Sustainable Packaging

A Bibliography

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Environmental Information, Awareness, Capacity Building and Livelihood Programme
EIACP

Consumer Education and Research Centre
EIACP Resource Partner, Programme Centre
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CERC - EIACP Resource Partner on Environment Literacy:
Eco-labelling and Eco-friendly Products

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PREFACE

Packaging material contributes significantly to the world's trash problem. Plastic bags, plastic wrappings, plastic containers, styrofoam sheets and plastic bubble wrap are some of the materials that take more than 400 years to biodegrade which in turn pollutes our landscapes, waterways and oceans.

Packaging materials made of single use plastic products, non-recyclable materials and non-degradable materials etc cause excess harm to the environment. And so sustainable packaging has become a high priority now for both consumers and companies ever than before.

Environmentally-friendly packaging solutions are no longer completely optional. In many cases, government policies, consumer preferences, and corporate standards are demanding that businesses implement sustainable packaging practices to reduce their environmental impact. These environmental concerns are demanding the use of more eco-friendly packaging options. Sustainable packaging covers any type of eco-friendly material used to wrap, store, ship or shelve products. Sustainability is not just about using recycled materials. True sustainability is concerned with promoting an increased use of life-cycle inventory and life-cycle assessment as a way to reduce the environmental impact or the ecological footprint of the packaging that we choose. Scientists and Industries are working on sustainable design for product packaging which causes little to no harm to environment. Certifications and labeling can help us verify how source material was produced. Sustainability certifications offer a standardised way of measuring the sustainability performance of a products' packaging. These certifications are not only useful for tracking company's progress towards environmental goals—they can also be used to help potential customers recognize them as an eco-friendly brand.

Many institutes, research scientists, NGOs, international and national organizations have undertaken study to identify, measure, practice, implement, and evaluate whether these certifications are enhancing sustainability or not. Research articles focus on measuring and evaluating the impacts of these certifications on packaging sustainability through better ecological, social or economic processes. The main aim of these environmentally-friendly packaging solutions is to preserve the world's ecosystems, ensuring human life quality and viability in the long-term.

In order to fill the information gap on the subject of "Sustainable Packaging", CERC-EIACP Programme Centre Resource Partner has collected information from the secondary sources. It is bringing out in he form of an annotated bibliography. This bibliography will be useful as background information in research projects, as reference tools and information tools. It will make readers aware of recent research on the subject to facilitate the writing of reports or publications.

It will be a good collection for libraries. It will make librarians or information officers aware of existing material on the subject. It covers the research articles, peer reviewed research papers, general articles, Ph.D and Master thesis and books indexed from 2000 to 2022. We welcome comments and suggestions from users to enable us to improve.

2022

Plastic Labelling Needs 'Sustainability Scale' To Help Consumers
Martin Guttridge Hewitt

Environment journal, March 3rd 2022

The online article details the research of a team at the University of Exeter, University of Bath, and the University of Queensland. The researchers have has proposed the development of a new, internationally-applicable labelling system for plastics, which will focus on sustainability rather than recyclability. They want a 'drastic overhaul' in packaging to better inform the public of the true environmental costs of products. They believe current labels and packaging offer little help to consumers who want to make greener purchasing decisions, because the information lacks real detail. Factors like the process of production, and resulting environmental cost, and health risks of additives are notably absent, among others. Making people aware of how packaging fits with local and regional recycling infrastructure should also be considered. This is vital because the mix of plastic products is so complex and confusing, industry must be responsible for clear, accurate and accessible instructions on how best to dispose of plastic items. Requiring producers to list all additives would be a major step towards informing the public and helping them make decisions regarding environmental impact and human health.

Keywords: Plastic Package, Packaging, Packaging Waste, Plastic Packaging, Sustainable Packaging, Labeling, Package Labels, Plastic Pollution, Consumers

Improving Transparency of Pre-packaged Food Packaging and Labelling Laws, Regulations and Best Practices: Conference and Compendium

APEC Sub-Committee on Standards and Conformance
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616

Philippines: Bureau of Philippine Standards, APEC Project: SCSC 7 2019T, April 2022, 67p.

The compendium presents the results of the 2020 APEC Survey on Packaging and Labelling on Pre-packaged Food Products – an update to 2015 survey which incorporated new areas of interest such as latest trends and developments on packaging and labelling technologies on top of mapping out relevant laws and regulations on pre-packaged food products. It also contains the discussions and presentations made during the APEC Conference on Pre-packaged Food Packaging and Labelling that was held on 17-18 November 2021 with the objectives of (a) providing an interactive forum for economies to share their laws and regulations on packaging and labelling; (b) informing APEC economies about the international standards and international standardization activities relating to packaging and labelling; and (d) providing a platform

for economies to showcase the latest trends and developments on packaging and labeling technologies, including sustainable and eco-friendly packaging and labeling options (such as smart labels), for pre-packaged food.

Key words: Food Products, Green Packaging, Prepackaged food, Packaging, Sustainability, Consumer, Environment Friendly, Ecological Packaging, Labelling

Implementing environmental labelling of food products in France

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11. Université Paris-Saclay, INRAE, AgroParisTech, UMR SayFood, Massy, France

International Journal of Life Cycle Assessment, 16 June 2022, 7p.

ISSN: 09483349|16147502

Consumers increasingly demand information about the environmental impacts of their food. The French government is in the process of introducing environmental labelling for all food products. A scientific council was set up, and its main conclusions are presented in this article, through six questions: What environmental issues should be considered? What objective should be targeted? What data are needed, and for whom? What methods for assessing environmental impacts? Which environmental scores should be chosen? What label format should be proposed? By answering these questions and considering the context, the available data, the proposed methods and adjustments, and the knowledge of consumer perception of formats, the scientific council considers that a labelling scheme is feasible and relevant.

Keywords: Data, Environmental labeling, Food, Operationalization, Public policy, Packaging, Ecolabelling, Labelling, Consumers

Life Cycle of Sustainable Packaging: From Design to End-of-Life
Rafael A. Auras and Susan E. M. Selke
School of Packaging, Michigan State University
New York: Wiley, October 2022, 496p.

ISSN: 978-1-119-87810-0|978-1-119-87812-4

The book offers expansive coverage of every aspect of the packaging life cycle, from design to management and end of life. It is a holistic and integrated evaluation of packaging's environmental footprint. The authors show students and readers how to incorporate design and life cycle concepts into the development of sustainable packaging materials and help them understand critical background information about pollution and risk management. The text is enriched with case studies for each chapter to facilitate the understanding of each concept. They also provide readers with learning objectives and self-study questions for each chapter that help them retain and understand the ideas discussed in the book. The book is provided with a companion website which includes the solution manual and teacher materials.

Keywords: Labeling, Sustainability, Design, Sustainable Packaging, Packaging, Life Cycle Analysis, Environmental Footprint, Life Cycle

Shifting to Sustainable Packaging -High Reward Without High Risk
Bob Tilling
Food Engineering, October 4, 2022

The online article gives stress on the way sustainably and safely transition to new a packaging process which is the need for an extensive label and artwork management solution. The widespread pressure for organizations to adopt new sustainable processes is growing across all industries. With the increasing demand for more sustainable options, it's clear to see that this pressure is particularly consumer led. Up to 66% of consumers have placed environmental responsibility on businesses and have rewarded those that deliver sustainable options by buying more sustainably produced products. Large, multinational companies are now following suit by transitioning to sustainable packaging. An example of this is P&G, which has launched a line of sustainable cardboard boxes for its laundry products while phasing out plastic containers in response to the rising environmental pressures. Need of an integrated label and artwork management (LAM) solution is required which completely automates the process for updating label and artwork assets. It enhances the label and artwork process by integrating asset data and introducing automated batch updates to allow any business to safely transition to sustainable packaging. With LAM solutions presenting sleek processes to adjust to new requirements, organizations can freely choose their preferred sustainable packaging process, from a new range of materials to packaging rightsizing—while significantly minimizing the risk of inaccuracies in labeling and artwork.

Keywords: Label Technology, Labeling, Labeling Solutions, Sustainability, Sustainable Packaging, Sustainable Solutions, Plastic Packaging, Packaging

Tell me more and make me feel proud: the role of eco-labels and informational cues on consumers' food perceptions

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British Food Journal, Volume 124, Number 4, 2022, 1365-1382p.

ISSN: 0007-070X

The present research identifies the impact of food-related and packaging-related eco-labels on consumers' perceptions of food quality and safety when an ecological claim, which explains the eco-label meaning, is provided. The findings of research articles are when the ecological claim is absent, only food-related eco-labels were found to generate a higher food evaluation. However, when the ecological claim is present, both eco-label types (i.e. food-related and packaging-related) increased, food perceptions of quality and safety because of higher feelings of pride. From a theoretical perspective, this research identifies both food- and packaging-related eco-labels as extrinsic cues able to affect consumers' perception of food quality and safety. Moreover, the findings of this study present practical implications for package design and health policymaking.

Keywords: Food related ecolabels, Ecolabels, Packaging related ecolabels, Packaging, Food Evaluations, Ecological Claims, Pride, Sustainability

Eco-friendly packaging determination in the food industry

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IOP Conference Series: Earth and Environmental Science, Volume 998, 2022, 10p.

