

Examination of a Specific Form of Eco-design

The Case of Eco-packaging

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Abstract

Eco-packaging can be defined as packaging designed to have a lesser environmental and ecological impact with a view to meeting more stringent environmental regulations and responding to ever increasing public sensitivity to environmental issues. For managers, investment in an eco-packaging process remains debatable given uncertainty linked to real return on investment. A study by a representative panel of 936 consumers reveals that perceptions of eco-packaging directly impact consumer propensity to purchase. Besides, the positive relationship between perceptions of eco-packaging and purchases of eco-packaged goods is indirectly supported by an increase in an organization's perceived brand equity and enhanced customer loyalty towards the organization. Collectively, these results provide a priori support for a managerial orientation towards eco-packaging.

Keywords: Eco-packaging; eco-design; brand equity; loyalty; purchase behaviour; mediation analysis.

Introduction

Eco-design is more often than not described as a promising avenue for reconciling the managerial challenges of market penetration and those relating to protection of the environment at each stage in the product lifecycle, and thus ethical or sustainable business management [1]. In contrast to conventional packaging, eco-packaging is a specific form of eco-design and represents a particularly advantageous advance from the dual standpoint of environmental and managerial concerns. Indeed, eco-packaging enables businesses to develop packaging presenting a lesser environmental impact and ecological footprint, the goal being to satisfy increasingly stringent environmental regulations and standards, as well as achieving voluntary ethical management [2]. At the same time, businesses may achieve extremely interesting strategic managerial objectives, notably with respect to marketing since eco-packaging optimizes brand/consumer communications, satisfies consumer needs and helps trim costs [1, 2].

Over and above environmental regulations and ethical goodwill, eco-packaging design responds to ever increasing consumer demand for green products [3, 4]. According to a 2009 survey conducted by Boston Consulting Group (BCG) in Canada, China, Europe, Japan and the United States, 34% of consumers demonstrate an interest in purchasing green products [3]. More specifically, a study by Responsible Consumption Observatory (RCO) in Québec reveals that when pricing is identical, 72.9% of Canadians prefer goods featuring eco-responsible packaging [4]. A shift from conventional packaging towards eco-packaging may therefore represent a rational managerial decision, in order to retain or to attract customers and generate profits.

In short, when eco-packaging design is incorporated into a company's marketing strategy, the company is better poised to sustain environmental pressures, improve its corporate image, conquer new markets and enhance product value [5]. Despite these supposed advantages of eco-packaging, little research has examined the real impact of eco-packaging on consumers [2]. Efforts in marketing have focused essentially on the effects of various packaging attributes (colour, shape, logo) on consumers, the impact of packaging on brands, and the influence of product-related attitudes and beliefs [e.g. 6]. Overall, past research has developed a rich corpus of knowledge on conventional packaging, and while much is presently known about this type of packaging, little is known about consumers' reactions to eco-packaging, especially in terms of purchase behaviour.

Attempts to achieve a better understanding of the impact of eco-packaging on consumers come replete with multiple advantages and offer several contributions to scholars as well as to practitioners. Firstly, knowledge of the like would enable businesses to determine the extent to which investment in an eco-design process would effectively prove beneficial. Secondly, a more detailed examination of the link between the provision of eco-packaged goods and consumer behaviour (i.e. purchases) would help determine the variables which exert an impact on this relationship. Thirdly, eco-packaging represents a relatively fecund stream of industrial ecology and environmental economics, especially since the latter do not generally make allowance for consumer points of view. Our exploration of consumer behaviour respecting eco-packaging therefore constitutes an original contribution, both from a theoretical and a practical perspective, by providing an alternate outlook and by documenting the effective interest of those most concerned by this advance, namely consumers.

