The application of "ecoputation" to assessing the social effects associated with the life cycles of products and services-case studies in the heating of buidings

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1. Context and scope

Since assessing the social effects associated with the life cycles of products and services first entered the research agenda, two complementary approaches have been developed. The first seeks to explore the **social aspects of the behavior** of the companies involved in the life cycle, in order to help them to meet certain standards. The objective of the second approach is to **anticipate the social consequences** of changes to be brought about in life cycles. The latter case may be called "socio-innovation" (Call for papers, this seminar).

In this paper we discuss how the novel approach known as "ecoputation" may be applied to a case study involving heating from biomass and in particular, heating from biomass in buildings. A company involved in biomass distribution and sales, and biomass heat services engineering, is involved, both in: (1) social behavior within the biomass life cycle relating to the seeking of profit (e.g. by customer service); and (2) anticipation of the social consequences of changes to be brought about in life cycles relating to changing patterns of heat system engineering (e.g. by anticipation of the range of demand for good quality fuel). The objective in such situations should be to find an integration of the complementary approaches of "socio-innovation" and the meeting of standards.

2. Main text

A helpful first step is an integrated system diagram. In Figure 1, "profit-seeking social behavior" is exhibited in the cycle from profit through survey to biomass, shown in white on a black background. A survey of company staff is used to reveal the company's criteria of acceptance of biomass profit. Complementary to the survey is its sustainability, shown in italics, while complementary to profit is that it should be economic, and complementary to biomass is its representation (type of timber, moisture level, etc).

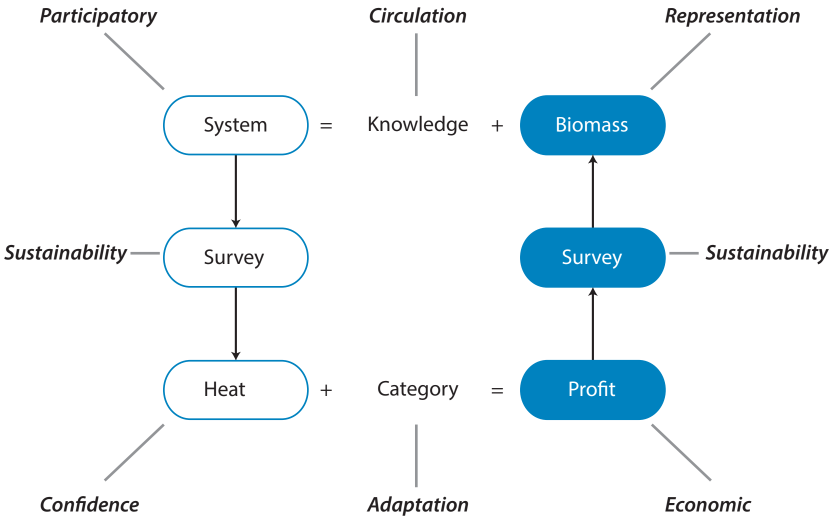

Figure 1: Optimisation of biomass profits and heat system process by survey.

On the left hand side of Figure 1, the "anticipation of the social consequences of changing patterns of heat system engineering" is exhibited in the cycle from system through survey to heat, shown in black on a white background. A survey, again with complementary sustainability, is used to reveal users' criteria of acceptance of heat systems. Complementary to heat is confidence (for example, relating to weather and cost), while complementary to the system is that it is participatory. The system may be fully "life cycle" if it extends from biomass planting to ash disposal, but in this diagram it need not be and a boundary can be drawn, for example, at harvesting.

Between the left-hand and right-hand sides of Figure 1 there are connections. Knowledge is used to connect the biomass inputs to a known system; the knowledge may be circulated. Additionally, heat and effects on categories together make up profit. If heat is high (so that heat losses are low), then effects on categories will be lower as less biomass is burnt. The 'categories' here include both conventional LCA impact categories and resource depletion categories from the burning of the biomass., as well as land use. If heat is lower (so that heat losses are higher), the effects on categories will be higher. Complementary to effects on categories are adaptations.

Some aspects of the two cycles are mutually reinforcing; for example a biomass which is both inexpensive to grow and harvest, and which has high calorific value. But some are not, for example customer service. There is, as the caption of Figure 1 indicates, an opportunity to use the surveys to optimize both biomass profits and the heat system simultaneously. But in order to do this, the aspects of the surveys, which are expressed in narrative, need to be numbered so that mathematical optimization can take place.

This is the point at which "ecoputation" becomes useful. "Ecoputation" is a methodology extended from Multiple Criteria Decision Analysis in which connected narratives (instead of disconnected criteria) with shared characteristics are deemed to belong to the same categories. The categories are numbered within a framework. The framework has a basic structure of words; these can be conjoined by mathematical mappings to yield longer narratives which are also numbered. "Ecoputation" is therefore possible, i.e. the development, presentation and communication of narrative information, including numeric information, by computational means. While LCA is optimized by computation, "Ecoputation" is not. Yet an optimization method is needed for both computation and ecoputation simultaneously. How this is best done is to be explored through this case study research.

The paper will assume no prior knowledge of "ecoputation".