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Measuring sustainability along the food supply chain: further development of a tool for measuring environmental impact of a food business



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1. Introduction

Assessment of the environmental impact and sustainability of a food business is desirable but not easily obtained. One problem that food businesses have, particularly SMEs, is how to measure their impact so that they can see where they might make appropriate changes to their activities. Previously we described a simple tool for measuring environmental impact (Salva et al., 2013). In this, food business were asked to complete a questionnaire and the results quantified *post hoc*. Quantitation was somewhat arbitrary, relying on the judgement of the researchers. Feedback to the respondents was only possible sometime later. A similar methodology has also been developed for quantifying small farms across Europe (Leach et al., 2012, 2013).

2. Aims and objectives

To develop and test a spreadsheet-based tool that may be used by food businesses to measure their sustainability.

3. Methods

3.1 The questionnaire

The questionnaire of Salvá et al., (2013) was adapted to an Excel® spreadsheet. The questions were simplified somewhat (Table 1). The scales were given descriptive anchors that help understanding. This was similar to sensory analysis where panellists are presented with unstructured line scales with labelled anchors at either end. The macro facility in Excel® was used to provide sliders so respondents could record their scores (Figure 1). The outputs from these were located on a separate tab and used to plot a spider graph of the results. Boxes were also provided for written comments in some places.

Table 1. Questions asked in the spreadsheet

- Do you have an environmental management policy or statement?
- If none, how long before you introduce one?
- Do you have an Environmental Management Statement (EMS)?
- If you do have an EMS, how often do you monitor and report your performance on the EMS?
- How often do you record/measure the waste streams that you produce?
- How far are you reducing your consumption of raw materials (eg as used for pallets, boxes, containers or other)? Please indicate the approximate proportion.
- Are you sourcing renewable materials or ingredients from sustainable resources? Please indicate the approximate proportion.
- By approximately how much have you reduced your energy consumption in the last 12 months?
- Have you reduced your greenhouse gas emissions in the last 1 – 2 years? These are CO₂, NO_x, SO_x.
- Do you use one or more of the following: *detergents, sanitizers, pesticides, herbicides or fertilizers*
- Have you reduced their use in the last 2 years?
- Please estimate the approximate average food miles travelled per product that you produce.
- Do you have water reduction strategies (e.g. improved plant cleaning processes, additional water meters or other)?
- Are there opportunities to reduce waste packaging for your products (or else retrieve, recycle them etc.)?
- Do you have a sustainability strategy? If so, please indicate how well developed it is.
- If you do have a sustainability strategy, please indicate how far you have implemented it.
- Do you make customers aware of the availability of more sustainable products (e.g. locally sourced food, lower carbon footprints, more energy efficient processes applied, less packaging waste etc.)?

The questionnaire was emailed to six local food business of which four returned them. Of these, one was a large company but the others were SMEs.

3.2 Data analysis

The spreadsheet questionnaire sent to each respondent was set up so that the results were displayed as spider diagram as the responses were entered. This allowed the respondents to see how they were performing. For further analysis, the scores were copied into another spreadsheet and a spider diagram generated with all the results. The sustainability scores from the four businesses were compared by 2-way anova using the statistical package 'R'.