This study seeks therefore to fill the void in topical literature on eco-packaging and addresses the limitations of earlier studies, mostly focused on conventional packaging. The principal objective of the study is, consequently, to achieve a better understanding of the impact of consumer perceptions of eco-packaging on purchases of eco-packaged goods. More specifically, research efforts provide answers to the following questions: (1) How is eco-packaging defined in marketing? (2) To what extent do consumer perceptions of eco-packaging impact purchases of eco-packaged goods? (3) What is the nature of the consumer process underpinning the purchase of eco-packaged products?

Discussion and hypotheses

Environment and marketing

In recent decades, product packaging has transitioned from a simple, utilitarian container to an informational component intrinsically linked to content [7]. In the 1960s, consumers focused on packaging functionality which was deemed a key competitive attribute and silent seller [1]. In the 1970s, companies began designing packaging that was lighter, more energy-

efficient and easier to transport [1]. Since the 1990s, businesses have ever increasingly concentrated on environmental protection to address more properly the social trend to eco-responsibility, while satisfying ever more stringent environmental protection standards and regulations [1]. Eco-packaging also represents a trend of ever increasing importance.

Two erroneous conceptions nonetheless underpin this trend. The dearth of packaging reuse/recycling solutions and systematic design of packaging with non-recycled materials spur the public to essentialize packaging, leading to attitudes of total rejection [4]. As a consequence, consumers generally over-evaluate the adverse environmental impact of packaging. On average, 12.6% of consumers in Québec understand that packaging represents less than 10% of the environmental impact of the product that they seek to protect [8]. In contrast, consumers tend to underestimate the usefulness of packaging given that they essentially consider the latter as waste. Packaging, however, serves the all-important functions of protecting goods during transport across the length of the supply chain and subsequently showcasing them at points of sale [7]. Only 27.6% of Québec consumers consider packaging to be necessary [8]. The misunderstanding of these facts explains keen consumer interest (72.9%) in eco-packaged goods [4] to which they assign a higher level of environmental neutrality than is actually warranted.

Additionally, companies tend to overestimate cost savings relating to eco-packaging. In reality, packaging plays an accessory role by promoting goods without significantly increasing their cost [9]. As a consequence, the financial gain associated with eco-packaging is less than managers might think. Additionally, rendering packaging more eco-friendly requires multiple investments often underestimated and extending to the likes of action required to secure an ecolabel, recourse to consultants and experts to analyse product lifecycle, logistics (e.g. new, more sustainable but sometimes more costly supply routes) and manufacturing transformations (e.g. production line changes to minimize emissions of carbon dioxide) [10], while sustaining packaging at an optimal level of usefulness. Clearly, eco-packaging engagement requires long term vision, sound organizational involvement and well-coordinated, incremental action plans to provide for a continuous improvement loop [9]. A vision such as this contrasts with short term managerial aims according to which eco-packaging equals reduced packaging and therefore reduced costs. What is more, a dedicated approach by a company can lead to adverse counter-effects on behalf of consumers (e.g. greenwashing) [11]. Businesses seeking to launch into eco-packaging would therefore be well advised to do so in a serious, forthright manner.

It is in this context that companies appear to be confronted with a dilemma: dominance of sustainable considerations on the one hand, and prevalence of marketing/managerial objectives on the other [1]. Investment in an eco-packaging process remains both desirable and debatable given uncertainty linked to real return on investment. In essence, while rationality may call for conventional packaging, ethical management, sustainability considerations, or corporate social responsibility may call for eco-packaging instead. To resolve that issue, this study is based on the premise that a better understanding of consumers' reactions to eco-packaging may provide managers with valuable information to improve their decision-making process as to whether or not to implement eco-packaging. This study seeks, therefore, to explore the impact of eco-friendly packaging attributes on consumers, and more specifically, of the impact of eco-packaging attributes on the propensity of consumers to purchase eco-packaged goods.

