Towards the development of the circular capability in the supply chain: A review and future opportunities

by

Quynh Do

Lancaster University, the UK

Research motivations

- Circular *textile and garment* supply chain is of my current research focus
- This research problem emerges from my interest in exploring which capabilities are needed for firms and their supply chain in the circular transition, grounded in this context.

Preliminary literature review

- Using a range of keywords on the circular economy capability in Scopus and Web of Science
- A sample of 20 relevant papers written in English, peer-reviewed in the business and management field.
- Findings and discussions:

- Three key findings on (i) main themes and theoretical lens (ii) methods used (iii) key constructs of CEC.
- Two conceptual framework proposed to shape the directions for the next paper, either a conceptual paper or a qualitative paper.

Finding 1 – Main themes and theoretical lens

Research Topic	No	References
Digitalisation *(BDA, Industry 4.0)*	7	Bag et al. (2021a); Bag and Pretoerius (2022); Kristoffersen et al. (2021); Ali & Johl (2023); Chaudhuri et al. (2022); Chaudhuri et al., (2022); Yuan et al., (2023)
Green Supply Chain	7	Zeng et al. (2017); Centobelli et al., (2021); Bag et al. (2022); Centobelli et al. (2021); Agyabeng-Mensah et al. (2022); Fernando et al., (2022); Guo & Christos (2023);
Institutional Pressure	6	Zeng et al., (2017); Centobelli et al., (2021); Baral et al., (2023); Agyabeng-Mensah et al., (2022); Bag et al., (2021b, 2022b)
Eco-Innovation	4	Bag et al. (2022b); Ali et al. (2023); Sehnem et al., (2022); Sari et al., (2024)

Finding 1 – Main themes and theoretical lens

Research Topic	No	References
Institutional theory	7	Zeng et al., (2017); Centobelli et al., (2021); Baral et al., (2023); Agyabeng-Mensah et al., (2022); Bag et al., (2021a, 2022); Ali and Johl (2023)
Dynamic capability	6	Khan et al., (2021); Fernandez et al., (2021); Sehnem et al., (2022); Bag et al., (2022b); Yuan et al., (2023); Saari et al., (2024)
RBV	5	Bag et al. (2021a, b); Bag and Pretoerius (2022); Chauhuri et al., (2022); Ali and Johl (2023)
Natural RBV	2	Guo & Tsinopoulos (2023); Fernando et al., (2022)
Network theory	1	Agyabeng-Mensah et al., (2022)
Resource orchestration theory	1	Kristoffersen et al., (2021)
Ambidexterity theory	1	Chauhuri et al., (2022)

Finding 2 – Research method

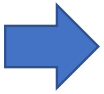
Research Method	No	References
Survey-based study	17	Zheng et al., (2017); Bag et al. (2021a, b; 2022); Bag and Pretoerius (2022); Kristoffersen et al., (2021); Centobelli et al. (2021); Khan et al., (2021); Fernandez et al., (2022); Agyabeng-Mensah et al. (2022); Chauhuri et al., (2022); Fernando et al., (2022); Baral et al. (2023); Guo and Christos (2023); Ali et al. (2023); Yuan et al., (2023); Saari et al., (2024);
Conceptual paper	3	Sehnem et al., (2022); Kusumowardani et al. (2022); Seles et al., (2022)

Finding 3 – Key constructs of CEC in survey papers

Zeng et al., (2017) on 3Rs

CEC1	The firm is devoted to reducing the unit product manual input.
CEC2	The firm is devoted to reducing the consumption of raw materials and energy.
CEC3	The firm initiatively enhances the energy efficiency of production equipment.
CEC4	Product packaging materials are used repeatedly.
CEC5	Equipment cleaning materials are used repeatedly.
CEC6	Leftover material is used repeatedly to manufacture other products.
CEC7	Waste produced in the manufacturing process is recycled.
CEC8	Waste products from consumers is recycled.
CEC9	Recycling waste and garbage is reprocessed.
CEC10	Waste and garbage are used after reprocessing to manufacture new product.

Many recent studies still use this CEC e.g., Centobelli et al., (2021), Bag et al., (2021a, 2022), Ali and Johl (2023), Baral et al., (2023) …



Kristoffersen et al., (2021)

