Efficacy and Hurdles of Carbon Footprint Labels in Shaping Consumer Choices

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Abstract

The purpose of this study is to look into the impact of carbon footprint labels on consumer behavior and to examine the benefits and challenges associated with their adoption. The goal of the study is to shed light on the obstacles that prevent consumers from incorporating carbon footprint labels into their decision-making processes and how well they work to encourage eco-friendly behavior. Both primary and secondary data are used in the study, which has a descriptive research design. Primary data is obtained through the use of a structured questionnaire, and secondary data is obtained from a variety of sources, such as websites, journals, and research papers. The results are interpreted using statistical techniques like weighted mean, frequency analysis, and Henry Garrett analysis. With the focus of the world on environmental sustainability, this study aims to address the barriers that prevent carbon footprint labels from being successfully incorporated into consumer choices. The legitimacy of such labels is weakened by a number of issues, including the absence of standardized measurement methodologies, consumer skepticism, and the possibility of greenwashing. A varied consumer landscape with variable product usage durations and influential factors is revealed by the data analysis. Customers are motivated to make environmentally conscious decisions by media coverage, corporate responsibility, and health concerns. Although a significant percentage appreciates carbon footprint labels as a means of promoting sustainable decisions, opinions and understanding regarding environmental friendliness vary widely. The analysis prioritizes factors associated with the advantages of carbon footprint labeling, suggesting that businesses who wear these labels have an edge over competitors and are encouraged to improve supply chain efficiency. In order to promote sustainability, the study highlights the importance of consumer awareness, company CSR profiles, and open information sharing.

Keywords: Carbon Footprint Labels, Environment Sustainability, Greenwashing, Corporate Responsibility, CSR Profile, Green Practices.

Introduction

Customers are actively looking for ways to align their purchasing decisions with sustainability goals at a time when environmental debates are becoming more and more important on the international scene. The implementation of carbon footprint labeling on items has shown to be a successful strategy in bridging the knowledge gap between customers and the environmental effects of their choices. The amount of CO_2 released into the environment over the course of a product's or activity's life cycle is measured relative to

the product or activity using its carbon footprint. It gives information on the environmental impact of a given project and is typically obtained via studies of both direct and indirect emissions connected to the resources used in a particular process. These labels, which are sometimes shown as eco-friendly emblems or numerical values, are meant to measure the amount of greenhouse gases that are released during the manufacturing, shipping, and disposal of a product. People are becoming more conscious of their own carbon footprints as societies deal with the effects of climate change and depleting resources. Within this framework, carbon footprint labels aim to provide customers with the knowledge they need to make environmentally responsible decisions. In a time when sustainability is a fundamental component of responsible living, these labels stand for more than just an aesthetic addition to packaging. Instead, they symbolize a commitment to accountability and transparency.

Review of Literature

(Rondoni & Grasso, 2021)Consumer preferences for buying products with a reduced carbon footprint (CF) label or their willingness to pay a premium (WTP) for such ecologically friendly products are the subjects of research in this field. This essay aims to accomplish two things. It first provides a thorough literature review with an emphasis on the analysis of Italian consumers' willingness to pay (WTP) for products with a CF label. Second, the study looks for factors that contribute to a positively stated WTP using data from two consumer attitude surveys about dairy products with a reduced CF label. The findings demonstrate that people who express a positive willingness to pay for products with a lower carbon footprint are more likely to claim that making choices about products with a lower environmental impact can help fight climate change. In contrast, consumers highly sensitive to price considerations are less inclined to pay a premium for CF-labeled products.

(Canavari & Coderoni, 2020)This manuscript reviews the entire body of scientific literature published between 2011 and 2020, resulting in [insert number] papers, with the goal of evaluating the current state of knowledge and identifying research gaps in the field. The results show that people who are older, female, have more money, are more educated, and have a more positive attitude toward carbon footprint labels. Furthermore, people who are more concerned about the environment and those who regularly buy foods with eco-friendly labels are more willing to pay more for products that have carbon footprint labels. But it's important to note that most consumers don't know much about carbon measurements, and the current system of carbon footprint labels is still unclear. Significant improvements in consumer understanding are observed when consumer-friendly symbols, like traffic light colors, are used to redesign carbon footprint labels. In addition, consumers in emerging economies such as China and Egypt have a positive attitude toward carbon footprint information, highlighting the necessity of developing a system of carbon footprint labels.

(Kühne et al., 2023)The study surrounds the research aspect to find the solution for the following question, whether it is possible to encourage consumers to make more environmentally friendly decisions by implementing carbon labeling on food? In an online experiment, 402 participants were randomly assigned to one of three food labeling conditions (Star Rating, Green Foot, and Traffic Light Label, or TLL) or a control condition. Participants were tasked with choosing 20 food products from a fictional online store. Compared to the control condition, the introduction of labeling conditions resulted in a decrease in overall CO_2 emissions, a rise in the variety of food products with green labels, and a decrease in the selection of food products with red labels. Notably, participants accepted the Traffic Light Label (TLL) the highest and it performed better than the other two labeling systems.

