Developing Sustainable and Resilient Supply Chains

Final Industry Report Project 2.86

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Yingbin Feng | Qinjun Liu | Peng Wu | Tiendung (TJ) Le Peng Zhang | Vasilios Papastamoulis



This research has been developed by Australia's Sustainable Built Environment National Research Centre (SBEnrc). The SBEnrc develops projects informed by industry partner needs, secures national funding, project manages the collaborative research and oversees research into practice initiatives. Current Core Members of the SBEnrc include ATCO Australia, BGC Australia, Government of Western Australia, Queensland Government, Curtin University, Griffith University, Western Sydney University and RMIT University. The industry-driven research outlined in this publication would not have been possible without the valuable support of our core industry, government and research partners.

Project Team

Project Steering Group Chair

Davina Rooney Green Building Council of Australia (GBCA)

Project Leader

Yingbin Feng	Western Sydney University

Research Team

Peng Zhang	Western Sydney University
Qinjun Liu	Western Sydney University
Vasilios	
Papastamoulis	Western Sydney University
Tiendung (TJ) Le	RMIT University
Pena WU	Curtin University

Project Steering Group

-	
Keith Hampson	Sustainable Built Environment National Research Centre (SBEnrc)
Ammar Shemery	Sustainable Built Environment National Research Centre (SBEnrc)
Philip de Beukelaar	BGC Australia
Louis Bettini	Main Roads Western Australia (MRWA)
Luciano Di Girolamo	MRWA
David Jones	WA Department of Communities
Aaron Dove	WA Department of Communities
Fiona Hogg	WA Department of Finance
Cara McNicol	Queensland Department of Environment and Science (QDES)
Cristyn Laing	QDES
Simon Hausler	QDES
Marissa Saunders	Stockland
Teresa Scott	Australasian Procurement and Construction Council (APCC)
Dominique Holani	APCC
Patrick Hastings	Infrastructure Sustainability Council (ISC)
Sabrena King	The Australian Department of Industry, Science, Energy and Resources
Hannah Sutton	ARUP
Emily Gentilini	ARUP
Adrian Doyle	ARUP

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We encourage you to continue to draw on the results of our Centre's applied research to deliver tangible outcomes for your operations. By working together, we can transform our industry and communities through enhanced and sustainable business processes, environmental performance and productivity.



John V McCarthy AO Governing Board Chair Sustainable Built Environment National Research Centre, Australia



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Building a sustainable and resilient supply chain involves an organisation's efforts to consider the uncertainties in the supply chain and the environmental and social impact of products and services through it. The purchasing power held by client organisations has a significant influence over their suppliers' business practices and sustainability outcomes. For those organisations who have high environmental, social and governance ambitions, supply chain sustainability and resilience are no longer just something to monitor and report, but also something to be proactively and systematically integrated and addressed in their corporate strategies, governance, management practices, processes and culture.

This SBEnrc project examined the approaches to improve supply chain sustainability and resilience in the built environment and provided practical recommendations for clients and suppliers to deliver sustainable and resilient products and services.

Executive Summary

The outcomes of the research, presented within this report, focus on the following areas:

- 1. Developing a capability maturity model for clients to address supply chain sustainability and resilience.
- 2. Developing a maturity assessment and benchmarking tool and demonstrating its application using case studies.
- 3. Examining the impact of client/governmentdriven initiatives and innovations on supply chain sustainability and resilience.
- Proposing strategies for enhancing supply chain sustainability and resilience for Australian organisations including small to medium enterprises and their clients.

The project outcomes will enhance the efficiency, reliability and sustainability of supply chains, and help Australian building and infrastructure clients in public and private sectors to achieve their sustainability and resilience goals. The outcomes may contribute to optimising long-term economic, social and environmental benefits to the nation and community.

Industry Motivation

The last decades have witnessed the emergence of sustainability issues as one of the most important concerns in an organisation's supply chain. An increasing number of organisations have realised the critical role of their supply chains when facing global sustainability challenges and risks and supply chain disruptions caused by crises such as the COVID-19 pandemic. According to Mckinsey & Company, the typical consumer company's supply chain creates far greater social and environmental costs than its own operations, accounting for more than 80 per cent of greenhouse gas emissions and more than 90 per cent of the impact on air, land, water, biodiversity and geological resources.¹

The purchasing power held by client organisations has a significant influence over their suppliers' business practices and sustainability outcomes. However, relatively few client organisations are well prepared for working with their suppliers to address the sustainability challenges and risks that lie in supply chains. Client organisations need to move forward in their effort to re-examine their corporate strategies, governance, management practices, processes and culture, and align their efforts to building and maintaining a sustainable and resilient supply network.

Aim

This project aims to examine the approaches to improve supply chain sustainability and resilience in the built environment and provide guidance for clients and suppliers to deliver sustainable and resilient products and services.

