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THE BENEFITS OF APPLYING PROJECT MANAGEMENT TOOLS TO LIFE CYCLE ASSESSMENTS

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ABSTRACT

Life Cycle Assessments (LCAs) that encompass complex value chains can be challenging to manage since data is needed from different value chain partners and information needs to flow between different players in the value chain. However, good project planning and the application of time-tested project management tools can help practitioners to overcome obstacles and successfully navigate the team through the study.

Project management provides a very useful tool box to LCA. For example, RACI charts help to clearly assign roles and responsibilities within a project team. To guarantee the appropriate timing of individual tasks, Gantt charts can be helpful to manage the timing and the sequence of individual activities. In this presentation, we use a case study from industry to demonstrate how the effective integration of such project management methods can help to successfully manage even complex value chain LCA projects.

INTRODUCTION

Life Cycle Assessment (LCA), while complex and sometimes complicated, becomes quite feasible, if good project management practices are applied. As with many other involved tasks, careful project design and planning go a long way towards avoiding pitfalls down the road. It is really about deciding who does what, until when, and with which resources.

The RACI chart for assigning team responsibilities and the Gantt chart for determining timeline and sequence of work items are two key techniques of project management. In the following, a case study will demonstrate how these two tools were successfully applied to a comparative LCA that involved a broad range of value chain partners.

METHODS

LCA System Boundary and Functional Unit Definition:

The first objective of this study is to compare the environmental performance of solvent-based and thermal flexographic plate imaging technology. The second objective is to benchmark the environmental performance of flexographic versus rotogravure printing including print form manufacture, imaging of the print form and printing of the film for the flexible packaging and tag & label markets. The results of these comparisons shall educate the value chain and support downstream customers in sustainable decision making.

The functional unit to compare imaged plates made by alternative image setting techniques (analog, digital, solvent, thermal) is area of imaged plate. The final functional unit for the study is area of printed substrate.

The value chains of imaging and printing processes are quite complex. For flexography the following steps are included in the LCA:

- Manufacture of the photopolymer plates
- Plate imaging or image setting steps (analog versus digital, solvent versus thermal)
- Flexographic printing of the packaging film

For the alternative gravure printing technology, the corresponding steps are:

- Facing and re-facing of the printing forms /cylinders
- Printing form imaging
- Gravure printing of the packaging film

Consequently, data was collected from a variety of value chain partners, including trade shops and printers serving the flexible packaging and tag & label markets. Stakeholders identified cradle-to-gate non-renewable energy and GHG emissions as the key environmental indicators. The LCA was concluded with a critical peer review.

Project Management Tools: RACI Chart

One key aspect of good project planning is to have the right team in place to solve the task at hand, and to assign and communicate the responsibilities in a clear and transparent manner. RACI stands for:

- **R= Responsible** person who owns the problem and performs the work. In an LCA analysis this is often the LCA practitioner or individual business people, who help collect input data for a life cycle analysis.
- **A = Approver**: Person, to whom “R” and the team is accountable and who is often the commissioner of the study.
- **C=** person to be **consulted**: often a technical subject matter expert or value chain partners, who have specific knowledge needed in certain parts of the project.
- **I** = person who needs to **be informed**: often a business manager who will use the results of an LCA to make the appropriate business decisions.

Project Management Tools: Gantt Chart

Gantt charts support managers to make sure that all activities are accounted for, their order of performance is logical and appropriate, and that completion times for each individual activity as well as for the whole project are determined. To create a Gantt chart, the project has to be broken down into individual tasks, which then need to be put into the appropriate sequence. Tasks that can be worked on in parallel need to be identified. The longest time path through the network of connected tasks (*critical path*) determines whether project deadlines can be met. The project manager then needs to give special attention to the activities on the critical path, and may consider increasing resources and financial support in those bottle-neck activities to support in-time completion of the overall project.

LCA guidance documents like the ISO 14040 standards (ISO, 2006) and the ILCD handbook (JRC, 2010) provide useful frameworks to identify resources and work streams that are relevant within the goal and scope of a given LCA project. Software tools like Microsoft Project are available to support the planning process and to help build Gantt charts. In this project, Gantt charts were established as Microsoft Excel spreadsheets to facilitate the exchange of information among the practitioners involved.

RESULTS

At the very beginning of the project, the project team developed layered RACI to manage resource responsibilities. The below RACI chart shows data collection activities on the highest level. More detailed RACI charts described the individual tasks at hand.

