	SUSHIJA Framework (Proposed Method)	Description
10. Visual Synthesis	Narrative descriptions only; no visuals.	Uses heat maps, network graphs, and thematic flowcharts.	Enhances clarity and accessibility for diverse users.
11. Knowledge Translation	Theoretical implications discussed; no dissemination tools.	Policy briefs, infographics, and stakeholder-facing developed.	Translates academic insights into actionable practice tools.

Table 4
AI and Automation Tools Across SUSHIJA Phases

SUSHIJA Phase	Tool / Platform	Function	Rationale
Study Screening	ASReview	Semi-automated relevance prediction.	Reduces manual workload and mitigates screening bias.
Deduplication	Zotero, Rayyan	Duplicate detection and tagging.	Accelerates cleaning and ensures consistency across large datasets.
Data Extraction	Python scripts, GROBID	Metadata and full-text extraction.	Enhances extraction accuracy and scalability from unstructured sources.
Thematic Analysis	NVivo	Qualitative coding and visualization.	Facilitates structured synthesis and pattern recognition across studies.
Living Review Updating	GitHub Actions, Google Colab	Automated update triggers and versioning.	Enables periodic refresh of evidence with minimal human intervention.

SUSHIJA goes beyond the old review’s narratives by providing flow diagrams, creating infographics and policy briefs with others. Using these approaches supports access, repeatability and actionable outcomes. The following table demonstrate that SUSHIJA is a workable tool for enhanced review protocols and can improve complex syntheses.

Challenges and Future Directions

The SUSHIJA Framework offers a range of innovations that have the potential to help overcome the difficulties researchers face. However, it is important to consider potential challenges in its application. First, while the Framework advances scoping review rigor potential, the intention of using research teams that include using AI tools, the critical appraisal protocol and continuous updating etc., and therefore may be better suited to research teams that are institutionally or well-funded. Individual smaller research teams, or projects that are under-resourced, may find it arduous to deploy and use the Framework while missing many of its core components. Options for scaling the framework could be devised to allow research teams to use the Framework that best fits their use of resources.

In general, using the Framework offers benefits to improving the rigor scoping reviews, but represents additional complexity. The multiple steps in scoping reviews, critical appraisal and continuous updating introduces complexity and perhaps a steep learning curve, for researcher teams that have not engaged in these tools and methodologies of exigence. Developing training resources and user-friendly platforms may provide an additional way to assist research teams in using the Framework and apply this advance methodology in practice.

Conclusion

The SUSHIJA Framework presents a new paradigm by addressing two primary limitations of traditional scoping methodologies. That is, encompassing aspects of a traditional systematic review, including critical appraisal and structured synthesis, the SUSHIJA framework balances both depth and breadth of evidence synthesis. The inclusion of stakeholder engagement in the early phases, use of AI-driven automation tools, and ongoing updating process allows a scoping review to be both full and current and provide relevant practice implications. There are noteworthy innovations in the SUSHIJA framework, such as one search strategy, critical appraisal of studies without exclusion, and linked visual tools of data synthesis, which contribute to the evolution of the field. The challenges of the resources/continuance of living reviews, and AI inability to process qualitative data, require additional refinement and focus. Importantly, the flexibility of the SUSHIJA framework, particularly its ability to scale to different resource settings, will be critical in realizing wider use across different research settings. Thus, the SUSHIJA Framework offers a progressive and flexible and long-term methodological approach to scoping reviews. In academic and non-academic contexts, as research evolves, SUSHIJA could offer a framework to ensure that scoping reviews remain relevant, credible, and useful to stakeholders. Future research could examine the use of SUSHIJA in other scholarly disciplines and test the usability or functionality of the framework. This paper provides a conceptual foundation and illustrative alignment for SUSHIJA. However, future studies are needed to validate its application across domains and assess its comparative performance against other frameworks.

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Supplementary Materials

Type of supplementary material	Availability/Access
Data	
Data for this study are not publicly available.	—
Preregistration	
Study was not preregistered.	—
Code	
No code was provided for the study.	—
Material	
No material was provided from the study.	—

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