Objectives

The objectives of this project are:

- 1. To develop a capability maturity model (CMM) for clients to address supply chain sustainability and resilience.
- 2. To demonstrate the application of CMM through case studies.

It will offer an innovative approach to understanding and assessing an organisation's capabilities and performance in addressing supply chain sustainability and resilience that are critical to achieving their sustainability and resilience goals.

- 3. To examine the impact of client/governmentdriven initiatives and innovations on supply chain sustainability and resilience.
- To propose strategies for enhancing supply chain sustainability and resilience for Australian organisations including small to medium enterprises (SMEs) and their clients.

Building a sustainable and resilient supply chain involves an organisation's efforts to consider the uncertainties in the supply chain and the environmental and social impact of products and services through it.

Benefits of Supply Chain Sustainability and Resilience

Supply chain sustainability and resilience can benefit not only an organisation's own interests and those of its stakeholders, but also society and the planet. The benefits motivate public and private organisations to move forward in their efforts to re-examine their corporate strategies, governance, management practices, processes and culture and align their efforts towards building and maintaining a sustainable and resilient supply network.

Here are the key benefits that supply chain sustainability and resilience can bring to client organisations.

- 1. Improved reputation and competitive advantage: Companies that prioritise sustainability and resilience in their supply chain can enhance their brand reputation and attract customers who are increasingly conscious of environmental and social issues, and gain competitive advantages over their competitors in a marketplace.
- Cost reduction: A supply chain that promotes close collaboration with suppliers and looks after natural resources can result in improved efficiency, cost reduction and increased profit margins.
- 3. Revenue growth: A more sustainable supply chain helps to improve the market share and stock price of a company.
- 4. Risk reduction: A sustainable and resilient supply chain helps to better manage regulatory and compliance risks.

¹ McKinsey & Company (2016) Starting at the source: Sustainability in supply chains. Available at: https://www.mckinsey.com/capabilities/sustainability/our-insights/starting-at-the-source-sustainability-in-supply-chains While conventional supply chain management focuses on the speed, cost and reliability of operations, sustainable and resilient supply chain management adds the goals of achieving environmental, social and governance outcomes and addresses the uncertainties and disruptions.

- 5. More efficient operations: Greater resilience often leads to minimised risk and a greater ability to invest in innovation and growth.
- Continuity of supply: Having diverse suppliers can help improve the continuity of products or services, preventing costly downtime and reputational damage.
- 7. Improved customer retention and relationships: Customers are more likely to be attracted to and pay for sustainable products and services.
- Improved investor relations: Promoting sustainable values and initiating sustainable practices can help secure a wider pool of investment options and enhance investors' confidence in the company.
- Improved relationships with suppliers: By working with suppliers to improve sustainability and resilience, organisations can build stronger and more collaborative relationships, which can result in better quality products and services.
- 10. Potential partnership opportunities: An organisation that embraces sustainability and resilience may attract other organisations that share the same commitment as partners.
- 11. Improved employee quality of life: A sustainable and resilient supply chain improves the quality of life of employees involved in the process, including providing fair treatment and fair compensation, and reduces harm to the environment, thereby avoiding their exposure to unnecessary risks.

Key Organisational and Management Processes

Client organisations play a vital role in building a sustainable and resilient supply network. For those organisations who have high environmental, social and governance (ESG) ambitions, supply chain sustainability and resilience are no longer just something to monitor and report, but also something to be proactively and systematically integrated and addressed in their corporate strategies, governance, management practices, processes and culture. Client organisations need to consider how they can improve their capabilities and prepare themselves for building and maintaining a sustainable and resilient supply chain.

The SBEnrc's research has developed a framework for improving client organisations' capabilities in addressing supply chain sustainability and resilience, with a focus on six key interconnected organisational and management processes (see Figure 1) as follows:

- 1. Leadership and strategy: focused on organisational priorities, strategies, plans and management commitments to sustainability.
- 2. Risk and opportunity: focused on risk governance and how sustainability risks and opportunities are identified, assessed and managed.

Data and knowledge

Alignmen and integratio

- 3. Organisation and management: focused on organisations' governance, resources, people and culture, complexity and change management and stakeholder engagement.
- 4. Procurement and process: focused on the integration of sustainability and resilience into the procurement life cycle.
- 5. Alignment and integration: focused on the alignment with and integration between internal business functions, alignment among partners in the supply chain and upstream and downstream supply chain integration.
- 6. Data and knowledge: focused on the collection, analysis and reporting of data, use of intelligence and analytical capabilities, and knowledgesharing within and beyond the organisation.

The next section will describe how these key processes can be assessed using the method of CMMs.