Objective
1. To examine whether the presence of carbon footprint labels changes the consumer behaviour.
2. To analyse the benefits of carbon footprint labelling.

Problem Statement
The contemporary global emphasis on environmental sustainability has prompted the adoption of various mechanisms to engage consumers in making eco-conscious choices, with carbon footprint labels emerging as a prominent strategy. There are notable hurdles that impede the successful integration of carbon footprint labels into consumer decision-making processes. These obstacles may range from a lack of standardized measurement methodologies and inconsistent labelling practices to consumer scepticism and a limited understanding of the complex relationship between carbon emissions and product life cycles. Additionally, the potential for greenwashing, the deceptive exaggeration of environmental claims, further undermines the credibility of carbon footprint labels, potentially diminishing their impact on shaping consumer choices. This study aims to explore the relationship between carbon footprint labels and consumer choices by considering multifaceted hurdles.

Research Methodology
Research Design : The Research design adopted for the study is descriptive in nature.

Nature and Source of Data : The research is centred both on primary and secondary data. The data is gathered through a structured questionnaire. The secondary data is gathered through various sources like websites, previous research papers, journals, etc.

Statistical Tools used : Frequency analysis is used to identify consumer behaviour in the presence of carbon footprint labels. Weighted mean is used to analyse the benefits and Henry Garrett analysis were used to analyze the drawbacks of carbon footprint labelling.

Results and Discussion
Table No : 1 Changes of Consumer behavior in the presence of Carbon Footprint Labels

Percentage Analysis	Group	Frequency	Percentage
Period of usage	Less than 6 months	39	32.5
	6 months to 1 year	34	28.3
	1-2 years	27	22.5
	More than 2 years	20	16.7
First Sight Influencer	Television advertisements	22	18.3
	Social media posts	21	17.5
	In store displays	20	16.7
	Product packaging	19	15.8
	Environmental organizations	16	13.3
	Educational institutions	22	18.3

Motivation Factor	Personal concern for the environment	9	7.5
	Health considerations	24	20.0
	influence of friends or family	19	15.8
	media coverage	21	17.5
	Government initiatives	13	10.8
	corporate responsibility	34	28.3
Focus of carbon footprint labels	Educating consumers	27	22.5
	Encouraging sustainable choices	43	35.8
	Both equally	30	25.0
	Neither	20	16.7
Level of understanding	Very knowledgeable	23	19.2
	Somewhat knowledgeable	29	24.2
	neutral	25	20.8
	somewhat uninformed	23	19.2
	very uninformed	20	16.7
Environment friendly	Strongly agree	26	21.7
	agree	30	25.0
	neutral	18	15.0
	disagree	24	20.0
	strongly disagree	22	18.3
Influencing level on purchase decisions	significant influence	24	20.0
	moderate influence	44	36.7
	Minimal influence	27	22.5
	No influence	25	20.8
Preference of products with carbon footprint label	Food and beverages	16	13.3
	Clothing and apparel	28	23.3
	Electronics	35	29.2
	Household goods	25	20.8
	beauty and personal care products	16	13.3
Products ignored due to lack of carbon footprint labels	Food and beverages	25	20.8
	clothing and apparel	26	21.7
	electronics	31	25.8
	household goods	24	20.0
	beauty and personal care products	14	11.7

Changes in behaviour	Choosing products with carbon footprint labels	41	34.2
	Reducing overall consumption	27	22.5
	Opting for sustainable and eco-friendly brands	29	24.2
	Prioritizing local and ethically sourced products	23	19.2

