

Evaluating materiality – multi-criteria environmental aspect and impact analysis

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Abstract:

An understanding of an organisation's material environmental issues should be the basis upon which an environmental management strategy is developed. Traditional approaches for evaluating significant aspects and impacts are based around risk assessment (magnitude and likelihood) methodologies that are often subjective and do not usually take into account other important business factors.

Many organisations struggle to effectively evaluate the issues that are important to their stakeholders and the environment because they do not use an appropriate framework. This problem can lead to a dilution of resources available to environmental and sustainability managers since these are often spread across multiple initiatives due to a lack of focus on the issues that matter most.

This paper introduces a multi-criteria environmental aspect and impact analysis methodology which can be used to effectively evaluate an organisation's material issues. The five criteria used to evaluate significance are: volume/quantity, severity, legal/market, financial implications and controllability.

The weightings of the five criteria can be manipulated to suit the individual priorities and maturity level of specific organisations. For example, a company or practitioner may decide to put a higher emphasis on financial implications while they are at a 'defensive' stage and review the weightings once they have reached a 'proactive' or 'managed' sustainability maturity level.

Biography:

Dr Manuel Seidel is an engineer with a background in environmental management and sustainability consulting. He is a co-founder of ecoPortal, an online tool that simplifies the management of sustainability issues for organisations. During his PhD research and consulting experience he founded the ecoWheel framework, an environmental management and sustainability strategy tool for business. The ecoWheel serves as the central interface of an environmental management programme, allowing stakeholders of the organisation to understand and contribute to the improvement activities of the organisation.

Helene Sterzik is currently completing a PhD at Massey University in the area of Environmental Life Cycle Management (LCM). She completed her undergraduate degree in 'Industrial Management and Engineering' at The University of Chemnitz in Germany in 2009, and her Master of Engineering Management degree at The University of Auckland in 2010. Helene's Master's thesis investigated the implementation of product stewardship schemes in manufacturing companies.

Most organisations still have a defensive approach to sustainability and environmental management. This means that they will only implement improvement initiatives when either their customers force them to, or if they are required to by law. Companies with this approach are often unconvinced of the commercial benefits of sustainability or too busy with day-to-day operational issues to be in a position to implement improvement initiatives.

Effective evaluation of significant environmental impacts is a key step for ensuring that the limited resources of an organisation are used in the most efficient way and for optimising the potential return on investment of the crucial first improvement project activities. This is particularly important with respect to generating visible outcomes and 'buy-in' from management and key staff in the organisation in order to overcome their concerns and perceptions.

The aspects and impacts evaluation criteria listed below and detailed in Table 1 reflect the characteristics and the internal dynamics of organisations at the 'defensive' state of corporate sustainability, and the barriers to the uptake of environmental initiatives

- Financial: This criterion relates to the financial implications associated with a particular environmental issue. For example are there potential cost savings associated with reducing the impact or is significant investment required? The weighting of this criterion in relation to the other criteria can be increased (e.g. to 10 as opposed to 5), as it can have an important influence in overcoming the initial concerns of management discussed earlier.
- Volume: This criterion relates to the quantitative impact on the environment, e.g. the volume of a particular waste stream in relation to another.
- Severity: This criterion addresses the severity of an environmental impact e.g. the bio-toxicity of a waste product or emission.
- Legal and market: This criterion takes into account the legal and market factors relating to the environmental impact.
- Control: The level of control that the organisation has in terms of reducing the impact is an important consideration. The more control the organisation has over the impact the higher the score in this category.

Each environmental impact is given a score on the basis of the five criteria. The scores for the five criteria are added together and multiplied by a factor of four giving a total out of 100. The environmental impacts with the highest scores can then be prioritised as early improvement projects. The aim of such improvement projects is to 'pick the low hanging fruit' and prove the commercial benefits of environmental improvement initiatives to sceptical managers.

The weightings of the five criteria can be manipulated to suit the individual priorities and maturity level of specific organisations. For example, a company or practitioner may decide to put a higher emphasis on financial implications while they are at a 'defensive' stage and review the weightings once they have reached a 'proactive' or 'managed' sustainability maturity level.

Social and community criteria can easily be integrated into the materiality evaluation matrix for those organisations that are using a holistic approach to sustainability.

The validity and effectiveness of this approach has been demonstrated in a range of case studies from a research and consulting perspective. In particular, the success of improvement projects generally created a strong momentum towards corporate sustainability and convinced decision makers as well as staff of the benefits of the implementation of an environmental management system.

Table 1: Environmental aspect and impact evaluation matrix

| | | Level of impact | | | | | |
|--------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| | | 0 (None) | 1 (Very low) | 2 (Minor) | 3 (Moderate) | 4 (High) | 5 (Very high) |
| Category of impact | \$ (Financial) | Significant investment costs associated with reducing impact make it unrealistic to do so in the foreseeable future | It is expensive to reduce this impact | No financial benefits of reducing this impact | Funded schemes exist to reduce this impact | Initial investment required leading to medium term benefits | Direct and measureable short term financial benefits |
| | V (Volume) | Insignificant quantity or volume | Very low quantity or volume | Minor quantity or volume | Moderate quantity or volume | High quantity or volume | Most significant material/impact quantity or volume |
| | S (Severity) | No direct environmental consequences | Environmental aspect can be addressed with minimal consequences on other issues | Aspect can be addressed resulting in moderate environmental impacts in other areas | Aspect has moderate environmental consequences | Aspect has high environmental impact. E.g. Waste which has to be sent to landfill | Immediate and obvious environmental consequences. Environmental aspect occurs regularly or is highly likely to occur. |
| | L (Legal and Market) | No laws or market requirements exist or are likely to exist in the future | There are currently no laws in other countries or industries | Law or market requirement exists for this aspect for other industries | Law or market requirements associated with this aspect exist in another country | Competitors have prevented/mitigated that particular impact and gain some form of competitive advantage | A legal requirement exists or is about to be introduced |
| | C (Control) | The specific process/action is unavoidable and there is currently no viable reduction mechanism | This impact is in the domain of third parties and is difficult to control | Potential to engage or influence a third party to reduce the impact | The company can modify the materials or process causing impact | Impact occurs as a result of the company's activities and can be controlled to a certain extent | Impact occurs as a direct result of the company's activities and is easily controllable |