Plastic consumption continues to increase every year, which creates negative impacts on the environment. One type of plastic consumption which significantly contributes to the environment is food packaging. Other food packaging materials that more environmental friendly are available, however, the food industries still used non-eco-friendly packaging for their business. The focus of this research is to determine the main considerations of the food industry, which continues to use not eco-friendly packaging as food packaging and provide alternative solutions for the food industry to shift from non-eco-friendly packaging to a more environmental friendly packaging. This research implemented AHP method to identify factors for selecting food packaging, provided assessment model and determined solutions that could encourage the food industry to shift from non-eco-friendly packaging to eco-friendly packaging.

Keywords: Environment, Eco-Friendly Food Packaging, AHP, Assessment Model, Sustainability

Innovative Application Study Of Label-free Concept in Packaging Design

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Highlights in Art and Design, Volume 1, Number 3, 2022, 27-30p.

ISSN: 2957-8787

The lack of an objective evaluation system and monitoring system for product design has led to an endless stream of “formalism” in product engineering, exacerbating the current situation of excessive and disproportionate product design, and even creating an economic and social hazard. This paper focuses on the important role of the “label-free” concept in the design of beverage packaging products, based on three aspects: national environmental protection, product differentiation, and international market trends, while conducting experimental research through data collection and project studies. The aim is to solve the problem of resource waste and environmental pollution caused by beverage packaging through this new design trend.

Keywords: Label-free concept; Packaging Design, Packaging, Labelling, Eco-labelling, Sustainability

Seen as Green? Assessing the Salience and Greenness of Environmentally Friendly Packaging Cues

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Journal of Food Products Marketing, Volume 28, Issue 1, 2022, 31-48p.

ISSN: 1045-4446| 1540-4102

Environmentally friendly products become increasingly popular. To be considered for purchase, they must be (1) sufficiently salient and (2) perceived as environmentally friendly (“green”). The current paper investigates whether implicit (packaging material) and explicit (eco-labeling) packaging cues can facilitate such salience and greenness perceptions. We conducted a mixed-method, within-subjects experiment using self-report measures to assess perceived greenness, and mouse tracking as an exploratory measurement method to assess salience. Finally, we explored whether green consumerism, as a personal value, moderates these effects. Results confirm that both implicit and explicit cues that signalize environmental friendliness positively influence perceived salience and greenness. Furthermore, we find that implicit and explicit cues seem mostly independent in affecting salience and greenness

perceptions and that green consumerism is no prerequisite for most of these packaging effects to emerge. As such, this research provides important new theoretical and practical insights on the role of packaging in food marketing.

Keywords: Product Packaging, Eco-Labeling, Green Consumerism, Sustainability, Environmental Friendliness, Labelling, Packaging, Plastic

Consumers' knowledge, practices, and perceptions about conventional and sustainable food packaging

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Food Science and Technology, Volume 42, 2022, 8p.
ISSN: 0101-2061|1678-457X

The aim of the study is to evaluate consumers' knowledge, practices, and perceptions about conventional and sustainable food packaging. Cross-sectional, descriptive, and exploratory study conducted with consumers in Vitória city, Espírito Santo State, Brazil. A questionnaire was applied to 163 consumers. Regarding the sociodemographic characteristics of the participants, most of them were women, in the age group 18-24 years, did not live with a partner and had individual income. Consumers reported quality as the most important factor taken into consideration at food purchasing time and indicated that always observe the packaging conditions at purchasing time. Most consumers reported that packaging presents a fundamental role in their purchase decision, and they have mentioned also that material's type influences their decision to purchase a food product. In addition, consumers preferred biodegradable packaging rather than the traditional one, whereas most of them reported to be willing to pay up to 5% more for products if their packaging had lesser environmental impact. Therefore, it appears that consumers evaluate products' packaging at purchasing time, but lack of information about the material type used for packaging and about its environmental implications is a serious issue that avoids behavior's changes from taking place.

Keywords: Consumer Behavior, Food Packaging, Environment, Packaging, Ecofriendly, Consumer, Environment Friendly, Sustainability

2021

Life cycle assessment of plastic grocery bags and their alternatives in cities with confined waste management structure: A Singapore case study

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Journal of Cleaner Production, Volume 278, 1 January 2021, 123956

ISSN: 0959-6526

Plastic grocery bags are one of the most ubiquitous single-use packaging products. Recently, 'eco-friendly' options of plastic grocery bags have gained traction such as kraft paper, cotton, biodegradable, and reusable polypropylene non-woven bags. However, the impact of using various grocery bags in cities with dense population, well-developed infrastructure and thermal treatment as an end-of-life waste management option has been insufficiently documented. In this study, commonly found single-use (HDPE, biodegradable plastic, kraft paper) bags and reusable (cotton, polypropylene non-woven) bags were considered for the life cycle assessment (LCA). The usage characteristics (reusability, dimensions, carrying capacity) of bags, the production process (raw materials extraction, production processes), and emissions were determined as the significant factors contributing to the negative environmental impacts. In a model city with confined waste management, the assessment determined that the reusable polypropylene non-woven bag (PNB) caused the least overall negative environmental impacts when there are 50 instances of reuse, followed by single use HDPE plastic bag (HPB). The global warming potential (excluding biogenic carbon) was 14, 81, 17 and 16 times higher for HDPE plastic, kraft paper, cotton woven and biodegradable polymer bags, respectively, when compared to PNB. Moreover, kraft paper or cotton woven bags demonstrated the highest negative impacts for the impact categories including abiotic fossil depletion, freshwater-, marine- and terrestrial-ecotoxicities, human toxicity, acidification and eutrophication potentials. Further, sensitivity analysis indicated that the inflexion point for the PNB was minimum 4 reuses to avoid emission equivalent to the HPB. Singapore was adopted as the model city with confined waste management structure that imports most of the grocery bags, either as finished goods or as raw materials. Through comprehensive insights based on the new outlook of the integrated LCA model (cradle-to-grave) that included full-scale transportation component, the usage of the real case data from a city to develop the life cycle inventory, and consideration of the existing grocery bags options, the environmental assessment along with critical evaluation was conducted.

Keywords: Consumer Perception, Packaging Material, Reusability of Packaging, Consumer, Packaging, Environment Friendly, Ecolabel, Cradle-to-Grave, LCA model

Environmental labeling for packaging
CONAI
Via Tomacelli, 132
00186 - Roma

21 January 2021

The Guideline was born as a publication able to offer answers to interpretative doubts on the regulatory dictate regarding environmental labeling for packaging and direct its correct application. The e-tag online tool was designed to build an environmental label compliant with existing regulatory references. Among these, the indication to the consumer of the composition of the packaging material, of how to give it at the end of its life for a quality separate collection, and of other useful information to characterize the packaging from an environmental point of view (recyclability, compostability or the content of recycled material).

This online guideline (http://www.progettarericiclo.com/en/docs/environmental-labeling-packaging) is developed by CONAI. CONAI is a private non-profit consortium in Italy, the measure by which packaging producers and users ensure that they achieve the recycling and recovery target of packaging waste provided for by law. CONAI serves as an effective system for the recovery, recycling and valorisation of steel, aluminium, paper, wood, plastic, bioplastic and glass packaging materials.

Keywords: Environment, Food Packaging, Compostability, Environment Labelling, Sustainability, Labelling, Packaging

Impact of eco-labelling on the implementation of sustainable production and consumption
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Environmental Impact Assessment Review, Volume 86, January 2021, 106505, 13p.

ISSN: 0195-9255

Due to the increasingly adverse impact of mass manufacturing and consumption, developing foreground knowledge on product quality with a view to reducing the volume of resources used throughout the product life cycle has become an issue of paramount importance. In recent decades eco-labels have become a strategic means of communication for environment-friendly products. In the present article eco-labelling is assumed to play an important role in accomplishing both sustainable production and sustainable consumption. In this article authors assessed the contribution of eco-labelling to promoting sustainable production and consumption. To evaluate the impact of eco-labelling upon the implementation of sustainable production and consumption, authors used the Analytical Hierarchical Process (AHP) method. They proposed

strategies for improving environmental labeling, developed on the basis of the AHP method. The limited ecological awareness of both consumers and business representatives is the basic barrier impeding the proper use of environmental labeling, remains a key, unsolved problem. Overcoming this barrier will require conducting educational and information campaigns aimed at society as a whole, because only then will environmental labeling be able to perform its functions effectively.

Keywords: Sustainable production, Sustainable consumption, Eco-labelling, Sustainability, Packaging, Labelling

Unwrapping the Arguments … Solving packaging and food waste through government/industry collaboration

Martin Gooch, Claire Sand, Benjamin Dent, Peter Whitehead, Hon. Lyle Vanclief and Abdel Felfel
Value Chain Management,
International and Packaging Technology and Research
Ontario, Canada

May 18, 2021, 24p.

The primary focus of this article is plastic food packaging, it pertains to all types of packaging materials. The complexity of packaging and food value chains means that implementing “one-size-fitsall” hammer policies (such as the Canadian Environmental Protection Act) to increase the use of recyclable plastics will not reduce GHG emissions. Further, it will result in more challenges, more wasted resources, more negative environmental impacts, and higher costs than carefully designed systems-based approaches.