Impact of eco-packaging on purchase behaviour

Packaging, whether eco-responsible or not, is considered a major factor in product competitiveness given that it enables attainment of several marketing objectives such as

consumer attraction, attribution, information and positioning. This is so because, according to topical literature, packaging would appear to be an inseparable element of both brand and product. First, literature to date points out a link between consumer perceptions of packaging components and brand personality [7]. Further, changes to packaging make it possible to differentiate products within a given category and to distinguish a brand from rival brands [12]. Second, research has demonstrated that packaging components (colour, shape, material) significantly impact consumer attitudes toward products [13]. So, from the onset, the structural elements of packaging are closely related to perceptions about the product, the brand, the company behind the product and the brand, and hence to purchase behaviour based on inferences about these different components. In this study, it is assumed that this mechanism holds not only for conventionally-packaged goods, as identified in the literature, but also for eco-packaged goods.

We employ Spence's signal theory [14] to comprehend more fully the mechanisms impacting consumer perceptions of eco-packaging and the impact of the latter on the purchase of eco-packaged goods. During a transaction, signal theory [14] makes it possible to resolve the issue of information asymmetry developed by Akerlof [15]. According to the latter [15], in a commercial context, consumers are often incapable of determining inherent supplier skills. This asymmetry can lead to 'anti-selection', which is to say the risk of a market disappearing over time given the absence of a signal of quality that would enable consumers to make optimal choices by distinguishing between good and poor quality products [16]. The issue of 'moral risk' also arises as a result of information asymmetry since suppliers can readily manipulate the level of quality supplied with each transaction. Consequently, consumers refer to the signals transmitted by the seller to infer information about the non-observable elements of a product such as quality [17]. The structural elements of packaging, such as those emphasizing its eco-responsible characteristics, act therefore as signalling cues for consumers about the packaged product and its quality. There should therefore be a link between consumers' perceptions of structural elements of eco-packaging and their reactions to such perceptions, which may reverberate in their purchase decisions.

The few studies available on the impact of structural elements of eco-packaging on consumer behaviour, inform us about the directionality of such a relationship. Swaen and Chumpitaz [18] demonstrate that the transmission of signals linked to corporate social responsibility makes it possible to reinforce trust in both a company product and a company brand. One study in the field of responsible consumption demonstrates that eco-packaging significantly impacts consumer attitude and behaviour with respect to a product through the consumer's perception of environmental signals such as, recyclable materials, reduced package size, and the presence of an eco-label [10]. What is more, eco-packaging could impact consumer intent to purchase given that 71.9% of consumers, favour products with eco-responsible packaging over other products in the same category [19]. Hence, the first hypothesis posits as follows:

H1: Consumer perceptions of eco-packaging positively impact behaviour relating to the purchase of eco-packaged goods.

Indirect impact on purchase behaviour

Trust. Trust has been identified as a key concept in the emergence of relationship marketing in that this notion makes it possible to establish, develop and sustain important relational

exchanges [20, 21, 22]. According to the theory of attribution, trust can be defined as a mechanism for attributing characteristics, motives and intentions to the partner involved in the exchange, and for evaluating partner potential by assuming that partner behaviour will be predictable and consistent with promises [23, 24].

One of the major challenges for businesses seeking to use eco-responsible product packaging resides in developing and sustaining a sound relationship of engagement with consumers in accordance with which the latter consider the business as competent, principled and well meaning. Consumers must have a positive perception of a company's eco-packaging efforts since this perception will lead to greater trust in the eco-packaging process engaged by the company. This condition is important for establishing continuity in consumer purchasing behaviour [20].

Previous research on consumer trust and responsible consumption suggest the existence of a mediating effect of trust on brand in terms of the relationship between eco-packaging perceptions and purchases of eco-packaged goods. Swaen and Chumpitaz [18] demonstrate the existence of a positive link between consumer perceptions of corporate social responsibility and consumer trust in both the company and the brand via perceived product quality and consumer satisfaction. Consumer perceptions in respect to a brand (e.g. quality) indeed represent the principal determinant of trust in the brand [21]. A number of previous research papers establish a relationship between consumer trust and purchasing behaviour [22]. At the cognitive level, consumer trust in a brand can have a direct, positive, mediating impact on purchases [20]. We therefore hypothesize as follows:

H2: Consumer perceptions of eco-packaging positively impact consumer trust in the brand (H2a), which in turn positively impacts eco-packaged product purchasing behaviour (H2b). Together, the two variables interact and exert a positive impact on the purchase of eco-packaged goods (H2c).