Risk and opportunit

Organisations must have the ability to understand and assess their performance and preparedness in the six key organisational and management processes for addressing supply chain sustainability and resilience. In collaboration with our industry partners, a practical approach has been applied to develop the CMM.

Structure of the CMM

The CMM aims to promote a holistic approach to enabling change and continual improvement for client organisations. The model is underpinned by the idea that an organisation has the capability to determine its ability to build and maintain a sustainable and resilient supply chain. Figure 2 shows the conceptual capability model.

		Maturity Levels		
Capability Areas	Reactive (minimal)	Defensive (marginal)	Accommodative (defined)	Proactive (optimised)
CA01 Leadership and Strategy				
CA02 Risk and Opportunity				
CA03 Organisation and Management		Rubrics		
CA04 Procurement and Process				
CA05 Alignment and Integration				
CA06 Data and Knowledge				



Procurement and process

Leadership and strategy

Supply chain sustainability and resilience

3.0 Capability Maturity Model (CMM)

This model draws upon the literature, current practices and collective knowledge and experience of practitioners from government agencies, client organisations, contractors, consultants and industry associations.

Figure 2: Conceptual Capability Maturity Model









3.0 Capability Maturity Model (CMM) (cont'd)

Capability areas: The multidimensional capability was categorised into six key capability areas addressing the key organisational and management processes including: CA01 leadership and strategy; CA02 risk and opportunity; CA03 organisation and management; CA04 procurement and process; CA05 alignment and integration; and CA06 data and knowledge.

Maturity levels: There are four levels of maturity for

- each of the six capability areas:
- 1. Reactive (minimal)
- 2. Defensive (marginal)
- 3. Accommodative (defined) 4. Proactive (optimised).

Recommended actions: The model includes recommended actions for each capability area, and at each maturity level. By completing these actions, the organisations will be developing relevant capabilities.

An example: Change requires sustained, long-term commitment from an organisation. By using the capability area CA05 alignment and integration, as an example, an organisation develops capability and progresses from the reactive (minimal) level to the proactive (optimised) level over time, as shown in Figure 3.





Maturity Assessment and Benchmarking Tool

This project has developed a practical maturity assessment and benchmarking (MAB) tool to operationalise the MAB process. The MAB tool assesses an organisation's capabilities and maturity levels in the six key organisational and management processes that are critical to enhancing supply chain sustainability and resilience.

CA1 Leadership and Strategy



Level 4	Proactive (optimised)

Your organisation demonstrates strong commitment to sustainability through extensive partnership and collaboration with various stakeholders and active engagement with communities. Your organisation demonstrates leadership in sustainability by initiating innovative sustainability solutions and promoting social and environmental impacts within the supply chain and for broader communities.





- The tool maps out 106 recommended actions that can assist the organisation with developing relevant capabilities.
- This report includes a high-level description of the maturity levels for each of the six capability areas. More detailed information about the MAB tool is provided on the project website.









CA2 Risk and Opportunity



Case Study 1: CA3 Organisation and Management

Main Roads Western Australia (Main Roads WA) used the MAB tool to assess their capabilities and practices in organisation and management. They achieved an overall score of 8 in this capability area, which indicates an accommodative (defined) maturity level. Main Roads WA is able to engage key internal and external stakeholders in sustainability and risk governance. Their organisational culture and governance arrangements support the achievement of positive environmental and social outcomes, sustainability capability-building, and complexity and change management.

Notwithstanding Main Roads WA's more matured organisational and management practices and processes in addressing supply chain sustainability and resilience, efforts are required to ensure the implementation of those partly completed initiatives and actions, such as: 1) enable the individuals tasked with delivering sustainable procurement to do so by building a supportive organisational

CA4 Procurement and Process



as the way the organisation does business. Your organisation is characterised by a culture that embraces change and an environment in which collaboration, innovation, effective communication and appropriate risk-taking (including opportunities) are encouraged.

culture and integrating sustainable supply chain training into existing organisational training regime; 2) include sustainability objectives and goals in collective and/or individual performance agreements and objectives, staff development reviews and evaluations, and incentive plans or other reward and recognition arrangements; and 3) work collaboratively with the organisation's industry peers and supply chains to share knowledge and develop better practice.

Main Roads WA is recommended to initiate further actions to: 1) actively engage with suppliers through early supplier involvement, incentives, supplier development plans, strategic supplier relationship initiatives, communications and capability development programs; and 2) develop supply chain development programs to improve competence and capacity where the market might not be capable of delivering new or challenging sustainability standards.

impact through integration with the business strategy and deep collaborations.

Case Study 2: CA4 Procurement and Process

The project team conducted an assessment on CA4 procurement and process for BGC Australia Pty Ltd. The result of assessment indicated that the company was at a less-matured stage in procurement and process. Overall, the company has begun to take formal actions to address sustainability issues in supplier assessment and selection and contract management processes. Specific sustainability requirements are identified and incorporated into procurement.

