

Comment on “The Evolution of Closed–Loop Supply Chain Research” by V. Daniel R. Guide, Jr. and Luk N. Van Wassenhove

Robert D. Klassen
Ivey Business School
University of Western Ontario
Canada

Guide and Van Wassenhove (2009) begin with an ambitious objective: to overview the rapidly evolving field of closed-loop supply chains in the form of a tutorial. To do so, a broad synthesis was made of multiple streams of research within and related to operations, including supply chain management, logistics, and market dynamics. Both the development of and challenges presented by closed-loop supply chains are thoughtfully structured under a five-phase framework. Let me leverage this framework, combined with paper’s two central themes - business perspective based on value recovery and process view vs. types of returns - to further explore critical questions that are raised by their paper.

Expanding the Business Perspective

At the outset, and later emphasized again, Guide and Van Wassenhove (2009) narrowed their tutorial to a business perspective on value-added recovery activities. While it is always helpful to clearly delimit what is being examined, it also is important to critically assess if the limits exclude strategically or methodologically important aspects. And defining business value has become a rather contentious issue subject to increasingly complex debate, particularly with growing interest in sustainable development.

One theoretically appealing, but operationally challenging, definition of business value is framed around the notion of a triple bottom line, with its demarcation of social, environmental and economic bottom lines (Elkington, 1997). More colloquially, this has been termed people, planet and profits. At the risk of greatly oversimplifying, these three dimensions can be conceptually illustrated using the analogy of a triangle, where the length of three sides represent the individual bottom lines, and the enclosed area is business value. In essence, multiple configurations can yield similar value, although the weighting applied to each bottom line is partly in the eye of the assessor. Regardless of one’s perception of their relative importance, these three dimensions are becoming an active part of corporate reporting and managerial decision-making, for example, as evidenced by the Global Reporting Initiative (www.globalreporting.org).

Guide and Van Wassenhove (2009) noted the relevance of green or sustainable supply chain issues, but then positioned them as being outside business value. Arguably, these issues should be encompassed within, not in addition to, business value - particularly for closed-loop supply chains. Not only have environmental issues motivated much research and managerial discussion about CSLCs over the



last 15 years, either driven by customer or regulatory requirements, but they also offer a pivotal option to improve sustainability. Returning to the triangle analogy, there is not necessarily an implied trade-off from CLSC, as some activities might expand both the economic and environmental bottom lines, while other activities might expand one at the expense of another. Moreover, the economic value (positive or negative) is far from certain even for those firms that are motivated to establish closed-loop supply chains to improve their environmental performance.

For example, a CLSC was developed and expanded over time by one U.S. carpet manufacturer. According to a senior manager, "[Interface] set out with the knowledge that it's impossible to do this and make money and we've actually had fun proving ourselves wrong at this over the years" (Hindo, 2006). And as competitors have continued to pursue alternative process technologies (some based on chemical decomposition versus others based on mechanical separation and remelting), the dominant design for a carpet-based CLSC has not yet emerged. Other CLSCs face similar economic and technological uncertainty.

Innovation in CLSCs

So why the unexpected outcome? Not only is uncertainty derived from the market, e.g., the timing, value and quality of returned goods as noted in Phase 5 (Guide and Van Wassenhove, 2009), but also the development of new process technologies employed to capture, sort, and remanufacture parts or utilize materials that move backward through the CLSC. Thus, both technological choice (Debo, Toktay, and Van Wassenhove, 2005) and innovation must be considered. Conceivably, the classic technological "s-curve" (e.g., Sahal, 1981) applies also to innovation in process technologies embedded in CLSCs. Given the early-stage development of CLSCs for many industries, products and markets, a rapid increase in business value is potentially possible driven by regulatory requirements or triple bottom line opportunities. Once managers (and researchers) are pushed to extend their horizons of analysis, new possibilities become evident (Corbett and Klassen, 2006). But until one or more firms actively invest in developing these technologies, forecasting business value for long-lived products at end-of-use or end-of-life is inaccurate, or worse, potentially misleading.

Differences between discreet goods (e.g., cell phones) and continuous process products (e.g., paper) were only briefly considered, with the latter usually limited to recycling in CLSCs (Guide and Van Wassenhove, 2009). While much of the field's evolution has focused on remanufactured discreet goods, we shouldn't lose sight of the three principle return-recovery pairs that they identified as prevalent: consumer returns?repair, end-of-use returns?remanufacture, and end-of-life returns?recycle. The implicit fourth outcome is end-of-life?disposal. Unfortunately, specific statistics are difficult to find on their relative use. However, the most important aspect may be understanding how managers strategically might shift their firm's products from one to another, or advantageously segregate the market into different pairings. Design or redesign is the key, e.g., end-of-life returns can be transformed into end-of-use returns through product leases, redesign of key components to extend their lives, and improved testing after return (Thierry, Salomon, Van Nunen, and Van Wassenhove, 1995).

Extending Our Research

Collectively, these tensions to define business value, forecast future value, and invest in technological innovation fuel the need to extend several contributions summarized in Phases 4 and 5 as research and practice expands in operations research. First, how might business value be better modeled as multiple dimensions of performance? This may become somewhat easier in the near future as some externalities, such as CLSC's carbon footprint, are priced by capacity-and-trade regulations or carbon taxes into the forward and reverse supply chains. At a minimum, economic and environmental criteria need to be included simultaneously rather than translating business value into only economic terms.

Second, further exploring the value of shifting from one form of CLSC to another based on innovative product design or market segmentation (possibly combining lease and purchase business models) may provide decision makers with more specific guidance for strategic investments. These shifts are likely to be difficult to execute, but potentially necessary to address regulatory and consumer expectations. Capturing both supply and demand evolution and the ability to segment customers through multiple means are critical.

Finally, modeling the role of innovation for products and processes related to CLSCs might benefit from considering both multiple regulatory and technological scenarios. Valuing product return flows at end-of-use and end-of-life remains particularly difficult for long-lived products, suggesting that research might benefit from employing real options (e.g., Dixit and Pindyck, 1994) rather than net present value for the economic bottom line. A similar approach may also be appropriate for assessing CLSC scenarios in which high-value components designed to be part of a firm's closed-loop "leak" to other third parties because of commodity prices, regulatory barriers or conflicts in distribution channels.

Overall, I think that Guide and Van Wassenhove (2009) have made several critical observations and effectively illustrated how the developing field of CLSC has benefited from leveraging a strong business perspective. Our challenge as the field continues to evolve is to ensure that our business perspective recognizes a broad range of performance metrics, and the dynamic nature of customer expectations and market opportunities. For in the end, we not only must improve our ability to generate business value in CLSCs, but we also must participate as consumers.

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