Brand equity. Brand equity is defined as an ensemble of assets and liabilities linked to the name and symbol of a brand, and having the effect of increasing or decreasing product value in the eyes of consumers [25, 26, 27]. Marketing mix and especially product characteristics contribute to brand equity [27, 28].

The product strongly influences the brand-consumer relationship through consumer perceptions of physical, tangible product attributes (principal/secondary characteristics, quality, design) [28, 29]. Brand equity is either strengthened or weakened by the perceived quality of a product's physical, tangible characteristics as a result of the mental associations that these characteristics spark in consumers [25, 26]. More specifically, the consumer purchasing behaviour model formulated by Tybout and Hauser [29] demonstrates the impact of consumer perception of product attributes on the decision to purchase.

Packaging is an essential component of any product, especially in a pre-purchase setting. Attributes enable consumers to recognize an eco-packaged product by showcasing the eco-friendly aspects of the packaging and ultimately the product throughout each of the stages in the latter's lifecycle. Research to date indicates that aspects relating to eco-packaging are either positively evaluated or over-evaluated by consumers [10, 19]. The presence of eco-packaging could thus lead consumers to form positive mental associations about the product and, ultimately, the brand. This mechanism definitely helps bolster brand equity. The following hypothesis encapsulates reasoning in this regard:

H3: Consumer perceptions of eco-packaging positively impact brand equity from the consumer standpoint (H3a), which in turn positively impacts eco-packaged product purchasing behaviour (H3b). Together, the two variables interact and exert a positive impact on the purchase of eco-packaged goods (H3c).

Loyalty. According to Danaher, Wilson and Davis [30], loyalty can be defined as the outcome of a cognitive process based on the comparison of product-related benefits (e.g. product or brand), as well as an affective process. More recently, studies (e.g. [10]) have demonstrated the existence of a positive relationship between environmental signals and consumer loyalty through added benefits. Indeed, eco-packaging provides a number of added personal and public benefits. With respect to individual benefits, eco-packaging is perceived by consumers as healthier, more practical, more economical and replete with positive emotional and social values linked to protection of the environment. Public benefits include protection of the environment and enhanced community wellbeing. The perception of an eco-packaged product exerts a positive impact on loyalty given the combination of personal and social benefits that consumers attach to eco-packaging [10].

Lastly, earlier research evidences a link between loyalty and consumer behaviour. For example, loyalty positively impacts word-of-mouth, product repurchasing intent and behaviour, as well as brand attachment [21]. Hence, the authors postulate as follows:

H4: Consumer perceptions of eco-packaging positively impact consumer loyalty (H4a), which in turn positively impacts eco-packaged product purchasing behaviour (H4b). Together, the two variables interact and exert a positive impact on the purchase of eco-packaged goods (H4c).

Figure 1 presents a graphic representation of the conceptual model.