Achieving a significant long-term environmental impact that aligns with Canada’s and the US’s SDG and carbon reduction commitments relies on visionary stakeholders adopting economically viable and sustainable systems approaches. Negotiated agreements have proven an effective means to tackle complex system issues, including those which result in negative economic and environmental externalities. This paper proposes establishing a negotiated agreement between industry and government that sets out explicit packaging and FLW targets. Industry is accountable for meeting legally binding targets. Government is accountable for enabling and assisting industry to meet those targets. Achieving these outcomes will require industry and all levels of government to collaborate in innovative ways to achieve win-win solutions for all.

Keywords: Packaging, Sustainability, Eco-label, Ecolabel, Sustainability, Environment Friendly, Food Waste, SDG, Sustainable Development Goals

7 Sustainable Packaging Trends for 2021

Amanda Jerelyn

Packaging Digest, July 13, 2021
Sustainable packaging has been a priority for brand owners for more than a decade. The consumers’

increased awareness continues to drive the sustainable packaging mission of brand owners. Around 74% of consumers say they are willing to pay an additional amount for products in sustainable packaging. Recyclable packaging seems to matter most to consumers because recycling is something they can do to contribute. However, in many areas, the business of recycling is struggling. This may force brands to adopt other sustainable packaging options.

The present article describes the seven sustainable packaging trends which are popular in 2021. These are Refillable parent packaging, Bulk dispenser refilling, Returnable/reusable packaging, Antimicrobial packaging, Edible films, Bioplastics and Post-consumer recycled resin.

Keywords: Ecologically Sustainable Packaging, Food Products, Green Consumer Behavior, Bioplastic, Edible films, Sustainable Packaging, Sustainability, Labelling

What are the Different Types of Sustainable Food Packaging?

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High Speed Training, July 19, 2021

Packaging is an essential part of food manufacturing and should aim to represent the environmental values of a brand to a customer. It is important to understand the challenges involved in creating sustainable packaging instead of prioritising materials which have a perception or sensory experience of being sustainable. This article outlines what is meant by sustainable packaging and discusses the positive and negative environmental impacts of each type of food packaging material. It also explains how to avoid 'greenwashing' and how to reach a conclusion on which packaging materials should be used in business.

Keywords: Biodegradable Package, Compostable Package, Food Packaging, Food Packaging Waste, Plastic Packaging, Greenwashing, Sustainable Packaging

Should Your Brand Consider Sustainability in Labeling and Packaging?

CTM Admin
CTM Labeling Systems
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Salem, OH 44460

July 24, 2021

This blog narrates how Sustainability in packaging and labeling is not just good for the planet; it is also good for business. There are more ways to be sustainable than just using compostable packaging. Eco-friendly labels and packaging use less material, reduce purchasing and shipping costs, and when done right, can increase your sales while lowering your total cost per unit. Reduce, Reuse and Recycle are the factors that make packaging eco-friendly. Using less packaging waste reduces the weight and size of products, which means less energy is needed during shipping. Sourcing renewable packaging options reduces products' ecological footprint, because it minimizes environmental impact and emissions.

Recycled materials are reprocessed, low impact materials are used in place of traditional materials, and harvested materials are carefully managed. Paper and cardboard are well-developed, inexpensive, readily available, and have easy and convenient recyclability. There are several recycle–friendly label materials you can use to reduce your environmental impact.

Keywords: Environment, Food Packaging, Compostability, Environment Labelling, Sustainability, Labelling, Packaging, Ecological Footprint

Consumer perception: the role of eco-labels and innovative packaging
Lisa Zimmermann

Food Packaging Forum, September 27, 2021

This article reviews the study published in British Food Journal of 2021 August issue. Italian studies investigate consumer perception and attitude; find food- and packaging-related eco-labels to equally signal higher food quality and safety to consumers; demonstrate high willingness of consumers to buy active, intelligent, and sustainable packaging; survey in UK finds adding stickers with clear recycling messages increases recycling behavior. Results indicate that consumer interest in purchasing innovative packaging is generally high, with more than 200 of the 260 respondents expressing "high willingness." Concerning the type of innovative packaging, participants were more willing to buy sustainable packaging, such as those made of compostable materials, than intelligent packaging.

WRAP, a civil society organization based in the UK, ran a trial with Unilever and Boots testing whether adding a sticker with a recycling message increased consumers' recycling of the package. They found a 5% increase in recycling of bottles with a sticker than those without. According to the report, "labels which use a directive tone, essentially telling the citizen what to do, were preferred over advisory tone labels. This preference applied to on-pack food storage guidance as well as recycling information."

Keywords: Food related ecolabels, Ecolabels, Packaging related ecolabels, Packaging, Food Evaluations, Ecological Claims, Consumer, Sustainability, Recycling

Environmental Impact Labelling for Food Products: Assessment Report by the Scientific Council Overview
The Ministry for Ecological Transition, the Ministry for Food and Agriculture, the Ministry for the Economy, Finance and Recovery, and the French Agency for Ecological Transition (Ademe), France

October 2021, 22p.

The French Ministry for Ecological Transition and the French Agency for Ecological Transition (Ademe) have conducted a pilot programme to design and implement a scheme to implement environmental labelling for food products. The overall objective of the pilot programme was to draw up a proposal for an environmental labeling scheme backed and promoted by the national government.

The ultimate choice of an environmental labelling scheme for food products will not depend on scientific arguments alone, however, as solid scientific knowledge is lacking in some areas and subject to as yet unresolved controversy in other domains. And while many environmental impacts that enter into environmental labelling are grounded in solid science, other aspects are the object of democratic debate. For these reasons the scientific council could not propose a closed labelling system or legitimately choose between the different schemes proposed by various categories of stakeholders.
The council set itself the tasks of identifying feasible options, discussing their scientific merits, outlining conditions for their implementation and assessing possible impacts, in particular on consumer behaviour.

This work focused on six questions: What environmental issues should be taken into account? What objectives should be targeted? What data should be used, and how? What methods are to be preferred for evaluation of environmental impacts? What environmental scores should be selected for labels? What label formats should be proposed?

Keywords: Consumer Perceptions, Packaging Design, Food Waste, Packaging Information, Save Food Packaging, Packaging Innovation, Labelling

Sustainable food packaging and recycling in restaurants and cafes
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Bachelor's Thesis, Degree Programme Energy and Environmental Engineering, December 2021, 26p.

Nowadays the restaurant industry is developing quite rapidly. Especially now when we are facing the COVID19 pandemic, take-away seems like the only option for restaurants to sell food, and customers are more concerned about the environment and how take-away packaging influences it. Currently many restaurants

are aiming to create more environmentally friendly packaging to replace plastic containers and attract more customers. The purpose of the thesis is to analyse and provide information about recycling and packaging ways in Finnish restaurants of different cuisines. The study was conducted by analysing two ways of leading restaurant business as well as comparing take-away packaging techniques and customer behavior towards it. Also, various articles and publications on sustainable and environmentally friendly packaging were reviewed and used for the thesis. The results of the study are presented in the thesis work and represent the comparison of two restaurants and their packaging techniques as well as improvements for businesses. And finally, it presents a good image to consumers and aims to raise their awareness of sustainability which is beneficial not only for the restaurants but also the world.

Keywords: Sustainability, Packaging, Recycling, Waste Management, Ecofriendly Packaging, Food Packaging

Impact of Sustainable Food Labels and Packaging on Consumer Purchase Intention: A Study on Millenials
Priyansha Shami and L, Fukey

SPAST Abstracts, Volume 1, Number 01, 2021
This paper aims to highlight important factors relating to sustainable food attributes like their packaging and labels and its impact on consumer attitude and on purchase intention. Young consumers represent a powerful segment of consumers in the development of eco-friendly conscious population, and also a promising market for green products. Therefore, more firms are targeting this section of population. There is a need to develop environmental education marketing programs and strategic marketing campaigns in order to increase the awareness on eco -friendly products of young consumer segment. (Ahmed et al, 2020)

The evolution of human behaviour as led to its concern for environment. Therefore, more and more consumers especially the young people are moving towards consuming sustainable foods. But in almost all previous researches focused on consumer attitude towards buying green food products have highlighted that quality, trust and safety of sustainable foods is still a major barrier. Lack of awareness of ecolabels, inability to differentiate between green and non-green foods and issues relating to their authenticity has led to low demand of these products and high prices has resulted in dissatisfaction among people, (Paul and Rana, 2017). The high prices of green products as manufacturing cost is relatively high of producing sustainable products has resulted in low demand for green products and is a prime reason as why green foods are still a niche market in India. Increase in demand for green products especially the food items is not only needed to maintain good health but is also the needed to save the environment from further degradation particularly the soil and water.

Therefore, this research is focused on qualitative, in-depth analysis of issues relating to typology of sustainable food labels in India and the kind of impact it has on the attitudes of millennials. Also, what are the features of packaging of sustainable food products that communicate product attributes better other than them being just organic and lastly, to assess consumer awareness regarding different kinds of ecolabels and their understanding of how ecolabels are different from other types of labels.