The assessment identified a number of actions that the company can take to improve their maturity level in the area of procurement and process. These actions include:

1. Implement two-way evaluations for effective performance management and to promote a good relationship between organisations and suppliers.

Case Study 3: CA4 Procurement and Process

The assessment of procurement and process for Main Roads WA indicated a less matured stage in this capability area. The result showed that Main Roads WA has initiated the majority of the proposed actions for Maturity Level 1 and Maturity Level 2, which have only been partly completed to date. It is recommended to extend the good procurement practices and processes to the full range of products and services beyond major projects. Other actions that Main Roads WA may consider to put into practice include:

- 1. Use reporting framework and rating tools to help define elements of sourcing strategies, specifications and tender evaluation criteria.
- 2. Include provisions in supplier contracts for goods or services to reward stretch targets for sustainability performance.
- 3. Embed sustainability considerations and priorities into the procurement process and day-to-day procurement activities.

- 2. Include provisions in supplier contracts for goods or services to reward stretch targets for sustainability performance.
- 3. Proactively engage with suppliers (or unsolicited bids from suppliers) to result in sustainability solutions that go beyond initial sustainability requirements reflected in final contracts.
- 4. Conduct post-contract evaluation to assess the achievement of sustainability goals; cultivate a culture of continual review and learning from the contract; and apply lessons learned in future procurement considerations.
- 5. Publish lessons learned in detail and in such a way that other organisations can learn from them.

- 4. Align profitability with sustainability through a combination of incentives and remedies.
- 5. Proactively engage with suppliers (or unsolicited bids from suppliers) to result in sustainability solutions that go beyond initial sustainability requirements reflected in final contracts.
- 6. Seek continual process improvement by regularly reviewing goals, requirements and practices; promoting innovation; applying tools, procedures and standards; embracing digital technologies; managing performance; providing incentives and resources; and engaging stakeholders and taking feedback.
- 7. Track, measure, report and benchmark the performance of supply chains and address root causes of issues through deep collaboration between clients and suppliers.
- 8. Publish lessons learned in detail and in such a way that other organisations can learn from them.

CA5 Alignment and Integration

Level 1	Reactive (minimal)	
Supply chains are organised functionally with a very lo		

ow degree of integration. They are characterised by high duplication of activities, internally and externally disconnected processes and limited coordinated efforts with suppliers and partners. There is little visibility into partners'/suppliers' operations.

Level 2	Defensive (marginal)

Supply chains are cross-functionally organised. Internal processes are integrated, information is shared and visibility is provided between functions in a structured way. Resources are jointly managed and there is a higher level of alignment between performance and objectives. Integrated planning is performed at strategic, tactical and operational levels.

Level 3 A	ccommodative (defined
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Supply chains feature collaboration across the extended enterprise. Information-sharing is extensive and visibility is high. Key activities such as product design or inventory management are integrated between supply chain partners. External input is incorporated into internal planning activities.

Level 4	Proactive (optimised)
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Your organisation is fully aligned with your supply chain partners on the key value dimensions across the extended enterprise. Your individual strategies and operations are guided by common objectives and fitness schemas. Your supply chain is fully flexible to interact and adapt to complex dynamic environments. Emerging value chain patterns are explored and identified.

CA6 Data and Knowledge

Level 1	Reactive (minimal)	
Your organisation has a process in place to facilitate s limited sustainability data on a single aspect (e.g. env regulatory compliance.		
Level 2	Defensive (marginal)	
Your organisation collects data on environmental, soci units and shares sustainability knowledge beyond the		
Level 3	Accommodative (defined	
Your organisation collects data on environmental, organisational units and supply chain members. Sustai boundary to the broader industry and community.		
Level 4	Proactive (optimised)	

Your organisation is able to digitise the sustainability data collection and analysis and enable internal and external benchmarking for environmental, social and governance aspects. Your organisation demonstrates a strong commitment to promote and support the education of communities at all levels.



d)

sustainability data collection. Your organisation collects ironmental) from internal organisational units to ensure

al and governance aspects from internal organisational boundary of the project or organisational unit.

d)

social and governance aspects from both internal inability knowledge is shared beyond the organisational

Benefits of Using the MAB Tool

Benchmarking

The MAB tool allows organisations to compare their practices and performance against the industry best practices as defined by the recommended actions for more matured levels (that is, accommodative and proactive levels) and identify gaps and areas for improvement.

The tool also allows the organisation to compare the current performance against past performance and helps the organisation to identify areas where they have made progress over time and where they need to further improve.

Prioritising interventions

The MAB tool enables organisations to assess their current maturity levels, evaluate the relevance and importance of actions at each maturity level and determine what needs to be done to progress from the present level to the next.

