A Capability Maturity Model for the Circular Economy: An Agri-food Perspective

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Extended abstract

This brief paper explores the implementation challenges of introducing the circular economy (CE) as a potentially disruptive business model for firms aiming to achieve both whole system sustainability and clean business growth. We argue that, based on the interactions with our project partners, firms tend to start their CE journey by addressing internal operational issues first, then involve their supply chains, before ultimately engaging with the wider socio-political environment through various knowledge exchange mechanisms such as hubs or eco-parks. Yet the relationship between CE adoption and progression in circular capability is not always linear, with considerable uncertainty over how CE implementation and learning mechanisms progress, particularly in rural regions dominated by small medium enterprises (SME).

We adopt the concept of the capability maturity model (CMM), already used in information systems applications (Paulk, 1993), and supply chain development (Lockamy and McCormack, 2004), to explore CE implementation. Through the development of our CE CMM model, we explore how a firm's state of change can be represented using systems thinking (Ford, 2009; Xu *et al.,* 2009) and to show the transition from current to future desired state. The attributes required of firms to address the CE can be represented using capability maturity to show how the build-up of connections, skills and capabilities can improve network and system performance (figure 1).

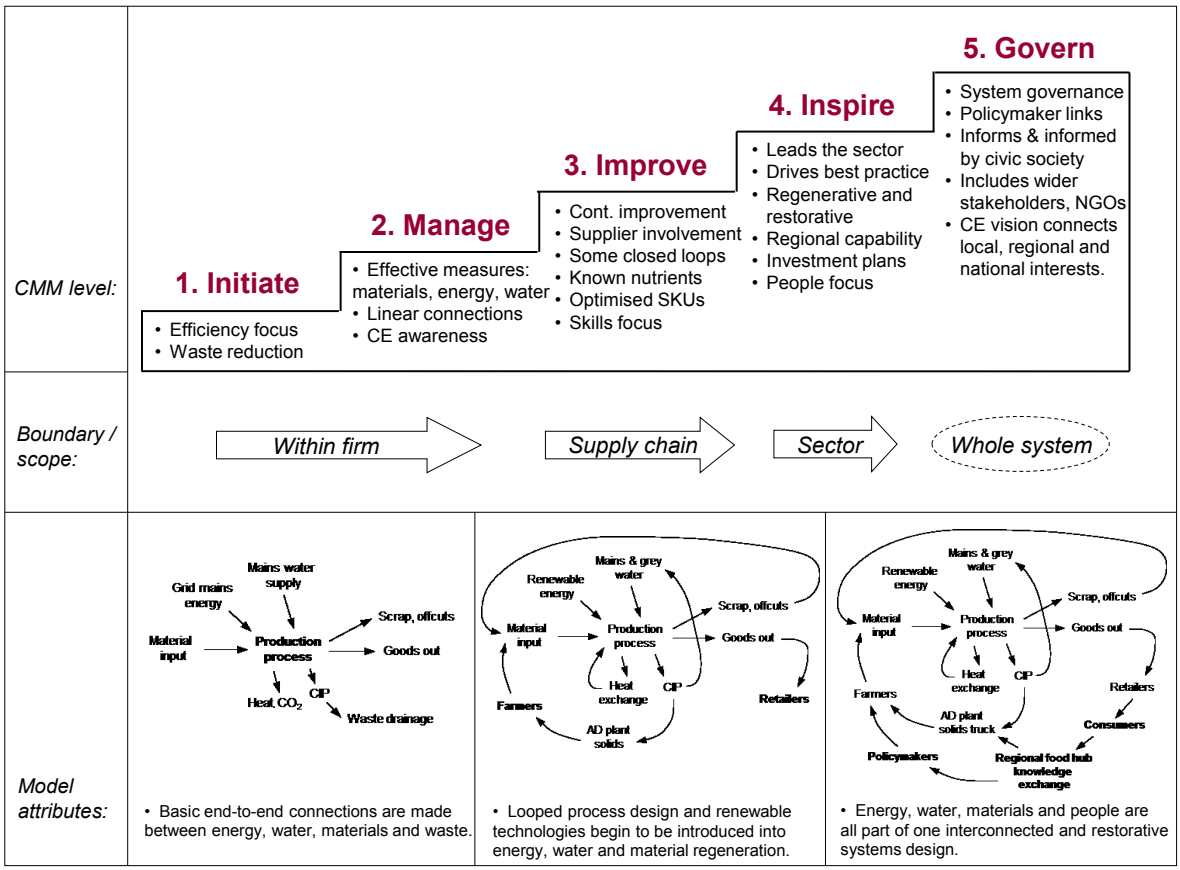

Figure 1. Circular Economy Capability Maturity Model

We use several modelling methods to understand the multiple stages, skills and capabilities in relation to CE implementation during our investigation. Based on empirical data from eight cases in

the south-west dairy and baking sector in the UK, observed over two years involving value stream process mapping, systems modelling and computer simulation of the materials-energy-water nexus. A multiple case comparison method is supported by Value stream mapping, Qualitative system dynamics, and quantitative modelling using Discrete-event simulation.

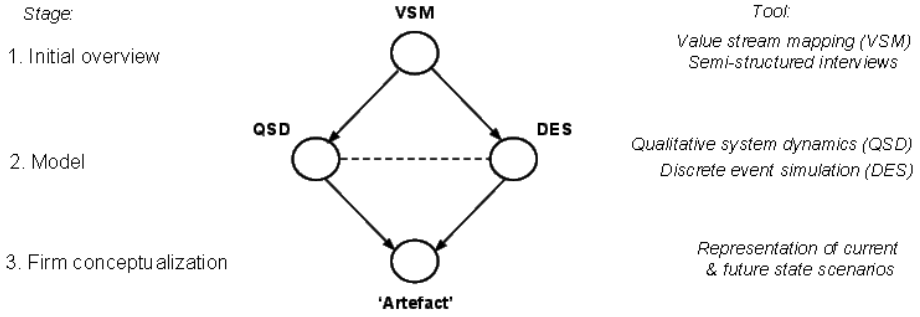

Figure 2 Research methods – multi-modelling

Our data supports a multi-objective approach, that is: a progressive sequence of attributes, skills and capabilities for firms who seek to 'climb the stairway' of the CE capability maturity model. Yet only several firms we examined actually aspired to become a CE industry sector leader who 'inspires, governs or influences' the system at policy level, where the other firms seemed content to merely 'manage' or 'improve' their position in relation to more incremental, lower level process-based development. While our model is a useful starting point for business, its implied linearity (i.e. assumptions over firm progression) is at times misleading for interpreting the motives of firms with only moderate aspirations towards CE and sustainability.

In terms of the theoretical implications of cumulative capabilities, we support the view of Flynn and Flynn (2004: 439) that the '*sequential progression of cumulative capabilities*' was not always directly evident in our findings, leading to the notion that development of cumulative capabilities in any context is a *'...complex endeavour, affected by many interrelated contingencies*' often occurring beyond firm boundaries (e.g. policy, legislation, civic involvement) and not limited to sequence of development.

Our model provides an initial reference point for future CE investigators to advance thinking in this emerging and important field. Further research will extend our use of systems modelling and conceptualization into other industry sectors, also to investigate the relationship between specific strategic initiatives in CE (e.g. regional funding) and higher-level cumulative capabilities.

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