The methodology adopted for this research would be qualitative and data will be collected from the participants through closed ended questionnaires.
This study aims to bring more clarity to what are the problems that young consumers face in reading and

interpreting the green food labels and will also try to understand their trust and quality issues associated with consuming green foods on a daily basis.

Keywords: Ecofriendly, Environmental labeling, Food, Operationalization, Public policy, Packaging, Ecolabelling, Labelling, Consumers, Green food Label

Communicating returnable packaging via ease of use labeling

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The International Review of Retail, Distribution and Consumer Research, Volume 31, Issue 4, 2021

ISSN: 1466-4402

Product labeling strategies are integral to effectively communicating returnable packaging campaigns to consumers. As sustainability initiatives have grown in importance, retailers have become more sensitive to the issues of excess packaging waste. This research presents two experimental studies. Study 1 demonstrates that messages pertaining to ease of use for consumers to return products were more effective than other alternatives, such as rewards, social modelling, and control. Study 2 shows that ease of use messages were more effective than justification-based messages when individuals were primed to be more self-enhancing, but not when they were primed to be more self-transcendent. Overall, this research shows that targeting self-enhancing values via ease of use messaging improves the likelihood of intended consumer participation in returnable packaging programs.

Keywords: Returnable Packaging, Labeling, Sustainability, Environment, Packaging, Ecolabel

The Effects of Environmental Sustainability Labels on Selection, Purchase, and Consumption of Food and Drink Products: A Systematic Review

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Environment and Behavior, Volume 53, Issue 8, 2021
ISSN: 0013-9165|1552-390X

This review assessed the effects of environmental labels on consumers' demand for more sustainable food products. Six electronic databases were searched for experimental studies of ecolabels and food choices. We followed standard Cochrane methods and results were synthesized using vote counting. Fifty-six studies (N = 42,768 participants, 76 interventions) were included. Outcomes comprised selection (n = 14), purchase

(n = 40) and consumption (n = 2). The ecolabel was presented as text (n = 36), logo (n = 13) or combination (n = 27). Message types included: organic (n = 25), environmentally sustainable (n = 27), greenhouse gas emissions (n = 17), and assorted "other" message types (n = 7). Ecolabels were tested in actual (n = 15) and hypothetical (n = 41) environments. Thirty-nine studies received an unclear or high RoB rating. Sixty comparisons favored the intervention and 16 favored control. Ecolabeling with a variety of messages and formats was associated with the selection and purchase of more sustainable food products.

Keywords: Systematic Review, Ecolabels, Food, Demand, Packaging, Food

The Good, the Bad, and the Ugly: Food Packaging and Consumers

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Sustainability, Volume 13, Issue 22, 2021, 1240

ISSN: 2071-1050

Food waste is a significant environmental, economic, and social issue. In many cases, packaging protects food and prolongs its shelf life, reducing the overall environmental impact by reducing food waste. This research focuses on consumer perceptions of the role of packaging and on-pack labelling in reducing household food waste. The following research questions provided the framework for the study: (1) could packaging play a role in decreasing food waste; (2) what are labelling and packaging designs' impacts on consumer decision-making about food waste? This research draws on two qualitative studies. Study One focuses on journey mapping—following food waste throughout the consumer's engagement with food 'journey' from planning to disposal. Study Two comprises a series of in-depth interviews in consumers' homes focusing on how consumers engage with food packaging and food waste. Results indicate that there are at least two streams of consumer perceptions to consider when determining the relationship between food packaging and reducing food waste: the first is how practically useful packaging is for consumer needs; the second is consumers' perceptions about food packaging itself. There are tensions and trade-offs between these two sets of considerations. The results of the studies show consumers are unlikely to consider food packaging or reducing food waste as a primary motivation in their food purchasing decisions. The studies also show reducing packaging, including plastic packaging, is seen as more important than reducing food waste. Our results also highlight important elements to consider when designing food packaging. These results suggest that a fundamental review is needed for many aspects of packaging and storage information and that this review should account for consumers' information needs at different points: purchase, storage, during consumption, and betweeninstances of consumption. Furthermore, our results suggest packaging designs that provide clear information and instructions for consumers to reduce food waste are needed.

Keywords: Consumer Perceptions, Packaging Design, Food Waste, Packaging Information, Save Food Packaging, Date Labelling, Packaging Innovation, Labelling

Sustainable packaging: an evaluation of crates for food through a life cycle approach

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The International Journal of Life Cycle Assessment, Volume 26, 2021, 753-766p

ISSN: 0948-3349|1614-7502

The packaging system plays an essential role in the logistic chain and takes into account the rise in packaging demand and consumption. A study on sustainability was carried out through a comparative life cycle assessment in order to quantify and compare the environmental impacts of plastic, corrugated board and wood (solid, MDF and particleboard) crates used for food delivery. Single-use and multi-use systems were considered and compared.

The most relevant impacts are linked to transport, electricity and raw materials contributions. Cumulative energy demand results show that the renewable energy resources in the case of plastic crates are about 3% while for the other type of crates exceed the 30% reaching the 77.5% in the case of solid wood crate. The environmental impacts result lower for multi-use plastic crate due to its possibility of being reused during its lifetime, avoiding the high impacts of the manufacturing. The best option among the single-use systems is the solid wood crate. The final results of the sensitivity analysis applied to the transport distances show that the impacts related to solid wood are more stable than plastic. Concerning the end-of-life scenarios, a significant decreasing (around 14.7%) in the global warming potential can be reached increasing the crates recycling till 100%.

The best crate materials are plastic crates if a recovery system is planned; otherwise, the best choice is the wood crate. It is preferable to use raw material, such as solid wood than processed material, such as particle board, MDF and corrugated board. In performing this type of analysis, it is important to have accurate data, preferentially primary data, in particular for plastic crates as evidenced by the sensitivity analysis.

Keywords: Crates, Food packaging, Life cycle, Sustainability, Wood Crate, Packaging

Discussion on the Design and Performance of the Whole Packaging Box of Environmentally Friendly Packaging Materials

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Advances in Materials Science and Engineering, Volume 2021, Article ID 4779965, 13p.

ISSN: 1687-8434|1687-8442

More and more designers and companies in the packaging industry begin to pay attention to research on environmentally friendly packaging design. From studying the additional functions of packaging to starting to study the environmentally friendly materials of packaging, as well as the “zero-pollution” packaging advocated today, the traditional form and mode of packaging has changed. This article aims to study the design of the overall packaging box of environmentally friendly packaging materials and discuss its performance. In this paper, the platform construction method and the modulus definition classification method are used to calculate the positive axis stiffness of the single-layer board. The effect of coating process on the wear resistance of paper-based materials was studied, the wear resistance of box board base paper and coated box board under different temperatures and different humidity conditions was compared, and the optimal design variable value range was set. The experimental results show that after the first level of optimization, the overall mass of the structure is reduced from the initial 39.42 kg to 31.18 kg and the optimization efficiency is 20.90%; the maximum relative deformation of the flap structure has increased from 0.143 mm to 0.198 mm, despite having the maximum tension. The opening displacement has increased, but it still meets the sealing deformation requirements. The design and performance discussion of the overall packaging box of environmentally friendly packaging materials have been completed relatively well.

Keywords: Consumer Perception, Packaging Material, Reusability of Packaging, Recyclability of Packaging, Consumer, Packaging, Environment Friendly, Ecolabel

Sustainable Paper-Based Packaging: A Consumer’s Perspective

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Foods, Volume 10, 1035, 2021, 19p.

ISSN: 2304-8158

Over the last two decades, there has been growing interest from all stakeholders (government, manufacturers, and consumers) to make packaging more sustainable. Paper is considered one of the most environmentally friendly materials available. A qualitative study investigating consumers’ expectations and opinions of sustainable paper-based packaging materials was conducted where 60 participants took part in focus group sessions organized in two stages. In the first stage, participants expressed their opinions about currently available packages in the market and their expectations about a sustainable packaging material. In the second stage of the study, they evaluated five paper-based prototype packages for two product categories (biscuits and meat). Too much plastic and over-packaging were the key issues raised for current packages. Price and quality were the main driving forces for consumers’ purchase intent. While participants were impressed by the sustainable nature of the prototypes, the design did not necessarily meet their expectations, and they were not willing to pay more for a sustainable package. The key message that emerged from the discussions was the “3Rs”—Reduce, Reuse, and Recycle”—which should be the main points to consider when designing a sustainable packaging

Keywords: Paper-Based Packaging; Consumers, Focus Groups, Sustainability, Environmentally Friendly, Packaging, Ecofriendly, Sustainability

Food packaging and sustainability – Consumer perception vs. correlated scientific facts: A Review

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Journal of cleaner production, Volume 298 2021, 126733p.