	LCA Practitioner	Internal Process Expert	Value Chain Partners	Comissioner	Subject matter expert	Internal/External Reviewer	Business Mananger
Goal and scope definition	R	C	C	I, A	C	C	I
Data collection	R	R	R	I, A	C		
Development of LCA Model	R				C		
Discussion of Results	R	C	I, C	I, A	C	C	
Interpretation / Business Guidance	R	C	I, C	I, A	C	C	I

Figure 1. RACI Chart for LCA

Due to the complex value chain, the study relied on the input from multiple contributors along the value chain, with the objectives to include knowledgeable internal and external experts on the considered technologies and value chains, and to gather input from customers and other stakeholders to determine the relevant issues early on in the process. The individuals involved came from diverse functional and educational backgrounds, e.g. marketing, R&D, business functions, trade shop customers, converter customers, and process technology.

Since the goal and scope definition is critical for the whole project, value chain partner and customer feedback was solicited as early as the goal and scoping process. Some of the data collection activities were performed internally, and some by value chain partners. In some cases, internal data was validated by real life operations at customers.

Given the interdependent relationship of its components, this LCA project deviated from its predefined, sequential path. Several iterations) were encountered during the project, such as realignment of scope, changes in data collection strategy, inclusion of additional resources. However, due to proper project management, the team was able to anticipate changes early on. Gantt charts like the one below were instrumental to realign timelines and resources in an

iterative fashion and to manage the complexities of the project, so that in the end, the project goal to complete the project within the given timeline could be attained.

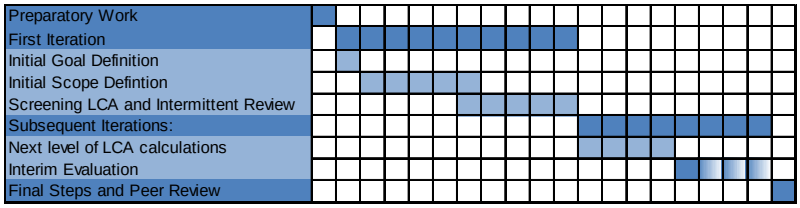

Figure 2. High-level Gantt Chart for LCA

All LCA case scenarios conducted support the general conclusion that flexographic printing is more sustainable with respect to non-renewable energy consumption and greenhouse gas emissions in the flexible packaging and tag & label industry compared to rotogravure printing (see Fig. 3 for illustration of exemplary results). Comparing thermal and solvent plate imaging processes, it can be seen that the environmental performance of the different imaging techniques is dependent on solvent recycle practices, the choice of equipment configuration, the selection of the trade shop electricity grid, and the choice of the fiberweb material. For more detailed results, please refer to the underlying publication (Veith & Barr, 2008).

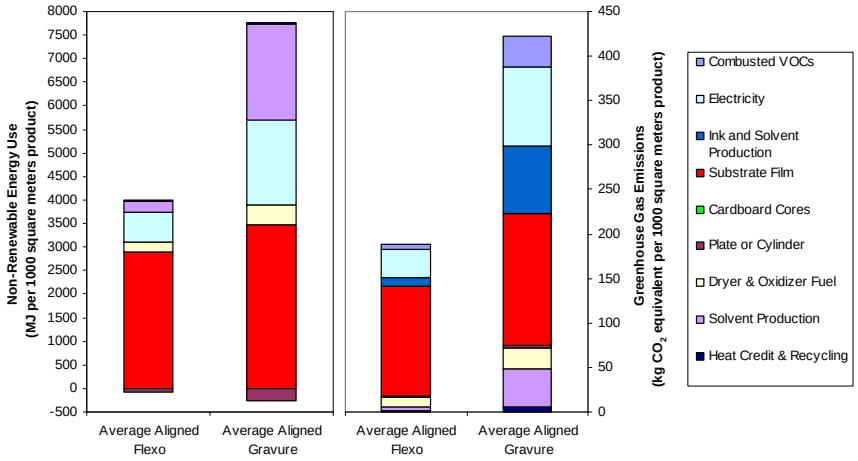

Figure 3. Flexography/Gravure Comparison of Cradle-to-Gate Impact Contribution

DISCUSSION / CONCLUSIONS

The successful management and timely completion of this exemplary LCA study clearly demonstrate that traditional project management tools like RACI and Gantt charts can indeed be very helpful to execute LCA projects within complex value chains.

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