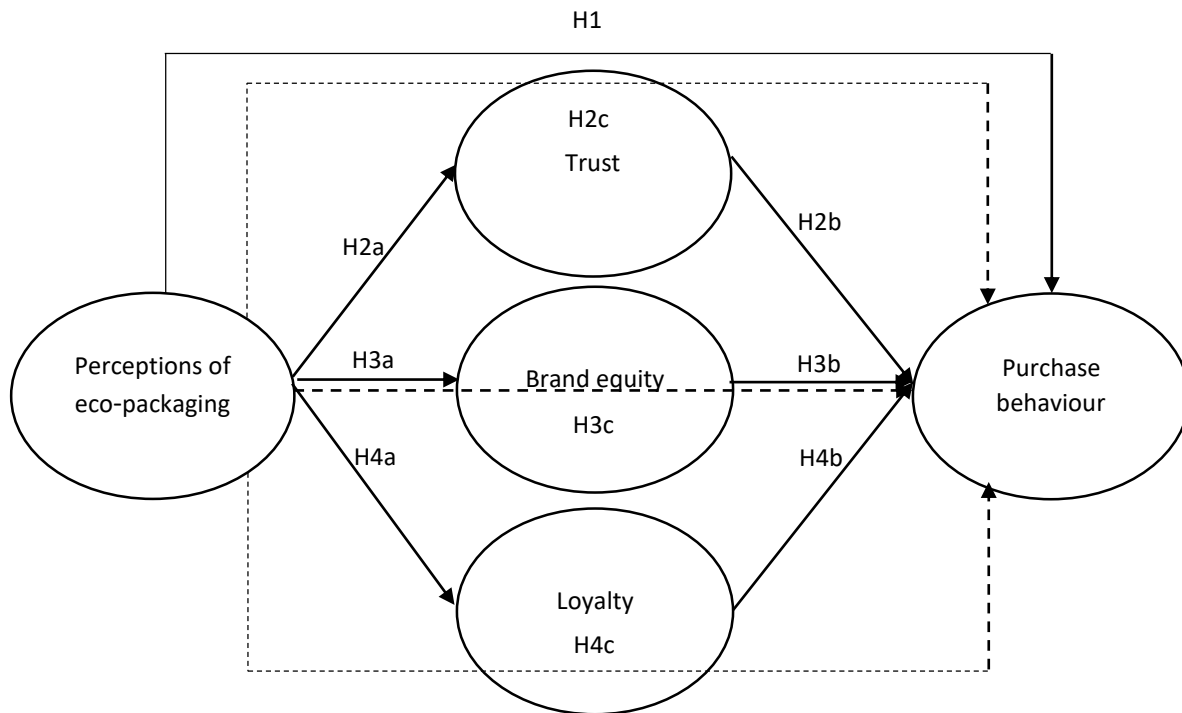


Figure 1. Conceptual model and hypotheses

Data collection procedures

The purpose of this research is to evidence the link between consumer perceptions of eco-packaging and actual purchases of eco-packaged goods. In other words, the study seeks to answer the following question: To what extent do perceptions of eco-packaging impact the purchase of eco-packaged goods? The concept of eco-packaging remains ambiguous and research to date has done little to lift the veil of ambiguity. As a consequence, the authors first conduct an exploratory study to identify the attributes linked to eco-packaging and to help determine the elements used to qualify packaging as eco-friendly. A confirmatory study subsequently tests the research hypotheses.

Exploratory study

The initial phase is exploratory and involves the detailing of the components of the eco-packaging construct by means of an analysis of academic and professional literature on eco-design and packaging. This exploratory stage enables the authors to identify and classify the principal attributes of eco-packaging and to shed light on the difference between eco-packaging and green or eco-friendly packaging.

Within the framework of this research, the authors rely on a corpus of academic and managerial research to characterize eco-packaging based on five categories of key attributes corresponding to the five lifecycle stages generally accepted in industrial ecology circles, namely: (1) materials [raw materials extraction stage]; (2) design, structure and graphic attribution [manufacturing stage]; (3) transport [distribution stage]; (4) consumption [usage stage]; (5) reuse [end-of-lifecycle stage]. Eco-packaging attributes are incorporated into each stage of the packaging lifecycle.