The tool visualises the assessment result by calculating the maturity scores and highlighting the interventions that are important to the organisation but have not been initiated or have only been partly implemented.

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4.0 Client/Government-driven Initiatives and Innovations for Enhancing Supply Chain Sustainability and Resilience

Government agencies and private organisations in Australia have undertaken initiatives and innovations that aim to enhance supply chain sustainability and resilience. This report provides examples and case studies on what impact those various client/government-driven initiatives and innovations have on both clients and suppliers.

Client-driven Supply Chain Initiatives and Innovations

Client-driven initiatives and innovations refer to efforts within a supply chain that are initiated and primarily influenced by the needs and demands of the clients. These initiatives focus on optimising the supply chain processes and operations to meet the specific needs and preferences of the clients. Table 1 presents key examples of client-driven initiatives and innovations in Australia.



(Source: Metamorworks - Adobe Stock)

Table 1: Client-driven Initiatives and Innovations

Initiative/Innovations	Impact on Clients	Impact on Suppliers
Property Council of Australia Modern Slavery Supplier Platform: Gathers and collates information from industry suppliers on their modern slavery exposures in operations and supply chain, with the aim to help companies identify and address the risk of modern slavery in their supply chains ²	 Improved quality and efficiency in the supply chain Early identification of potential modern slavery risks Greater visibility and transparency of the supply chain Improved due diligence Reputational benefits Enhanced supply chain management 	 Increased awareness about modern slavery Continuous improvement regarding modern slavery Improved transparency about suppliers' practices to prevent modern slavery Better due diligence Increased compliance costs Reputational risk
Adopting Industry 4.0: Capral optimises its supply chain by adopting Industry 4.0, including assessing potential changes in supply models and shifting services to New South Wales (NSW)-based manufacturers ³	 Better understanding of its supply chain Increased efficiency and reduced costs throughout its supply chain Improved product quality Enhanced flexibility Better communication and collaboration among suppliers, clients and other stakeholders 	 Enhanced efficiency Reduced costs Minimisation of pressures from imported products Better communication and collaboration among suppliers, clients and other stakeholders Increased agility
Aboriginal and Torres Strait Islander Business and Social Enterprise Database: Introduced by CPB Contractors, this initiative aims to diversify their supply chain to include more Aboriginal and Torres Strait Islander suppliers and businesses ⁴	 Development of long-term partnerships with Traditional Custodians and their communities Increased diversity of supply chain Improved reputation Enhanced sustainability 	 Improved access to opportunities Increased engagement and collaboration
Green Concrete: By using an industrial waste product to create green concrete, BGC is optimising resource use, reducing greenhouse gas emissions and minimising waste, contributing to creating a robust local supply chain ⁵	Cost savingsImproved sustainabilityEnhanced performance	 Market differentiation Increased demand Improved sustainability Research and development opportunities
Supplier Diversity Strategy: Drives Lendlease's engagement with suppliers, from large to medium companies to sole traders. Lendlease has partnered with ResponsibleSteel [™] to bring together many innovative steel suppliers and manufacturers to reduce emissions across the supply chain ⁶	 Increased relationships with small business, Indigenous-owned, woman-owned and minority-owned businesses Access to a wider range of goods and services Increased cost savings Positive reputation Increased engagement with local communities 	 Increased opportunities for small and diverse suppliers, with access to new business opportunities Increased collaboration between suppliers Enhanced innovation Improved quality of materials

² Stockland (2022) Modern Slavery Statement.

³ NSW Government (2022) Capral – Industry Sectors. Available at: https://www.business.nsw.gov.au/industry-sectors/industry-opportunities/advanced-manufacturing/success-stories/capral ⁴ CPB Contractors (2022) Reconciliation Action Plan Stretch: November 2022 – October 2025. Available at: https://cimicdigital-cdn.azureedge.net/-/media/projects/cimic/cpb/pdfs/reconciliation/ cpb0005-rap-web.pdf?la=en

⁵ BGC Concrete (2021) Enviro Pave3. Available at: https://www.bgcconcrete.com.au/assets/pdfs/enviropave3-brochure.pdf ⁶ Lendlease (2021) Lendlease Annual Report 2021

Case Study 4: Sustainable and Resilient Design Framework

Challenge

Large infrastructure projects have numerous benefits including increasing business efficiency, providing iob opportunities and linking communities. These positive impacts are crucial to consider during a crisis like the COVID-19 pandemic. However, the design of large road projects is typically led solely by financial considerations, without sufficient consideration to social and environmental benefits. Reducing the carbon footprint of the construction supply chain related to infrastructure projects and developing sustainable and resilient capabilities of local suppliers still pose great challenges for highway design. To address the challenges, Arup promoted an innovative approach to highway infrastructure based on circular economy principles.