ISSN: 0959-6526

Food packaging maintains the food safety and ensures the quality of food throughout the supply chain. Both are achieved by the protective function of the packaging against negative ambient influences such as mechanical damage, light or water vapour. Material, form and concepts of packaging vary widely, which thus also differentiates the environmental impact for packaging.This paper provides an overview of the current research of European consumer perception and how this correlates with the environmental impact of loose foodstuffs and packaged food. Considered materials are plastic, glass, metal, and paper/cardboard. These perceptions are compared to the objective environmentally friendliness based on the selected assessment criteria carbon footprint, recycling rate, reuse rate and biological degradation/decomposition in Europe. The purpose of this paper is to discover whether there is any link between the consumer perception and the scientific assessed environmental sustainability. Consumers judge packaging material by criteria of circular economy, natural looking material, and design. The environmental impact of paper/cardboard and metal are rated in line with the scientific measure by consumers, whereas plastic packaging is underestimated and glass and biodegradable plastic packaging are highly overestimated. These results indicate that the rating of European consumers and scientific life cycle assessments turn out differently. The differences are mainly linked by theoretical concepts of recyclability, biodegradability, and reuse rate of the packaging. Consumers evaluate food packaging by affective feelings than using cognitive reasoning. Their knowledge about the practical implementation of recyclability, biodegradability and reusability as well as additional environmental impact factors are low. Consequently, consumers' buying behaviour is in most cases less environmentally sustainable than intended. Awareness trainings based on scientific facts, clear product and packaging information based on labelling schemes ("eco-labelling") and nudging for sustainable behaviour can potentially support consumers in their sustainable buying behaviour.

Keywords: Biodegradability, Biodegradation, Carbon Footprint, Cardboard, Circular Economy, Cognition, Consumer Attitudes, Environmental Impact, Food Safety, Glass, Mechanical Damage, Paper, Supply Chain, Water Vapor, Europe, Ecolabel, Labelling, Packaging, Sustaiability

2020

The drive toward sustainability in packaging—beyond the quick wins
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Paper, Forest Products & Packaging, January 30, 2020

This article is written by partners of the Mckinsey and presents the approach of the company towards sustainable packaging. Sustainability—particularly regulatory and public concerns around single-use packaging waste—is combining with other powerful trends1 to drive major changes in consumer packaging. Regulators are moving on the issue, and Fast-Moving Consumer Goods (FMCG) companies and retailers are proactively making bold commitments to improve both the sustainability of their packaging and to fundamentally rethink their packaging systems. Today, it is upstream substrate producers that appear to be taking the innovation lead in sustainable packaging. These players are working on top-priority areas that can also offer high recyclability, or incorporate recycled content.
To target opportunities in sustainable packaging converters should strategically best position themselves to support FMCG companies and retailers on sustainable packaging. It is suggested there should be "System-level changes." Some examples of these kinds of changes include improving existing recycling infrastructure, recycling technologies, and circular value chains, alongside initiatives to increase consumer awareness and drive community support for behavioral change around recycling.

Keywords: Sustainability, Consumer Awareness, Public policy, Packaging, Recycling, Labelling, Consumers, FMCG

Sustainable Packaging – The Imminent Leap Towards Sustainability

FutureBridge, April 16, 2020

This article is published in FutureBridge where author discusses about five major functions of an ideal packaging. Packaging plays a significant role in food and non-food product categories as it provides protection to the goods stored in it. It also serves as a marketing material that attracts consumer's attention and acts as a communication instrument between businesses and end consumers, thus promoting the product.

The five major functions of packaging are Protection, Identification, Communication, Convenience and Marketing. It details how these functions play a role. Article also highlights the importance of materials currently used in packaging and sustainable packaging. It discusses criteria to achieve sustainable

packaging, its benefits and actions led by government, businesses. Now many organizations are seeking professional help in identifying various options available for them to move away from the current plastic dominated packaging to more eco-friendly packaging materials. With the increasing awareness regarding the damage caused by plastics, consumers are preferring products having eco-friendly packaging materials. Packaging material providers and product companies should take immediate steps toward sustainable packaging or they might be left behind by their competitors.

Keywords: Food Products, Green Packaging, Sustainable Packaging, Packaging, Sustainability, Consumer, Environment Friendly, Ecological Packaging, Labelling, Non Food Products

Food Packaging's Contribution to a Polluted Environment

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350 Victoria St, Toronto, ON M5B 2K3, Canada

Thesis, November 23rd, 2020,30p.

This thesis studies the effects of food packaging on climate change and how the incorrect disposal of packaging pollutes the environment. Through this paper, the reader will be able to understand the different factors which result in consumers' decision making to disregard packaging labels. It will also discuss the concept of greenwashing and why many businesses take advantage of the term "biodegradable", in order to present their products as eco-friendly. Through the use of primary and secondary research, and by connecting with consumers, this paper will help understand how their daily lifestyles alter their decisions on food packaging disposal. After analyzing the non-existing consequences towards incorrect food packaging disposal, the use of unrecyclable and misleading substrates and the lack of involvement from businesses in regards to the education of consumers on their products, this paper will discuss how the packaging industry is contributing to the pollution affecting our environment and what steps should be taken to prevent this from occurring.

Keywords: Label, Green Washing, Packaging Design, Packaging, Labelling, Eco-labelling, Sustainability, Eco-friendly, Biodegradable, Labels

Food Packaging's Contribution to a Polluted Environment

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Ph. D Thesis, November, 2020, 30p.

This thesis studies the effects of food packaging on climate change and how the incorrect disposal of packaging pollutes the environment. Through this paper, the reader will be able to understand the different factors which result in consumers' decision making to disregard packaging labels. It will also discuss the concept of greenwashing and why many businesses take advantage of the term "biodegradable", in order to present their products as eco-friendly. Through the use of primary and secondary research, and by connecting with consumers, this paper will help understand how their daily lifestyles alter their decisions on food packaging disposal. After analyzing the non-existing consequences towards incorrect food packaging disposal, the use of unrecyclable and misleading substrates and the lack of involvement from businesses in regards to the education of consumers on their products, this paper will discuss how the packaging industry is contributing to the pollution affecting our environment and what steps should be taken to prevent this from occurring.

Keywords: Ecolabels, Greenwashing, Packaging related ecolabels, Packaging, Biogradable, Ecological Claims, Consumer, Sustainability, Recycling

A Study on Consumer Perception and Importance to Selecting Ecofriendly Packages

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International Journal of Creative Research Thoughts, Volume 8, Issue 12, December 2020, 9p.

ISSN: 2320-2882

Consumers are changing their perceptions towards the products preferring environment friendly products because there is a growing awareness to protect the environment. Today, consumers are more concerned about environmental changes and their purchasing behavior has changed in this regard. Concern for the environment in buying patterns of consumers who prefer products that support the environment with a growing trend are visible. The aim of the current study is to identify the consumer perception and importance to selecting an eco-friendly package. The present research is applied regarding the aim, and in terms method of data collection is an empirical survey. Using a sample of 60 consumers of selected and studied. Then the required information was gathered using a questionnaire. The results show that the consumer's environment-friendly perception has a positive and significant effect on his sensitivity to recyclability of product packaging. The findings also indicate that consumer sensitivity have positive and significant effect on consumer perception and importance of reusability of product packaging.

Keywords: Consumer Perception, Packaging Material, Reusability of Packaging, Sensitivity to Recyclability of Packaging, Consumer, Packaging, Environment Friendly, Ecolabel

Labelling for packaging - Guidelines according to Article 219 paragraph 5 of Legislative Decree 152/2006
Ministry for Environment, Land and Sea Protection, Italy

27/07/2022, 48p.

Italy has changed in September (2020) its environmental regulation which had a direct impact on the marking of product packaging, including cosmetic products. According to the new Italian Legislative Decree (nº 116, of 3 September 2020), all products must have the "environmental labelling" on its packaging.

This report presents the Italian Legislative Decree nº152 of April 2006 which has been amended by the Legislative Decree nº 116 of 3 September 2020. This Decree has presented new requirements concerning disposal information that must be reported on the labelling of products (including cosmetic and personal care products, medical devices and food supplements). These obligations apply to packaging material suppliers, but companies must guarantee compliance before making their product available. The Legislative Decree nº 116 (article 219, paragraph 5) states "all packaging must be appropriately labelled according to the procedures established by the applicable UNI technical standards and in compliance with the decisions adopted by the Commission of the European Union, to facilitate the collection, reuse, recovery and recycling of packaging, as well as to provide consumers with the correct information on their final destinations". The Decree also refers that all producers have "the obligation to indicate, for the purposes of identification and classification of the packaging, the nature of the packaging's material used, on the basis of Commission Decision 97/129/EC".

In sum, this means that it is mandatory to be indicated clearly on the labelling the following information: the nature of the packaging materials used as well as indications concerning the separate collection, reuse, recovery and recycling and correct information to consumers on the final destination of packaging.

Keywords: Labeling, Sustainability, Labelling, Sustainable Packaging, Packaging, Ecolabel, European Union

Assessing Young Consumers' Responses to Sustainable Labels: Insights from a Factorial Experiment in Italy
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Sustainability, Volume 12, 10115, 2020, 23p.

ISSN: 2071-1050

This study provides insights into young consumers' responses to sustainable labels. Drawing on signaling theory, the article studies how third-party labels (TPLs) act and interact with company-level claims,

trying to better understand their impact on young consumers' perceptions and willingness to buy (pay for) a chocolate bar. A between-subjects factorial experiment—conducted by manipulating third-party sustainable labels (presence/absence of the labels) and self-declared claims (absence of the claim, formal claim, and friendly claim)—was used to test: (a) the effect of TPLs and self-declared claims on consumers' perceptions, purchase intention, and willingness to pay, (b) whether this effect was mediated through the perceived credibility of the sustainability message, and (c) what kind of tone-of-voice adopted in the company's claim was more effective. Data were collected via an online survey among a sample of 315 consumers (age range: 18–39 years) in South Italy.