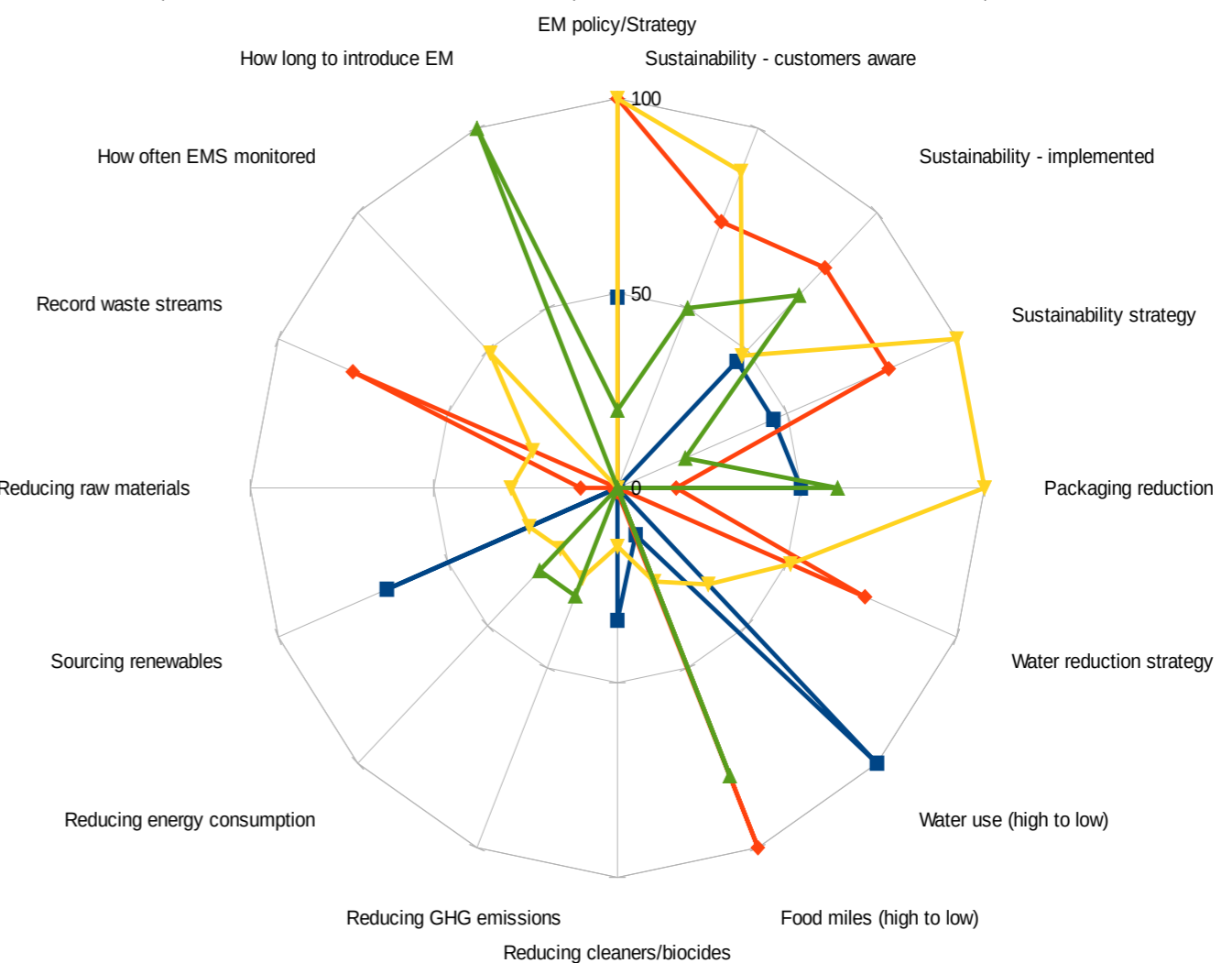
Figure 1. Extract from the spreadsheet-based questionnaire

4. Results

The mean 'sustainability scores for the four business were 25%, 38%, 46% and 29%. Only two of the businesses had an Environmental Management Strategy (Figure 2) and only one monitored it. All four had some sustainability strategy with intention to implement it, or it was implemented in part. One had a policy of reducing packaging, another had a strategy to reduce water use. All aware of greenhouse gases emissions, they were not actually trying to reduce them. There seemed limited effort to reduce energy use. Anova showed there was no significant difference between them ($F = 1.15$, $P = 0.335$). All four business thought the questionnaire easy to use but one commented that some of the questions were difficult to answer for their particular situation.

Figure 2. Sustainability scores of the food businesses for the 16 criteria.

— Business 1, — Business 2, — Business 3, — Business 4



5. Conclusions

This version of the questionnaire was fairly easy to use but modifications are needed for certain types of business. The sliders made scoring easy. Graphical presentation of the results made it very clear where the strengths and weakness of each business lay. If used on a regular basis they would be able to see their performance over time so they could implement strategies to enhance their overall sustainability. Further work is needed to make the questionnaire suitable for a wider range of businesses and to ensure that the most useful data is collected.

6. References

Leach, K., Gerrard, C. and Padel, S. (2013) Rapid sustainability assessment of organic and low-input farming across Europe and identification of research needs. Report for Sustainable Organic and Low Input Dairying (SOLID). EU Seventh Framework Programme KBBE.2010.1.2-02.

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