Solution

ARUP was commissioned by the Queensland Department of Transport and Main Roads to prepare the preliminary design as part of the Development Phase to upgrade the Yatala South Interchange Exit 41 project in Queensland. To achieve far-reaching resilient outcomes, Arup developed an outcome-led design framework that can support the circular economy and reduce the carbon footprint of infrastructure projects. This framework is a database with metrics of contextspecific indicators, interventions, and metrics that enable designers/users to correlate the trade-offs between a project's cost, time, economic, social and environmental benefits.

Government-driven Supply Chain Initiatives and Innovations

Government-driven initiatives and innovations refer to efforts within a supply chain that are initiated and primarily influenced by the government. These initiatives aim to address specific social, economic or political issues and can impact the entire supply chain, from production and transportation to distribution and retail. They may involve changes to laws, policies and procedures. Table 2 presents key examples of government-driven initiatives and innovations in Australia.

- Using this framework, planners, designers and engineers can make informed choices that align with Sustainable Development Goals.
- Arup also proposed the use of a waste by-product from the sugar industry on roads in Queensland. Australia produces 35 million tons of sugar each season. Sugarcane bagasse ash (SCBA) is one of the by-products. SCBA was found to be an effective neutraliser of acid sulphate soil. Therefore, the use of SCBA could reduce the carbon footprint of Queensland's road infrastructure.

Impact

As a result, using the outcome-led design framework in Queensland's road project helped raise sustainability awareness in early design and drive highway planning conversations towards more rounded benefits including material sustainability, safety and economic stimulus. Moreover, using a recycled and local waste material can contribute to the circular economy and boost local economies. Arup's initiatives can support the delivery of sustainable and resilient highways, and foster innovation and the creation of exciting opportunities for more circular built environments.

4.0 Client/Government-driven Initiatives and Innovations for Enhancing Supply Chain Sustainability and Resilience (cont'd)

Table 2: Government-driven Initiatives and Innovations

Initiative/Innovations	Impact on Clients	Impact on Suppliers
Australia–UK Joint Supply Chain Resilience Initiative: A cooperative effort between the Australian and British governments aimed at improving public sector capacities to build critical supply chain resilience ⁷	 Increased abilities in recognising supply chain vulnerabilities and risks Gain insights into enhancing public sector approaches to managing critical supply chain risks Increased international collaborations Improved relationships with suppliers 	 Increased demand for critical goods and services Improved supply chain security and stability Increased competition among suppliers New compliance requirements (e.g. new reporting or certification requirements) Improved relationships with clients
The \$107.2 million Supply Chain Resilience Initiative: Established as part of the Australian Government's Modern Manufacturing Strategy, it will provide businesses with support to establish or scale capability that addresses a supply chain vulnerability ⁸	 Improved resilience to future supply chain shocks Reduced supply chain risks for critical products Enhance visibility and transparency of the supply chain for critical products Optimised supply chain performance 	 Improved planning Enhanced visibility Better reputation Increased trust
South West Supply Chain Strategy: It aims to connect and integrate supply chains, improve infrastructure and policy, increase regional economic growth and enhance efficiency and road safety ⁹	 Connected and continuous supply chains Seamless modal integration Optimised infrastructure and supportive policy Improved transport efficiency Improved road safety 	 Increased access to markets Improved efficiency Enhanced sustainability Improved collaboration New compliance requirements
Construction Industry Supply Chain Data-Sharing Framework: It will identify appropriate-use cases for construction material supply chain data-sharing. It will focus on the concrete supply chain in the Western Program Alliance of the Level Crossing Removal Project ¹⁰	 Improved efficiency Minimisation of downtime Compliance management and identification of opportunities to reduce material waste 	 Streamlined communication between concrete supplier, sites, main contractor and other key stakeholders Improved visibility of the movements of materials Improved coordination and interoperability
Sustainable Procurement in Infrastructure Initiative: It aims to reduce waste and pollution while increasing the use of renewable, recycled and low embodied carbon materials in NSW transport projects and supply chains ¹¹	 Improved service quality Increased sustainability Increased transparency 	 Improved sustainability performance Increased demand for sustainable products and services Increased competitiveness Improved relationships with clients

7 Australia's Department of Industry, Science and Resources and UK's Department of International Trade (2022) Australia–UK Joint Supply Chain Resilience Initiative – Introduction Module. ⁸ Department of Industry, Science and Resources (2020) Manufacturing a new future for Australia.

⁹ Department of Transport WA (2020) Draft South West Supply Chain Strategy.