Authors found that third-party labels, "alone" were not effective in influencing consumers' perceptions and willingness to buy/pay, while a self-declared claim, especially if characterized by a formal tone of voice, had a much more relevant impact. The combination of TPLs and self-declaration affected most consumers' willingness to pay when the copy claim was informal. The perceived credibility of the sustainability message mediated the relationships between self-declared claims and the majority of the dependent variables, while, with reference to the relationship between TPLs and dependent variables, it did not act as a mediator.

Keywords: Labeling, Sustainability, Experimental Design, Young Consumers, Willingness To Pay, Chocolate Bar, Packaging, Ecolabel

"Can I Recycle This?: A Global Mapping and Assessment of Standards, Labels and Claims on Plastic Packaging

United Nations Environment Programme1 and Consumers International 2
1. Economy Division, Resources and Markets Branch Consumption and Production Unit, 1 rue Miollis, Building VII, 75015 Paris, France
2. 24 Highbury Crescent, N5 1RX London, United Kingdom

France: UNEP, 2020, 75p.
The report was developed through a collaborative effort led by Consumers International and the United Nations Environment Programme. It contributes to the One Planet Network-Wide Plastics Initiative.
This publication is an output of the Consumer Information Programme of the One Planet network. The One Planet network is the network of the 10 Year Framework of Programmes on Sustainable Consumption and Production.

To assess and understand the effectiveness of plastic packaging consumer communications on sustainability, this report aims to: (1) provide a global mapping of standards and on-package labels and claims related to plastic packaging, (2) create a framework to categorise labels and claims by type, focus, geography, and other relevant characteristics, (3) assess how well the on-package labels and claims align with the Guidelines for Providing Product Sustainability Information (UN Environment and ITC 2017), and (4) identify opportunities to use standards, labels and claims to more effectively tackle plastic pollution.

A global assessment of recycling and sustainability labelling on plastic packaging claims to have found that only 17% of assessed labels give consumers quality information to make informed recycling and purchasing decisions.

The research reportedly found that 20% of the 30 worldwide labels assessed were given a negative score by consulted experts. 17% were positive, with the rest receiving mixed or neutral results.

The findings of the report highlight that work is needed to improve both the definitions used in labels and claims on plastic packaging, and the standards that underpin them, as well as the design of consumer communications. Greater consistency is needed for terms that communicate information about content or reusability intended to influence purchase decisions. Terms that provide information on options for end of life disposal should be more attentive to real-life conditions, accessibility, and consumer understanding.

Keywords: Plastic Package Packaging, Packaging Labels, Packaging Waste, Plastic Packaging, Sustainable Packaging, Labeling, Package Labels, Plastic Pollution

Sustainable Food Packaging: Materials and Waste Management Solutions

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Journal of Environmental Research, Engineering and Management, Volume 76, Number 3, 2020
154–164p.

ISSN: 1392-1649 | 2029-2139

The current food packaging model in most cases is a linear material flow model and is far from the sustainable alternative – circular economy – approach where materials are recycled and recovered at the end of each service life. High concern is rising on packaging waste and especially plastic packaging and negative environmental impact. A number of factors, including policy and legislative changes, rising concerns on food and packaging waste, environmental contamination, and world demand for food and energy resources, undoubtedly make an impact on development of biodegradable and compostable packaging made from renewable environment friendly resources and a sustainable waste management opportunity at the end of product life. Food packaging industry already has options of compostable packaging that meets biodegradation and composting standards and does not impact environmental contamination, but a variety of existing bio-labels such as bio-based, biodegradable, and compostable appear misleading for consumers, and terms biodegradable and compostable are often used as synonyms, although they are not the same.

Keywords: Biodegradable Package, Compostable Package, Food Packaging, Food Packaging Waste, Plastic Packaging

Green Packaging Market Size, Share & Trends Analysis Report By Packaging Type (Recycled, Reusable, Degradable), By Application (Food & Beverages, Healthcare), By Region, And Segment Forecasts, 2020 – 2028: Market Report analysis

Report ID: GVR-1-68038-052-1, 139p.

The global green packaging market size was valued at USD 274.15 billion in 2020 and is expected to grow at a compound annual growth rate (CAGR) of 6.1% from 2020 to 2028. Growing consumer awareness regarding sustainable packaging, together with the strict bans regarding the usage of single-use plastics, are expected to fuel the industry growth. The industry is anticipated to grow at a steady rate owing to the growing food and beverage industry that is increasingly adopting packaging made from degradable and recyclable materials. The foodservice industry is replacing single-use plastic straws, lids, closures, caps, cups, and food trays with products made from paper or compostable alternatives. The product demand in the foodservice industry will continue to grow on account of changing consumer preferences towards convenience and packaged foods. This report forecasts revenue growth at global, regional, and country levels and provides an analysis of the latest industry trends in each of the sub-segments from 2017 to 2028.

Keywords: Food Products, Green Packaging, Prepackaged food, Packaging, Sustainability, Consumer, Environment Friendly, Ecological Packaging, Labelling

Sustainable packaging as a tool for global sustainable development

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SHS Web of Conferences 74, 04012, 2020, 8p.
Globalization and its Socio-Economic Consequences 2019

In various areas of human activity more attention is paid to environmental and ecological problems and also social issues. International enterprises take into account these criteria in management and strive to reduce the degradative impact and negative effects of their activities. These activities include the global concepts of sustainable development, circular economy and social responsibility. These concepts are also increasingly taken into account by companies from the packaging industry. For this reason, more often we hear about the so-called “sustainable packaging”, which is a consequence of the above actions and brings new opportunities in the environmental, economic, ethical and social aspects. The aim of the article was to characterize sustainable packaging. Based on the literature, sustainable packaging was defined, at the same time indicating that although this definition shows how to improve the packaging present on the global market, it should also be constantly improved and adapted to the changing market, society or environment requirements, as well as the state and development of the packaging industry. Examples of companies’ around the world activities in the field of creating sustainable packaging were also presented.

Keywords: Sustainable Packaging, Food Packaging, Environment, Packaging, Ecofriendly, Consumer, Environment Friendly, Sustainability

Consumers' Response to Environmentally-friendly Food Packaging: A Systematic Review

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ISSN: 0959-6526

Consumers play an important role in the market penetration of environmentally-friendly food packaging because it is they who decide whether or not to buy a particular product. The objective of this paper is to analyse the state of the art regarding consumers' response to environmentally friendly food packaging in order to identify existing barriers to purchase and potential measures to overcome these barriers. The paper is based on a systematic synthesis of 46 scientific journal articles on consumer studies related to environmentally-friendly packaging. The literature review applies a conceptual framework regarding the ways consumers respond to product stimuli and the psychological processes involved. Three important barriers to purchasing environmentally-friendly packaging are identified. First, consumers need guidance in recognizing environmentally-friendly packaging; for while consumers primarily consider the packaging material itself and any eco-labels, they also consider other packaging design elements such as colours and pictures of 'nature' that can be misleading. Second, it became obvious that consumers lack knowledge, in particular about new packaging materials like bio-based packaging. Third, many of the studies reviewed provide evidence that other product attributes such as price and product quality are more important to consumers than environmentally-friendly packaging. Nevertheless, some studies recorded a significantly higher willingness on the part of consumers to buy and pay for environmentally-friendly packaging and products with reduced packaging compared to products with standard packaging, signalling an overall positive attitude. The literature review revealed many research gaps. For example, it became obvious that consumers' response to environmentally-friendly food packaging is not yet well understood, in particular with regards to purchasing behaviour (in the real world as opposed to in a survey setting) and measures for overcoming existing barriers.

Keywords: Packaging, Consumer, Food, Sustainable, Environmentally-Friendly, Green, Sustainability, Eco friendly

Development of A Holistic Framework for the Key Packaging Elements of Agri-Food Products

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In this paper, a holistic methodological framework is developed aimed at the design and production of effective packaging that satisfies the needs of the modern market. Marketing and logistics managers, food technologists and social responsibility executives acknowledge the importance of a holistic approach to marketing and strive to consolidate their perception of such an approach and what it entails for packaging. Food producers can take account of these efforts and utilize those elements which emerge as being appreciated by all of the constituents cited above. To this end, primary research data was collected using a questionnaire that was completed by managers in the relevant business units of companies operating in the prepackaged agri-foodstuffs market in Greece, a major and competitive market.

Keywords: Packaging, Holistic Marketing/Logistics approach, Food industry, Environmental Friendly Practices, Eco friendly, Labelling, Sustainability

2019

Designing for Packaging Sustainability. The Effects of Appearance and a Better Eco-Label on Consumers' Evaluations and Choice
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Proceedings of the Design Society: International Conference on Engineering Design, Delft, The Netherlands, Volume 1, Issue 1, 26 July 2019, 3251-3260p.