- (1) Raw materials extraction: Two principles guide the raw materials selection process. The first relates to the use of renewable, recyclable or other materials more respectful of the environment. The second relates to the reduction in non-recyclable components.
- (2) Manufacturing: Allowance is made for environmental considerations during the packaging design and structure process. More precisely, at the design level, one must pinpoint the sources of the packaging's environmental impact. At the structure level, it is important to reduce to a minimum or optimize packaging size, weight and shape. Additionally, it is generally necessary to ensure eco-friendly labelling (FSC, SFI, CSA, PEFC) and provide ready visibility and information in this regard in instructions intended for consumers.
- (3) Distribution: Packaging should be efficient and optimized to ensure product conservation.
- (4) Use: Eco-packaging extends the useful life of products. The eco-packaging manufacturing process should take into consideration the relationship between packaging and mode of consumption.
- (5) End-of-life: Generally, eco-packaging is rechargeable, recyclable, even compostable.

The object in pointing out the attributes of eco-packaging is to build a scale of measurement for the concept. Figure 2 visually recaps the principal components of eco-packaging by incorporating both the environmental objective and method of lifecycle analysis.

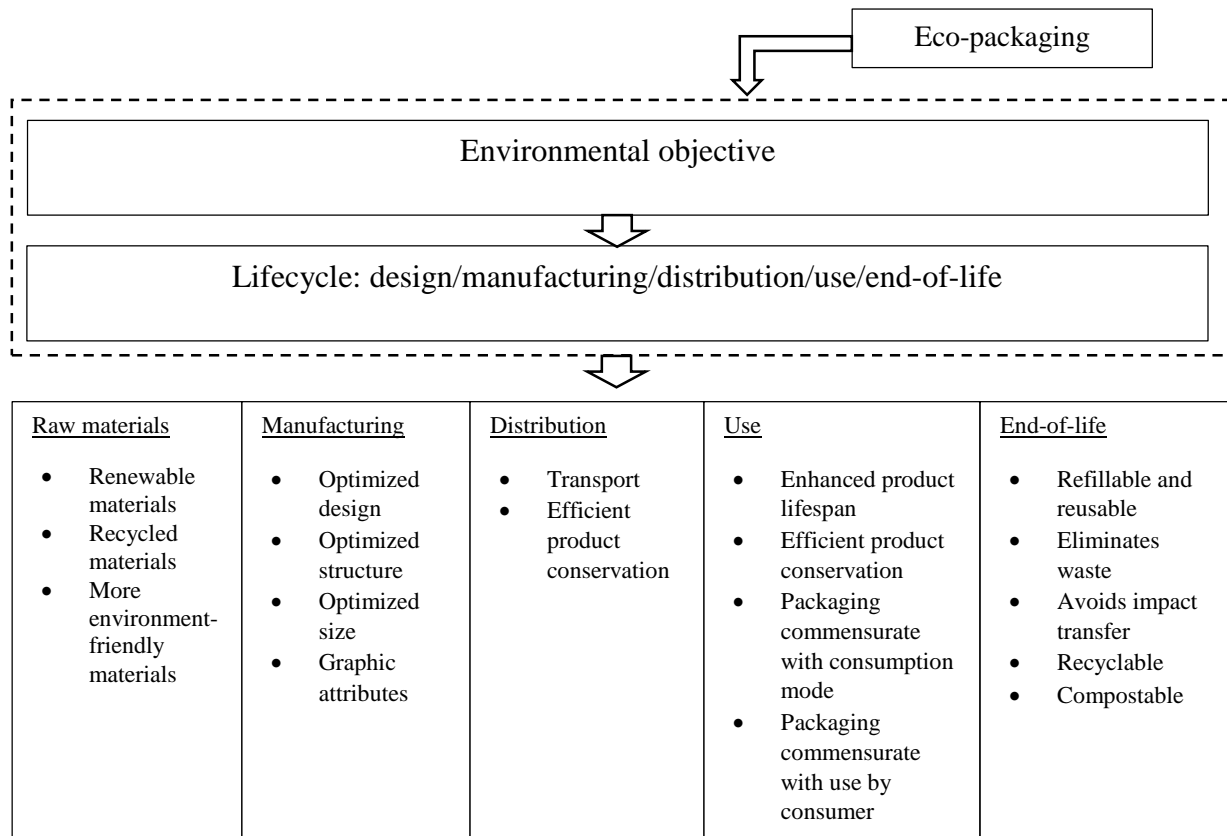


Figure 2. *Components of eco-packaging*

Another objective of the exploratory analysis relates to evidencing the difference between eco-packaging and green or eco-friendly packaging. The level of integration into the packaging lifecycle would appear to differentiate the two concepts [10]. Green packaging incorporates environmental considerations into certain lifecycle stages. By contrast, eco-designed packaging or eco-packaging meets stricter criteria: packaging must make allowance for all stages in the packaging lifecycle. In other words, eco-design relates to deep-seated change intended to enhance packaging by means of a process extending from the procurement of raw materials to end-of-life management.

Confirmatory study

Formulation of instruments of measurement. Construct instruments of measurement are twofold in nature. On the one hand, the scale of measurement for ‘consumer perception of eco-packaging’ is formulated based on the exploratory analysis. More specifically, consumer perception of eco-packaging is measured based on fifteen items defined and grouped together based on the principal components of eco-packaging identified during the exploratory phase.

On the other hand, the instruments of measurement for ‘trust’, ‘loyalty’ and ‘brand equity’ are adapted from previous scales used to measure the constructs. The concept of brand ‘trust’ is