10 IMOVE (2022) Construction industry supply chain data sharing framework. Available at: https://imoveaustralia.com/project/construction-industry-supply-chain-data-sharing-framework/

1 NSW Government (2022) Sustainable procurement in infrastructure. NSW Government. Available at: https://caportal.com.au/tfnsw/tiip/dr-sustainable-procurement

Case Study 5: Recycled Material

Challenge

Construction activities consume more raw materials by weight than any other industrial sector. Due to the continuous rate of waste generation and the nature of the industry, it is a challenging task to achieve zero waste. There is a large quantity of construction waste that ends up in landfills or illegal dumping sites every year. Thus, further recycling needs to be planned to avoid social, economic and environmental consequences of the growing quantity of construction and demolition (C&D) waste. To this end, stakeholders across the construction materials supply chain need to consider the principles of a circular economy, aiming to keep the value of materials in the loop as much as possible.

Solution

Among the main stakeholders, governments can facilitate market development for recycled content through their purchasing power and sustainable procurement. Main Roads WA established a state government initiative called Roads to Reuse (RtR) in 2019. The initiative is the product of collaboration with the Waste Authority, Department of Water and Environmental Regulation and WA local governments, with the aim to promote the use of recycled C&D products in public projects across the state by supporting pilot projects.



(Source: Mike Mareen - Adobe Stock

Main Roads WA worked closely with main stakeholders, including suppliers and contractors, throughout the project's development to secure materials and ensure their proper utilisation. They evaluated the suitability of the crushed recycled concrete (CRC) including assessing sampling, testing and audit reports, and testing the product's performance in construction projects. The RtR pilot project demonstrated the effectiveness of CRC as a safe and reliable standard road construction material.

Impact

The RtR initiative is a crucial milestone towards incorporating CRC as a safe and reliable material for standard road construction to protect human health and the environment. The recycled C&D products demonstrate positive environmental and social outcomes through reducing waste to landfill and supporting the Western Australian economy by recovering valuable materials and creating local jobs. The initiative also helps to develop a culture of sustainability through the supply chain and improve the overall outcome for sustainability.

A sustainable and resilient supply chain is important for a healthy economy. An organisation can change its practice and build a sustainable and resilient supply chain from organisational, people and operational dimensions.¹² The organisational change entails change in the structure, culture, policies and strategies of an organisation. The people change involves managing the employees of the organisation. The operational change relates to the processes, activities and tasks that are necessary to achieve an organisation's goals and objectives. Table 3 and Table 4 present the strategies for clients and suppliers respectively to enhance supply chain sustainability and resilience from the organisational, people and operational dimensions.

Table 3: Strategies for Clients

Position procurement to support the achieved and the achieved	evement of ESG targets
Develop sustainability objects, action plan and performance measuring system	n, policies, governance framework
Work collaboratively with suppliers and of to share knowledge and develop sustainational	ther stakeholders in the supply chain bility practices
Actively engage with suppliers through ea supplier development plans and supplier	arly supplier involvement, incentives, relationship initiatives
Diversify supply networks and create opp and other diverse suppliers	ortunities to source from Indigenous
Develop an awareness of sustainable dev involved in the procurement process	elopment among all employees
Build sustainable procurement capabilities professionals, providing appropriate training resources	s by recruiting specialised ing and committing necessary
Provide a supportive organisational cultur delivering sustainable procurement	e for individuals tasked with
Involve employees in sustainability initiative management	ves through performance
Encourage employees to provide input an resilience policies and practices	nd feedback on sustainability and
Recognise and reward employees' contribution sustainability and resilience	outions to building supply chain
Conduct supplier assessments	
Implement real-time monitoring and analy	rtics
Develop business continuity plans	
Develop robust sustainability data manag	ement
• Use reporting framework and rating tools strategies, specifications and tender evaluations	to help define elements of sourcing uation criteria
Integrate product design and inventory m partners	anagement between supply chain
Streamline supply chain process and redu	uce non-value-added activities
Invest in digital technologies to manage a	nd track the supply chain

5.0 Recommendations for Clients and Suppliers (cont'd)

Table 4: Strategies for Suppliers

Dime

Organi

Pe

Opera

nsions	
sational	 Adopt responsible sourcing practice
	 Establish objectives and goals that a
	Comply with supplier code of condu
	 Collaborate with clients to promote working together on sustainability in
	 Build strong collaboration by activel the clients
ople	 Cultivate a skilled workforce to enha operational events
	 Participate in the training and educa improve workers' skills and compare
	 Promote sustainability awareness in
	 Involve employees in sustainability i
	 Encourage employees to provide in and practices
	 Recognise and reward employees' or resilience
	 Promote diversity and inclusion in w
	Provide a healthy and safe work env
	 Implement green operational practic products and services and renewab
ational	 Optimise production processes and
	Use alternative modes of transporta
	Reduce transportation distances
	Optimise transportation routes

- Optimise supply chains by adopting digital technologies and innovations to better assess potential changes, improve efficiency and serve clients' needs
- Establish a data-sharing platform feedback