The environmental burden of packaging is huge. However, redesigning packaging to make it more sustainable without damaging its other functions is not always easy and can have a negative impact on consumers' choice. In this paper, we adopt a user-perspective and test the effects of packaging appearance and a better eco-label on consumers' responses. Based on the literature, we designed an eco- label using a traffic light system with an objective sustainability score enabling to compare the sustainability of different packages. The results of our experimental study (N=120) show that while a sustainable (vs. typical) appearance in packaging has a positive effect on perceived sustainability, it has a negative effect on perceived usability. However, we demonstrate that the presence of a high score on the eco-label positively impacts the perceived sustainability of both the sustainable and the typical packages and the choice intentions. This eco-label also enabled to mitigate the negative effects of the sustainable appearance on perceived usability. Designers and policy-makers can use the results of this paper to positively influence evaluations of and choice for sustainable packaging.

Keywords: Packaging, Sustainability, Eco-label, Ecodesign, Communication, Ecolabel, Sustainability, Environment Friendly

The Food Print of Food Packaging
FoodPrint

25 November 2019, 30p.

Single-use food packaging is taking a huge toll on our environment. As our landfills and waterways are increasingly clogged with plastic bags, Styrofoam food containers, disposable coffee cups and more, it's clear that the convenience of food packaging is outweighed by the waste and pollution that the packaging leaves behind. Something less widely understood is that this same food packaging, from the additives like phthalates which give plastics their pliability or perfluorinated chemicals that allow cardboard to contain liquids, all the way to the bisphenol linings that coat our aluminum cans, much of our food packaging is extremely dangerous to our health.

The Safer Materials in Food Packaging report discusses the needs for innovation in food packaging and showcases innovative companies and potential solutions to the sector's health and environmental challenges. This report is written by FoodPrint and based on a March, 2019 report, Safer Materials in Food

Packaging, by Safer Made and commissioned by Forsythia Foundation.
Keywords: Consumer Perceptions, Packaging Design, Food Waste, Packaging Information, Save Food Packaging, Packaging, Labelling

The environmental impact of packaging in food supply chains—does life cycle assessment of food provide the full picture?

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The article presents a review of 32 food LCAs published in peer-reviewed scientific journals over the last decade. The steps of the food product's life cycle that contribute to the direct and indirect environmental impacts of packaging provide the overall structure of the analytical framework used for the review. Three aspects in the selected food LCAs were analysed: (1) the defined scope of the LCAs, (2) the sensitivity and/or scenario analyses and (3) the conclusions and recommendations.

Authors conclude that the indirect environmental impact of packaging is insufficiently considered in current food LCA practice. Based on these results, this article calls for a more systematic consideration of the indirect environmental impact of packaging in future food LCAs. In addition, it identifies a need for more packaging research that can provide the empirical data that many food LCA practitioners currently lack. In particular, LCA practitioners would benefit if there were more knowledge and data available about the influence of certain packaging characteristics (e.g. shape, weight and type of material) on consumer behaviour.

Keywords: Food, Food supply chain, Food waste, Life cycle assessment, Packaging, Review, Sustainability

EnvPack an LCA-based tool for environmental assessment of packaging chains.
Part 1: scope, methods and inventory of tool

Tom N. Ligthart[1], Eggo U. Thoden van Velzen[1] and Marieke Brouwer[1]

Part 2: influence of assessment method on ranking of alternatives

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The International Journal of Life Cycle Assessment, Volume 24, 2019, 900–914 & 915-925p.

ISSN: 0948-3349|1614-7502

The environmental impact, resource use and waste generation of packaging has been a topic of worldwide debate. This resulted in founding the Netherlands Institute for Sustainable Packaging (KIDV), which aims to facilitate the reduction of these impacts. Within KIDV's scientific programme, an LCA-based tool was developed to show packaging design students the underlying causes of this impact. Researchers can assess packaging chain alternatives with the tool, which is presented in the first part of the paper. Second part of the paper assessed EnvPack, a tool for assessing the environmental impact of packaging, offers the user four assessment methods. The question arose whether the choice of the method would affect the ranking of packaging alternatives and whether different hotspots in the life cycle would come up.

In comparison with existing LCA-based packaging tools, EnvPack includes four different assessment methods that all offer a single score comparison of alternatives. All four methods showed, per product group, the same packaging with the worst and the best total aggregated impact. For the intermediate performing alternatives, the ranking is dependent on the assessment method. Although the raw materials' life-cycle stage is in most cases the most contributing stage, the choice of the assessment method can affect the hotspots within the packaging life cycle.

Keywords: Beverage, Circular economy, Cumulative energy demand, Environmental design tool, Packaging, Product loss, ReCiPe impact assessment, Shower gel, Soup, Sustainability

A study on ecolabeling and Life Cycle Assessment for food products in Indonesia: Potential application to improve the competitiveness of the tea industry

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IOP Conference Series: Earth and Environmental Science, 277, 012026, 2019, 12p.

The increasing customer awareness and supporting regulation on environmentally friendly products around the globe has fostered the need for revealing environmental performance information on their label, using an instrument called ecolabel. Ecolabeling system requires a life cycle consideration for the product, and Life Cycle Assessment (LCA) serves as a method to perform the assessment for the entire product's life cycle. In the field of food industry, specifically the tea industry, a 2014 report by International Institute for Sustainable Development showed a growing influence of ecolabel in the global market. Ecolabel and LCA become important tools for improving product competitiveness. Meanwhile, tea as one of Indonesia's main commodity has faced a challenging competition in the international market as indicated by decreasing

export—despite increasing global demand-—in recent year. This study reviews the ecolabeling system in Indonesia and LCA for food products. Furthermore, this study also investigates the potential application of ecolabel and LCA to improve the competitiveness of the tea industry. According to the study, the implementation of ecolabeling for tea still faces some challenging issues due to the supporting certification scheme and customer perspective.
On the contrary, research on LCA for food products provides a promising application to improve tea product competitiveness. Therefore, this study recommended that, while educating people more toward ecolabeling, research on LCA should be continuously conducted to support the implementation of ecolabel in the long term. This paper was presented in 3rd International Symposium on Green Technology for Value Chains, 2018.

Keywords: Ecologically Sustainable Packaging, Food Products, Life Cycle Analysis, Recycling, Ecolabel, Sustainability, Labelling, Tea

Considering Ecologically Sustainable Packaging during Decision-Making While Buying Food Products

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Ekonomika Poljoprivrede/ Economics of Agriculture, Volume 66, Number 1, 2019, 107-126p.

ISSN: 0352-3462

Modern production of packaging is characterized by great choice of packaging materials and the shape of the packaging. There is almost no product on the market that does not have highlighted symbols that should give information about the product and the packaging. Although most consumers pay attention to the symbols, a certain number never checks them, because they consider them irrelevant. The paper investigates consumer perception of the importance of green packaging of food products. A primary research on the sample of 115 respondents has been carried out investigating respondents' behaviour while making the choice on food product packaging. The findings suggest that concern for the environment and less danger for health are two major motives for buying food products in ecologically sustainable packaging. The respondents think that wood and paper have least influence on the environment, while plastic and glass harm the environment the most.

Keywords: Ecologically Sustainable Packaging, Food Products, Green Consumer Behavior, Recycling, Croatia, Sustainable Packaging, Sustainability, Labelling

Assessing the Environmental Sustainability of Food Packaging: An Extended Life Cycle Assessment including Packaging-Related Food Losses and Waste and Circularity Assessment.

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Sustainability, Volume 11, Number 3, 925, 2019, 21p.

ISSN: 2071-1050

Food packaging helps to protect food from being lost or wasted, nevertheless it is perceived as an environmental problem. The present study gives an overview of methods to assess the environmental sustainability of food packaging. Furthermore, we propose a methodological framework for environmental assessment of food packaging. There is a broad consensus on the definition of sustainable packaging, which has to be effective, efficient, and safe for human health and the environment. Existing frameworks only provide general guidance on how to quantify the environmental sustainability of packaging. Our proposed framework defines three sustainability aspects of food packaging, namely direct environmental effects of packaging, packaging-related food losses and waste, as well as circularity. It provides a list of key environmental performance indicators and recommends certain calculation procedures for each indicator. The framework is oriented towards the Product Environmental Footprint initiative and the Circular Economy Package of the European Union. Further research should develop a method to determine the amount of packaging-related food losses and waste. Moreover, future studies should examine the potential environmental benefits of different measures to make food packaging more circular.

Keywords: Food Packaging; Environmental Sustainability; Life Cycle Assessment; Circular Economy; Food Losses and Waste; Sustainability Framework

2017

Consumer Buying Behaviour towards Green Packaging in Finland

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Ph. D Thesis, 2017, 56p.

The objective of this study was to investigate consumer behaviour in connection with functionality of green packaging. Based on three major functions of conventional package, the aim was to examine how consumer perceives ecological packaging in terms of ability to fulfill its functions.
In the first section of thesis, a theoretical review was discussed based on previous studies and researches in term of “green packaging” and “customer behaviour”. The literature review was the background of the following empirical study. After the literature review, the empirical study was executed. A questionnaire was designed based on previous theoretical knowledge, the data collection occurred within ten days among respondents from Vaasa University of Applied Sciences.