Interpretation

The data reveals a comprehensive insight into consumers' perspectives on environmentally conscious choices and the impact of carbon footprint labels on their preferences and behaviours. The data on the period of product usage indicates a diverse consumer landscape, with 32.5% reporting usage of less than 6 months, possibly reflecting a segment of new or frequently changing consumers. A substantial 28.3% have a usage duration of 6 months to 1 year, suggesting a moderately engaged group. Additionally, 22.5% report using products for 1 to 2 years, while 16.7% indicate a usage period exceeding 2 years. The "First Sight Influencer" data provides insights into the sources that initially influence consumers. Television advertisements lead with 18.3%, followed closely by educational institutions, also at 18.3%. Social media posts and in-store displays hold the attention of 17.5% and 16.7% of respondents, respectively. Product packaging contributes to the initial influence for 15.8% of consumers, while environmental organizations have an impact on 13.3%. The "Motivation Factor" data reveals the various influences driving consumers' environmentally conscious choices. Corporate responsibility emerges as a prominent motivator, with 28.3% of respondents citing it as a significant factor. Health considerations closely follow, motivating 20.0% of consumers, while media coverage and the influence of friends or family play notable roles, at 17.5% and 15.8%, respectively. Government initiatives and personal concern for the environment also contribute, with 10.8% and 7.5% of respondents acknowledging them as motivation factors. The data on the focus of carbon footprint labels indicates that a significant portion of consumers values labels for encouraging sustainable choices, with 35.8% expressing this preference. Educating consumers is also deemed important by 22.5% of respondents. A notable 25.0% believe that both educating consumers and encouraging sustainable choices are equally crucial. On the other hand, 16.7% of consumers express that neither focus is particularly important. The data on the level of understanding among respondents regarding environmental issues and carbon footprint labels indicates a varied landscape. A significant portion considers themselves somewhat knowledgeable (24.2%), while 19.2% express a high level of understanding, categorizing themselves as very knowledgeable. Another 20.8% hold a neutral stance, suggesting a moderate level of familiarity. Approximately 19.2% admit to being somewhat uninformed, while 16.7% characterize themselves as very uninformed. The data on attitudes towards environmental friendliness indicates a spectrum of opinions among respondents. A combined 46.7% express positive views, with 21.7% strongly agreeing and 25.0% agreeing that they consider products to be environmentally friendly. Conversely, 38.3% hold more sceptical views, with 20.0% disagreeing and 18.3% strongly disagreeing. Additionally, 15.0% of respondents remain neutral on the matter. The data

on the influencing level of environmental considerations on purchase decisions reflects a range of impacts. A substantial 36.7% of respondents note a moderate influence, while 20.0% state that environmental factors have a significant influence on their purchase decisions. Another 22.5% acknowledge a minimal influence, indicating a less pronounced effect. Meanwhile, 20.8% assert that environmental considerations have no influence on their purchasing choices. The data on the preference of products with carbon footprint labels across different categories reveals distinct consumer inclinations. Electronics emerge as a prominent category, with 29.2% expressing a preference for products with carbon footprint labels, followed closely by clothing and apparel at 23.3%. Household goods and beauty and personal care products are each preferred by 20.8% and 13.3%, respectively. Food and beverages also garner interest, with 13.3% of respondents expressing a preference for products in this category with carbon footprint labels. The data on products ignored due to the absence of carbon footprint labels highlights distinct consumer responses across various categories. Electronics stand out, with 25.8% of respondents choosing to overlook products lacking carbon footprint labels, closely followed by clothing and apparel at 21.7%. Food and beverages, household goods, and beauty and personal care products also experience consumer avoidance, with 20.8%, 20.0%, and 11.7%, respectively. The data on changes in behaviour in response to environmental considerations reveals diverse consumer actions. A significant 34.2% of respondents indicate a shift in behaviour towards actively choosing products with carbon footprint labels. Another substantial portion, 24.2%, is opting for sustainable and eco-friendly brands, suggesting a growing preference for environmentally conscious choices. Additionally, 22.5% of respondents are reducing their overall consumption, indicating a more mindful approach to consumption patterns. Furthermore, 19.2% are prioritizing local and ethically sourced products, reflecting a consideration for the broader impact of their purchasing decisions.

Benefits of carbon footprint labelling
Henry Garrett Ranking
"Garrett's Ranking Technique was applied to study the preference, change of orders of constraints and advantages into numerical scores. The prime advantage of this technique over simple frequency distribution is that the constraints are arranged based on their severity from the point of view of respondents".

Number of respondents who ranked the factors
The number of respondents who ranked the factors were first analysed through frequency analysis.

Factor /Rank	1	2	3	4	5	6	7	8	9
Increased Consumer awareness over the environmental impact of products.	27	6	17	20	11	10	12	10	17
Individuals can actively foster sustainability through their choices.	10	10	27	34	16	4	14	6	9
Incentivized to adopt greener practices among Businesses.	13	12	13	6	20	24	4	10	28
Companies with carbon footprint labels gain a competitive advantage.	14	32	12	24	12	12	6	6	12
Motivates companies to enhance and optimize their supply chains	25	18	18	6	24	6	7	6	20

Enhances company's CSR profile.	16	12	5	18	18	12	11	25	13
Structured governance and compliance measures.	18	6	6	24	7	7	18	20	24
Effortlessly recognize and endorse products	10	11	19	9	10	14	26	9	22
Building trust and credibility through transparently sharing information.	11	23	10	6	11	13	23	16	17

