

Systematic sustainability assessment of food packaging

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Companies from the food packaging and food manufacturing sectors are showing interest in the sustainability assessment of their packaging. However, before more sustainable packaging alternatives are developed in elaborate processes, a transparent and comprehensible consideration of possible product variants based on well-founded criteria is advisable. This article presents results from the development of a systematic sustainability assessment of food packaging in the form of an assessment matrix. It provides an insight into the structure of the matrix and gives reasons for its application in companies in the food industry.

Interest in sustainable packaging in the food industry

The food industry uses plastic packaging for portioning, transporting and protecting food, among other things, and thus ensures an adequate and hygienic supply of food. After a product has been manufactured, packaging is essential for storage, transport and sale. In addition to functional properties, they carry information about the product; in the case of food, this is information about quantities, ingredients or shelf life. After a short period of use, such as unpacking the product, many packages become waste that are incinerated or exported. The recycling rate for packaging in Germany is around 69 percent (Umweltbundesamt 2020, statista 2022). In order to avoid waste, sustainable packaging is recommended in the Packaging Directive 1994/62/EC (Umweltbundesamt 2021) and is also desired by customers (MM Board & Paper GmbH 2019).

In a holistic approach to implementing sustainability goals (Leal Filho 2017), the three aspects product protection, environmental impact and circularity can determine the sustainability of packaging (Wohner and Kladnik 2021). Sustainable packaging ideally fulfils all three aspects, is made of environmentally friendly material and can be recycled or reused.

A valid assessment of the sustainability of individual packaging solutions requires clear data, including knowledge of material composition, manufacturing processes and origin of raw

materials (van Eygen et al. 2018). An assessment should therefore only be carried out on a company-specific basis and in relation to concrete cases. The aim of the evaluation is a comprehensible and transparent assessment of whether the costs and effort required to develop this packaging alternative are worthwhile.

Assessment matrix for a holistic sustainability comparison

As part of the Prosperkolleg project, several representatives from plastics and paper processing, packaging manufacturing, packaging plant construction, food processing and recycling companies met in a series of specialist workshops between September 2020 and June 2021. Existing and future desirable partnerships along the value chain and the greatest challenges for the industry in dealing with sustainable packaging made headway. The Prosperkolleg has developed an *assessment matrix for sustainable food packaging* in order to create as holistic an understanding as possible of the sustainability assessment of packaging.

Several systematics are available to assess the sustainability of packaging, including ECR Circular Packaging Initiative Austria, No Plastic in Nature Tool (World Wide Fund For Nature 2019), Idemat (Vogtländer 2015), The Alternative Materials Tool (Plastic ACTION (PACT) 2020) and BÖWL Leitfaden (Bund ökologische Lebensmittelwirtschaft).

In the context of the expert workshop series, these tools were reviewed and a separate catalogue of criteria was drawn up in the form of the *assessment matrix*. The *assessment matrix* enables a comparison of sustainability between any food packaging used and a packaging alternative on the basis of 32 evaluation indicators. The indicators are divided into the main indicator groups product protection, circularity, environment, plant utilization and communication. In addition to transparency, the *assessment matrix* creates the basis for a structured



Figure 1: Strawberries in different packaging; sources: pixabay; Engin Akyurt, unsplash.com

discussion of different sustainability aspects (cf. the example of an assessment in the appendix, Figure 2).

Initial findings from expert discussions and survey results show that the indicators in the sustainability assessment have different relevance depending on the company or depending on the individual case analysis of several packages, which is why this is taken into account in the *assessment matrix*. An overall result for the assessment of sustainability after evaluation of the 32 indicators is currently not included in the *assessment matrix*. This is due to the fact that companies pursue different objectives in the main indicator groups and that different demands are placed on the packaging depending on the packaged food, such as chilled, solid or liquid food. In addition, the *assessment matrix* is intended as a decision-making aid with non-binding recommendations without consideration of legal standards from the food industry and is similar to the approach of comparable assessment systems such as the ECR Sustainability Assessment (Wohner and Kladnik 2021).

Testing the evaluation system in corporate practice

The testing of the application in corporate practice was the subject of 23 packaging analyses in different companies, in which used or manufactured food packaging was compared with the *assessment matrix for sustainable food packaging*. The evaluation of individual case studies was followed by a survey of the companies as to whether and how the *assessment matrix* could support them in their everyday business.