Reinvent and rethink (CE-INV)	CE-INV1. We provide value offerings that are decoupled from material use (e.g. abandoning physical product for digital service) CE-INV2. We support products during their lifetime through providing spare parts and/or repair services as separate sales offerings CE-INV3. We provide the result or performance of a product as a service instead of selling the physical product (e.g. performance-based business models) CE-INV4. We provide the access or usage of a product as a service instead of selling the physical product (e.g. usage-based business models)
Restore, reduce and avoid (CE-RRA)	CE-RRA1. We source secondary, recycled and/or renewable materials (e.g. industrial symbiosis, using ocean plastics or non-toxic materials) CE-RRA2. We run a lean and clean production (e.g. use less energy and materials, treat wastes, rework) CE-RRA3. We optimize product use and operation to extend the product life, minimize energy use, and/or increase product utilization.
Recirculate (CE-REC)	CE-REC1. We provide activities for extending the existing use-cycles of products and parts (e.g. upgrade, repair, maintenance) CE-REC2. We provide activities for extending products and parts to new use-cycles (e.g. reuse, refurbish, remanufacture) CE-REC3. We provide activities for extending the lifespan of materials (e.g. recycle, cascade, energy recovery)

A handful of literature adopts this e.g., Saari et al., (2024).

Findings 3: Key constructs in conceptual papers

Reference	Dimension of CEC	Sub-Constructs
Kusumowardani et al. (2022) in food supply chain context	Pollution Prevention	Continuous improvement, Environmental commitment
	Product Stewardship	Stakeholder engagement, Market sharing, Information sharing
	Sustainable Development	Technological collaboration, Social collaboration
Seles et al. (2022) in line with ReSOLVE Framework	Management & People	Integration of CE principles into business strategy, Circular indicators, Human resource management
	Structure, Product, & Process	Design for circularity, Reuse, Recycle, Prolong, Product-Service Systems (PSS), Digitalization
	Relationship with Stakeholders	Sustainable sourcing, Cooperation, Supply Chain Management (SCM), Regulatory compliance
Sehnem et al. (2022) in circular innovation context	Dynamic Capability	Behaviors, Routines, Processes, Learning mechanisms, Knowledge governance
	Relational Capability	Organizational procedures, actioned informed by knowledge, experience, skills for survival and competitive advantages
	Absorptive Capability	Development of new products and processes through knowledge absorption

Suggestion 1 – Linear structure of a circular capability

Constructs	Sub-constructs
Operational capability *(routinise these practices)*	Design for durability, reuse and recycled Sourcing regenerative materials and energy Sourcing recycled materials (closed-loop) Circular business model (servitisation, resale, repair) Reduce (materials and energy) Recycle (materials and packages)
Contextual capability *(conditions enabling circular process)*	Circularity into goals, visions, strategies Organisational structure facilitating circularity processes Knowledge management for circularity (training, learning) Data transparency for circularity
Relational capability *(external stakeholder partnerships)*	Supply chain collaboration (entrepreneurship) Ecosystem orchestration

Revisit capability view

- Collis (1994) defined organisational capabilities that encompass process and socially oriented routines influencing resource deployment efficiency for creating value through products and services.
- Winter (2003) viewed organisational capabilities as high-level routines that are learned, patterned, deliberate and repeated. Winter (2003) proposed a three-part hierarchical structure:
  - ***Zero-order, or ordinary, capabilities*** are those that enable a firm to "make a living" in an equilibrium state in which they produce the same goods for the same market at the same scale. To adjust this equilibrium state
  - ***First-order capability*** are those in response to environmental changes
  - ***Second, or higher-order, capabilities*** refer to the abilities of leaders to have foresight and to orchestrate strategic change proactively

Suggestion 2 – A need for a capability hierarchy

Types of CEC	Focus	Form	Mechanisms and capabilities
Zero-order	Efficient resource utilisation and waste reduction within existing linear processes.	Incremental process	Reduce Reuse Recycle
First-order	Adapting and transforming existing products, processes, and business models for circularity.	Radical process	Circular design Regenerative sourcing Closed-loop supply chain Circular business model
Second-order	Fostering a circular culture, and influencing the wider ecosystem.	Logic	Circularity logics Transparency Open innovation culture

Evaluation of CE capability

Capability Level	Zero-order CEC	First-order CEC	Second-order CEC	Outcome	Description
Low	✗	✗	✗	Linear Inertia	- No integration of CE principles - Lack of awareness or intention to CE
Medium	✓	✗	✗	Fragmented Circularity	- Superficially dabble into circular practices, lacks a holistic strategy for integration - May be driven by external pressures or short-term gains
Medium	✓	✗	✓	Strategic Ambiguity	- Have a vision for circularity but lacks the strategic capabilities to deliver it at scale. - Lead to confusion, frustration, and a disconnect between strategy and execution.
Medium	✓	✓	✗	Decoupling Circularity	- Actively developing and implementing CE strategies, but not yet fully integrated across the organization. - Alignment challenges across departments, functions, or stakeholders.
High	✓	✓	✓	Regenerative Circularity	- Fully embedded circularity into its DNA - A strong focus on data transparency, innovations and collaborations. - Actively influences the broader ecosystem

Thank you for your attention

Questions

q.do1@lancaster.ac.uk