The online survey was conducted in Finland with 121 participants. IBM SPSS Statistic version 23 was used to analyse the collected data. The result suggested that both non-experienced and experienced respondents have positive evaluation towards ecological packaging in term of fulfilling its functions. However, there were some issues, which cause negative impacts on consumer perception, detected in the analysis. To conclude, the suggestion for green marketers in further study. Besides contribution of the research, author was examined limitations, as well as the reliability and validity of study.

Keywords: Consumer’s Buying Behaviour, Green Packaging, Functionality, Packaging, Sustainability, Consumer, Environment Friendly, Ecological Packaging.

2016

Consumers' perception regarding sustainable packaging

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Thesis for the Marketing and Consumer Behaviour Group, August 19, 2016, 40p.

Convenience and use, package type and sustainability are most important when evaluating products. Sustainability is judged by packaging amount, recyclability, re-usability and biodegradability respectively. Plastic is seen as a less sustainable material then carton, glass and bioplastic. Significant differences in the perceived sustainability for normal and portion sized packages were found. No significant differences on sustainability were found for returnability, recyclability and biodegradability. Taste, quality, convenience and environmental friendly packaging are the best predictors of participants' attitude towards the products.

Keywords: Green Packaging, Sustainable Packaging, Packaging, Sustainability, Consumer, Environment Friendly, Ecological Packaging, Labelling

2015

Evaluating Consumer Response to Environmental Labels on Packaging Using Eye-Tracking

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Thesis, May 2015, 66p.

Labeling is one way consumers evaluate products for purchase. Environmental labeling is used to provide environmental information to the consumer. If a person is familiar with a particular labeling process they may be more inclined to consume such product. This study used the Tobii© T60 eye-tracking system to determine differences in gaze durations and time to first fixation between the Forest Stewardship Council (FSC) label and an unsubstantiated label. Labels were placed on two different products (toilet paper and paper plates) and four locations (top-right corner, bottom-right corner, top-left corner, and bottom-left corner). Additionally, after the participants viewed the images they were asked to complete the six-question GREEN Consumer Values scale and then asked to sort eighteen different images based on label type and price. Participants did not differentiate between the two labels. Labels placed in the bottom-right corner received the least amount of attention (as measured by fixation duration) when compared to labels placed in the other three corners. Eye-tracking data was then split at the median and two groups were created: low label fixators versus high label fixators. High label fixators scored overall higher on the GREEN Consumer Values scale than low label fixators.
Participants sorted the 18 products based on price, putting the lowest-labeled product first 84% of the time. Future studies could include looking at other environmental labels and broader populations.
This thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of Master of Science in Forest Products

Keywords: Environmental Labeling, Green Consumer, Eye-Tracking, Packaging, Labelling, Sustainability, Eco-labelling

2011

Characterization of Food Packaging Materials and Labeling Application Methods: A Case Study for a Harris Teeter Supermarket

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Institute of Packaging Professionals Journal of Packaging, February 2011, 17p.

Packaging manufacturing uses a variety of materials and labeling methods to protect and promote a product. The purpose of this research study was to characterize the current state of consumer food packaging and labeling application methods in a typical supermarket that may assist in product development decisions. This involved categorizing the types of display package materials, label materials, and label application methods. In addition, the relationship of the display package material to the label material and label application methods was investigated. Learning more about the current divisions of packaging materials creates predictions for packaging trends and streamlines the product development process.

Keywords: Packaging, Labeling, Materials, Product Development, Case Study, Supermarket, Sustainability

Consumer effects of environmental impact in product labeling

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Journal of Consumer Marketing, Volume 28, Issue 1,2011, 76-86p.

ISSN: 0736-3761

The purpose of this paper is to investigate the impact of different levels of environmental information on key consumer metrics. More specifically, it aims to evaluate environmentally benign products against those that have negative environmental impacts. Multiple product categories and messages that varied from strongly negative to strongly positive were used to test whether the accuracy/completeness of the information changes consumers' view of green products. The results show that consumer perception of product quality, value, and purchase intentions does not differ significantly between products with positive environmental messages and those without any message. Products with positive environmental messages are viewed better than products with negative environmental messages. It is also found that the impact of

environmental information is greater for consumable products. Practical implications – Clearly presented information can make a significant difference in consumer evaluation of products. If green products highlighted the reasons why products free of harmful ingredients did not have a negative impact on the environment, and if non-green products were required to disclose the harmful impact of their ingredients, green products would be favorably perceived over the non-green alternative. The paper conjectures that if “fair” and clear explanations of environmental impact, both good and bad, are required, consumer evaluations of green products will improve and, ultimately, a larger percentage of consumers will purchase green products. The findings suggest that policy makers should require manufacturers to disclose key product ingredients and their environmental impact. This project adds to the growing body of literature on environmental labeling, and investigates the effects of different levels of environmental information on key consumer metrics.

Keywords: Environmental Management, Labelling, Information Disclosure, Packaging, Green Marketing, Eco-Labelling, Sustainability

2009

Sustainable Packaging: A Study of Consumers' Loyalty and Behavior

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Bachelor thesis within Business Administration, May 2009, 70p.

The ecological consumer has been a significant and central character in the development of green marketing. In an effort to enhance brand equity and increase consumers' loyalty, companies are relying on environmental claims. From advances in processes, to product design and packaging materials that diminish waste, companies are more and more emphasizing on sustainability. The purpose of this study aims to identify if sustainable packaging can be used as a marketing tool to increase brand equity. In addition, the authors intended to identify who is consuming sustainable products and particularly sustainable packaging. Through both a quantitative and a qualitative study authors analyzed consumers' behavior and attitude towards sustainable packaging and green consumption in general. The findings of the study conclude that the gap between consumers' attitude and purchasing decision concerning ecological products in general is important. The main reasons are a lack of communication, promotion and availability regarding these products as well as the high-proposed price. Furthermore, the study confirmed that women are much more involved than men in the consumption decision making process in both "classic and green" purchasing.

Keywords: Sustainable, Ecological Products, Brand Equity, Behaviour, Attitudes, Labelling, Packging

2007

Food Packaging—Roles, Materials, and Environmental Issues

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Research Scientist, Department of Science and Technology Projects, Institute of Food Technologists, Washington, D.C., U.S.A.

Journal of Food Science, Volume 72, issue 3, 2007, 45-55p.

ISSN: 1750-3841

The Institute of Food Technologists has issued this Scientific Status Summary to update readers on food packaging and its impact on the environment. Advances in food processing and food packaging play a primary role in keeping the U.S. food supply among the safest in the world. Simply stated, packaging maintains the benefits of food processing after the process is complete, enabling foods to travel safely for long distances from their point of origin and still be wholesome at the time of consumption. However, packaging technology must balance food protection with other issues, including energy and material costs, heightened social and environmental consciousness, and strict regulations on pollutants and disposal of municipal solid waste.

The primary purpose of food packaging must continue to be maintaining the safety, wholesomeness, and quality of food. The impact of packaging waste on the environment can be minimized by prudently selecting materials, following EPA guidelines, and reviewing expectations of packaging in terms of environmental impact. Knowledgeable efforts by industry, government, and consumers will promote continued improvement, and an understanding of the functional characteristics of packaging will prevent much of the well-intentioned but ill-advised solutions that do not adequately account for both pre-consumer and postconsumer packaging factors.

Keywords: Food Processing, Food Packaging, Packaging, Labelling, Food, Packaging Technology

Consumer Education and Research Centre

Consumer Education and Research Centre (CERC), set up in 1978, is a non-political, non-profit and nongovernment organisation dedicated to the education and empowerment of consumers as well as promotion and protection of consumer interests through effective uses of education, research, the media and law. CERC has three major roles-to make consumers aware of their rights, to help them protect themselves and to make providers of goods and services accountable. Its activities include complaints handling, legal advice and litigation, consumer education and awareness programmes, library and information service, publication, comparative testing of products, advocacy, investor and environment protection.

CERC-EIACP Programme centre - Resource Partner

Environmental Information, Awareness, Capacity Building and Livelihood Programme acronymed as EIACP erstwhile Environmental Information System (ENVIS), is a Resource Partner to Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India. MoEF&CC has recognized Consumer Education and Research Centre (CERC) as ENVIS Centre in 2005. The focus of EIACP is to provide environmental information to decision makers, policy planners, scientists and engineers, research workers, etc. across the country. EIACP was conceived as a distributed information network with the subject specific centres to carry out the mandates and to provide the relevant and timely information to all concerned.

Subject assigned to the CERC- EIACP Centre is “Environmental Literacy - Eco-labelling and Eco-friendly Products.” The Centre launched the website http://cercenvis.nic.in/ on NIC (National Informatics Centre) platform with the theme ‘Eco-labelling and Eco-Friendly Products’. The website furnishes the information on national and international scenario on this subject. It publishes theme based quarterly newsletter named “Green Insights”. It also circulates bi-monthly e-bulletin “Green Alert”. To sensitize mass towards sustainable consumption and sustainable lifestyle, we are active on social media platforms such as on Facebook, Instagram, Twitter and Youtube Channel.

CERC
Since 1978

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