measured based on six items sourced from work by Swaen and Chumpitaz [18]. Four items measuring brand equity from the consumer standpoint are adapted from work by Yoo, Donthu and Lee [28], and Hoeffler and Keller [31]. The scale used in this research to measure loyalty is adapted from Swaen and Chumpitaz [18]. This scale comprises three items based on cognitive, affective and behavioural attachment to the brand, as well as positive word-of-mouth in the interest of the brand. The items used to measure the different constructs are all analysed on a ten-point Likert-type scale ranging from 'totally disagree' to 'totally agree'.

Data collection. An initial data collection was conducted using an online panel of between 200 and 250 Canadian consumers, and served to pretest the instrument of measurement. The object of the pretest was to reduce the number of ambiguous items of measurement and fine-tune overall measurement. Three items (PERC7, PERC10, PERC 12) from the scale of measurement of 'consumer perception of eco-packaging', three items (CONF1, CONF2 and CONF3) from the 'trust' scale, one item (CAP1) from the 'brand equity' scale, one item (LOY4) from the 'loyalty' scale, and one item (PUR1) from the 'purchase' scale were ultimately deleted as they generated ambiguity and confusion for consumers.

The second phase of data collection related to a broad, Web-based survey of an online, representative panel comprising 936 Canadian consumers. In order to be eligible for the study, consumers needed to be at least 18 years old and to be responsible for the household purchases. The sample was further selected based on pre-set quotas relating to gender and age. This means that we required a certain proportion of men and women as well as specific proportions of consumers from each age group (i.e. 18-24; 25-34; 35-44; 45-54; 55-64; 65 and over). Together with a large sample size, this approach was expected to increase the representativeness of our sample with regards to the total Canadian population, in order to increase statistical power, as well as to improve the generalizability of our results. Accordingly, the sample provided for diversity in terms of gender, age, family income and level of education. Women accounted for 57% of the sample, 36% of respondents were married, 69% had less than an undergraduate degree, 74% reported a family income of less than \$80 000, and 47% were between the ages of 35 and 64 years.

Results

Validation of measurement model

Structural equation modelling. To make allowance for the complexity of the relationships between many of the latent variables, we relied on a technique known as structural equation modelling in order to assess the measurement model. Within the framework of our research, the object was to test for the fit, validity and reliability of the different latent variables (perception, purchase levels, trust, brand equity and loyalty) pertaining to our model. We used the robust maximum likelihood estimate technique (ML-r), as this method makes allowance for issues of non-linearity in large samples as in the case at hand where $n = 936$.