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Strategies

- es that align with ESG targets
- align with clients' goals and objectives
- uct in terms of sustainable supply chain
- sustainability and resilience by sharing information, nitiatives and establishing shared goals and metrics
- ly participating in the supplier audit and assessment of
- ance employees' capability to deal with adverse
- ation programs organised by government departments to ny's productivity
- supply chains for employees
- nitiatives through performance management
- put and feedback on sustainability and resilience policies
- contributions to building supply chain sustainability and
- orkforce/
- /ironment
- ces by using recycled materials, environmentally friendly ole energy sources
- minimise material usage
- ation
- Establish a data-sharing platform to enhance supply chain visibility and obtain clients'









SMEs play a significant role in economic development 3. Partner with Clients: Partner with clients to initiate around the world. In Australia, around 98 per cent of construction companies are classified as SMEs, accounting for 70 per cent of Australia's workforce and generating 44.6 per cent of the overall market value.¹³ However, SMEs are facing particular difficulties in building supply chain sustainability and resilience. In general, SMEs are limited in terms of their time and financial and human resources.

They also lack the essential capabilities in implementing long-term strategic changes to enhance resilience and sustainability. Changes in SMEs are chiefly driven by external pressures, especially those from clients. Consequently, SMEs are more vulnerable to disruptions in the supply chain than well-established organisations and large corporations. The following strategies specifically target SMEs on a construction supply chain.

- 1. Start Small: Start by making small, incremental improvements to sustainability and resilience practices, rather than trying to make large, sweeping changes all at once.
- 2. Public-private Collaboration: Coordinate with government departments to seek financial and moral support.

- sustainable and resilient supply chain practices through pilot projects.
- 4. Collaborate with Other SMEs: Collaborate with other SMEs to promote sustainability and resilience throughout the supply chain by sharing best practices, working together on sustainability initiatives and establishing shared goals and metrics.
- 5. Business Certifications: Obtain essential certifications such as ISO Certification to ensure compliance with management standards and improve credibility of production and distribution systems, thereby enhancing the competitiveness of suppliers of SMEs in markets.
- Quality Management: Adopt a step-by-step approach to reach a higher level of quality in terms of quality management, quality assurance, quality control and continual improvement processes.
- 7. Innovations: Distinguish from other suppliers by adopting innovation, such as using innovative technologies, creating green products and developing sustainable packaging solutions.
- 8. Resource Efficiency: Focus on resource efficiency by reducing waste, minimising the use of resources and improving the efficiency of operations.

This SBEnrc project examined the approaches to improve supply chain sustainability and resilience in the built environment. It provided practical recommendations for clients and suppliers to deliver sustainable and resilient products and services.

The project developed a framework for improving client organisations' capabilities in addressing supply chain sustainability and resilience, with a focus on six key interconnected organisational and management processes including leadership and strategy, risk and opportunity, organisation and management, procurement and process, alignment and integration and data and knowledge.

The project offered an innovative approach to understanding and assessing an organisation's capabilities and performance in developing supply chain sustainability and resilience that are critical to achieving its sustainability and resilience goals.



(Source: Travel mania - Adobe Stock)



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A practical maturity assessment and benchmarking tool - the MAB tool - was developed to operationalise the MAB process. Case studies were conducted to demonstrate the application of the MAB tool.

The project also examined the impact of client/ government-driven initiatives and innovations on supply chain sustainability and resilience, and proposed recommendations for Australian organisations including SMEs and their clients to enhance supply chain sustainability and resilience from organisational, people and operational dimensions.

The project outcomes will enhance the efficiency, reliability and sustainability of supply chains and help the Australian building and infrastructure clients in public and private sectors to achieve their sustainability and resilience goals. The outcomes may contribute to optimising long-term economic, social and environmental benefit to the nation and community.

Embodied emissions of construction materials are estimated to be approximately 5 per cent to 10 per cent of Australia's total emissions and this share is expected to rise in coming years. Acting on embodied emissions will require a collaborative approach with all members of the industry supply chain.¹⁴

Building on the outcomes of SBEnrc Project 2.76 *Sustainable Procurement* and SBEnrc Project 2.86 (this project), the Centre's next project in the theme of Sustainable Procurement will seek to drive supply chain decarbonisation in the Australian built environment by leveraging organisations' purchasing power and optimising their procurement processes and practices. It is expected that the next project will contribute to achieving the Net Zero emission goal by reducing the carbon emissions from supply chain activities in the built environment.





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Find out more:

Project webpages (including link to YouTube video): *Developing Sustainable and Resilient Supply Chains* https://sbenrc.com.au/research-programs/2-86/

For further information:

Associate Professor Yingbin Feng (Project Leader) Western Sydney University Y.Feng@westernsydney.edu.au

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