In summary, there was a general interest in sustainability assessment in marketing in the companies, on their own initiative or derived from customer requirements. The majority of the companies surveyed found the indicators and assessment criteria contained in the *assessment matrix* comprehensible and understandable. The probability of using the *assessment matrix* for internal company sustainability comparisons was rated as high to very high by most respondents. The main benefit of the *assessment matrix* for packaging development was the systematic and transparent evaluation of sustainable

packaging. Additional added value was the documentation of the results as a basis for discussion for internal communication or discussions with external partners in the value chain. Cost reduction and focusing on the essential factors during a sustainability assessment were mentioned in passing.

Summary and conclusion

The Prosperkolleg workshop series "Sustainable Packaging in the Food Sector" showed that there are challenges, opportunities and plans for the production and use of sustainable packaging alternatives in food production and food packaging. Conflicts of objectives under sustainability aspects, consumer education, technically and economically feasible processes as well as evaluation indicators for alternative, more sustainable materials along the value chains concerned were discussed.

In order to be able to document and discuss a technical evaluation of packaging alternatives in a comprehensible way, a matrix with suitable indicators for the evaluation of several aspects of sustainability, in particular circular value creation, was developed. The evaluation matrix provides companies with recommendations for evaluating packaging made of alternative materials.

The development of the evaluation matrix in the context of the expert workshop series, its use and evaluation for sustainable food packaging was accompanied by the Prosperkolleg. Since the end of the workshop series, the project partner Effizienz-Agentur NRW has continued to develop the matrix in line with the practical requirements of the companies. Cooperation with interested companies is expressly desired.

We look forward to talking with you.

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Appendix

Verpackung A: Schale aus Plastik

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Informationen zu Produkt und Verpackung		Produkt (Artikelnummer)	Abbildung	
Schale aus Plastik		111		
Primärverpackung		Sekundärverpackung	Tertiärverpackung	
Plastikschale		Kartonage	Schutzfolie um Palette	
Bilanzgrenzen		Hauptmaterialien	Anzahl Nutzungszyklen	
Gate2Gate		Kunststoff Kunststoff	1	
Ansprechpersonen				
Ideengeber:in: Name				
Gutachter:in: Name				
Projektleiter:in: Name				
Kaufmännischer Kontakt: Name				
Bewertungsübersicht				
1. Produktschutz		2. Zirkularität		1,91
Transportschutz	3 - mittel	Recyclingfähigkeit	2 - schlecht	
Wiederverschließbarkeit	5 - sehr gut	Substitutionsquote	3 - mittel	
Barrierefähigkeit	5 - sehr gut	Rezyklatgehalt	2 - schlecht	
Migrationspotenzial	3 - mittel	Nachwachsende Rohstoffe	2 - schlecht	
Temperaturbeständigkeit	3 - mittel	Mehrweg	2 - schlecht	
Produktveränderungen	3 - mittel	Wahrscheinlichkeit der Wiederverwendung	2 - schlecht	
Hygieneschutz	3 - mittel	Trennbarkeit (Aktionsbedarf Konsument:in)	2 - schlecht	
Platz für eigene Indikatoren	3 - mittel	Wiederverwendungs-fähigkeit der ganzen Verpackur	3 - mittel	
		Kompostierfähigkeit	2 - schlecht	
		Biologisch abbaubar	1 - sehr schlecht	
		Platz für eigene Indikatoren	1 - sehr schlecht	
Gewichtung	essentiell	Gewichtung	wichtig	
3. Umwelt		4. Anlagenauslastung		0,00
Littering-Gefahr	4 - gut	Anlagenauslastung	3 - mittel	
Materialeinsatz (Menge)	3 - mittel	Ausschuss	3 - mittel	
Materialeinsatz (Art)	schlecht	interne Kreislaufführung	3 - mittel	
Energieverbrauch	3 - mittel	Betriebsstoffe	3 - mittel	
Wasserverbrauch	4 - gut	Platz für eigene Indikatoren	3 - mittel	
Land-use	5 - sehr gut			
Giftstoffgefahr für Umgebung	5 - sehr gut			
Restentleerbarkeit	5 - sehr gut			
Platz für eigene Indikatoren	1 - sehr schlecht			
Gewichtung	mäßig	Gewichtung	weniger wichtig	
5. Kommunikation		Nächste Schritte, Entscheidungsbedarf		Datum
Erklärungsbedarf/Bildung	3 - mittel	Ist die Zirkularität unterschiedlich genug?	14.07.2021	
Marketing	4 - gut	Bedarf es stärkerer Kommunikation?	30.07.2021	
Verbrauchsdatum/MHD	4 - gut	Mittleres Management informieren	15.09.2021	
Platz für eigene Indikatoren	1 - sehr schlecht			
Gewichtung	unwichtig			

Figure 2: Summary of the sustainability assessment of a packaging

Series

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