Percent position = 100(Rij-0.5)/Nj

Rij = 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th ranks

Nj = Total rank given by 120 respondents = 9

Rank	100(Rij-0.5)	Percent position
1	100(1-0.5)/9	5.5
2	100(2-0.5)/9	16.6
3	100(3-0.5)/9	27.7
4	100(4-0.5)/9	38.8
5	100(5-0.5)/9	50
6	100(6-0.5)/9	61.1
7	100(7-0.5)/9	72.2
8	100(8-0.5)/9	83.3
9	100(9-0.5)/9	94.4

From Henry Garret table, Garret value is found for the percent position

Rank	Percent position value	Garret Value
1	5.5	81
2	16.6	69
3	27.7	62
4	38.8	55
5	50	50
6	61.1	44
7	72.2	38
8	83.3	31
9	94.4	19

For each rank, garret value is multiplied by given value in the table

Factor /Rank	1*81	2*69	3*62	4*55	5*50	6*44	7*38	8*31	9*19
Increased Consumer awareness over the environmental impact of products.	2187	414	1054	1100	550	440	456	310	323
Individuals can actively foster sustainability through their choices.	810	690	1674	1870	800	176	532	186	171

Incentivized to adopt greener practices among Businesses.	1053	828	806	330	1000	1056	152	310	532
Companies with carbon footprint labels gain a competitive advantage.	1134	2208	744	1320	600	528	228	186	228
Motivates companies to enhance and optimize their supply chains	2025	1242	1116	330	1200	264	266	186	380
Enhances company's CSR profile.	1296	828	310	990	900	528	418	775	247
Structured governance and compliance measures.	1458	414	372	1320	350	308	684	620	456
Effortlessly recognize and endorse products	810	759	1178	495	500	616	988	279	418
Building trust and credibility through transparently sharing information.	891	1587	620	330	550	572	874	496	323

All the calculated values are totalled row wise

Factor /Rank	1*81	2*69	3*62	4*55	5*50	6*44	7*38	8*31	9*19	Total
F1	2187	414	1054	1100	550	440	456	310	323	6834
F2	810	690	1674	1870	800	176	532	186	171	6909
F3	1053	828	806	330	1000	1056	152	310	532	6067
F4	1134	2208	744	1320	600	528	228	186	228	7176
F5	2025	1242	1116	330	1200	264	266	186	380	7009
F6	1296	828	310	990	900	528	418	775	247	6292
F7	1458	414	372	1320	350	308	684	620	456	5982
F8	810	759	1178	495	500	616	988	279	418	6043
F9	891	1587	620	330	550	572	874	496	323	6243

The total score is divided my number of respondents to calculate average score, then rank the highest average score as I and the least average score with Rank X.

Factors	Total	Average Score	Rank
Increased Consumer awareness over the environmental impact of products.	6834/120	52.6	IV
Individuals can actively foster sustainability through their choices.	6909/120	53.1	III
Incentivized to adopt greener practices among Businesses.	6067/120	46.7	VII
Companies with carbon footprint labels gain a competitive advantage.	7176/120	55.2	I
Motivates companies to enhance and optimize their supply chains	7009/120	53.9	II

Enhances company's CSR profile.	6292/120	48.4	V
Structured governance and compliance measures.	5982/120	46.0	IX
Effortlessly recognize and endorse products	6043/120	46.5	VIII
Building trust and credibility through transparently sharing information.	6243/120	48.0	VI

From the table, it is evident that the variable 'Companies with carbon footprint labels gain a competitive advantage' secured first rank with an average score of 59.8, followed by the variable 'Motivates companies to enhance and optimize their supply chains' with an average score of 58.4, the third rank was captured by the variable 'Individuals can actively foster sustainability through their choices' with an average score of 57.6, the IV rank was attained by the variable 'Increased Consumer awareness over the environmental impact of products' with an average score of 57.0, the V rank was attained by the variable 'Enhances company's CSR profile' with an average score of 52.4, the VI rank was attained by the variable 'Building trust and credibility through transparently sharing information' with an average score of 52.0, the VII rank was attained by the variable 'Incentivized to adopt greener practices among Businesses' with an average score of 50.6, the VIII rank was attained by the variable 'Effortlessly recognize and endorse products' with an average score of 50.4, the IX rank was captured by the variable 'Structured governance and compliance measures' with an average score of 49.9.

Conclusion

This study offers a thorough investigation of the benefits and challenges posed by carbon footprint labels in terms of influencing consumer decisions. The results show a wide range of consumer viewpoints, from different product usage durations to significant variables influencing decisions about environmental responsibility. The study highlights the benefits of carbon footprint labels in spite of obstacles like greenwashing and a lack of standardized measurement techniques, with a sizable percentage of consumers indicating a preference for products with labels. The findings also show that consumers are becoming more conscious of and inclined toward eco-friendly brands, and they are actively selecting sustainable products. These insights offer invaluable knowledge for fostering genuine environmental consciousness and shaping the future of responsible consumption as businesses and policymakers navigate the changing landscape of sustainable consumerism.

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