The final measurement model exhibits good fit ($\chi^2_{(307)} = 1254.6832$, CFI = .951, TLI = .944, RMSEA = .057 [.051; .064], GFI = .930, AGFI = .914). With respect to reliability, Cronbach's alphas for each latent variable are greater than 0.8 and therefore higher than the minimum value of .7 recommended by Nunally and Bernstein [32]. In addition, Jöreskog's rho or reliability construct is greater than .9 for all constructs, confirming their reliability. Convergent validity is achieved through level of significance, factor loading value (Lambda value > 0.5) [32] and average value extracted (AVE) (> 0.5) [33]. Discriminant validity is estimated based on a

comparison between the square root value of the construct’s AVE and correlation between this construct and others. Discriminatory validity is said to be confirmed whenever the square root of average value extracted is greater than all correlations [33]. This means that the construct shares more variance with its own indicators than variance associated with other indicators ($AVE > r^2$). These different parameters enable us to conclude that the measurement model demonstrates good quality fit.

Table 1. *Descriptive statistics*

Principal constructs	Mean [scale 1-10]	Standard deviation [scale 1-10]	Coefficient of variation (%) ^a	Internal consistency
Perceptions of eco-packaging	7.51	1.83	24	.96
Trust	5.94	2.09	35	.93
Brand equity	7.05	2.01	29	.94
Loyalty	6.20	2.27	37	.98
Purchases	7.00	1.99	28	.90

Note: ^a coefficient of variation = ratio of standard deviation to the mean.

Analysis and results

A bootstrap mediation procedure [34, 35] is used to test the hypothesized relationships in the model. The Preacher and Hayes macro for SPSS (January 2016 version) serves to determine the mediation effects. Estimates are based on 5000 bootstrap samples. The bootstrap method overcomes the issue of non-normal sampling distribution owing to the indirect effect being a product of parameters *a* and *b* [34, 35, 36]. The bootstrap analysis tests the direct effect of the independent variable on the mediating variable (path *a*), the direct effect of the mediating variable on the dependent variable (*b*), the direct effect of the independent variable on the dependent variable (path *c*), the overall effect of the independent variable on the dependent variable (*c'*), and the indirect effect of the independent variable on the dependent variable through the proposed mediator (path *ab*) [36].

Antecedents of moderators. As shown in Table 4, the results indicate that perceptions of eco-packaging exert a positive direct relationship on the purchase of eco-packaged goods ($\beta = .300, t = 9.831, p < .001$), providing support for H1. Perceptions of eco-packaging also positively influence trust ($\beta = .528, t = 15.745, p < .001$), brand equity ($\beta = .678, t = 22.813, p < .001$) and loyalty ($\beta = .625, t = 16.887, p < .001$), providing support for H2a, H3a, and H4a. Hence, consumer perceptions of eco-packaging positively impact trust, brand equity and loyalty, in a direct relationship.

Table 2. *Confirmatory factor analysis and convergent validity*

Items	λ_i^d
<i>(Lead-in question: Of the following attributes, which best describes eco-responsible packaging? Please indicate the level of importance you would attribute to each of the items below (from 'not at all important' to 'totally important')</i>	
1. Perceptions of eco-packaging ($\alpha^a = .961$, $\rho^b = .960$, $AVE^c = .643$)	
Packaging made from renewable materials	.869
Packaging made from recycled materials	.905
Packaging made from vegetable matter747
Packaging is recyclable	.895
Packaging is compostable	.832
Packaging is biodegradable890
Packaging is reusable	.777
Packaging bears indication that product is recycled	.743
Packaging reduced to a minimum (required least possible amount of raw materials)788
Paper or cardboard packaging made using fibre from sustainably managed forests	.747
Packaging made from materials respectful of environment	.859
Packaging bears clear indication of method of disposal725
<i>(Lead-in question: To what extent do you agree with the following statements about brands which make an effort to use packaging more respectful of the environment?)</i>	
2. Confidence ($\alpha = .927$, $\rho = .917$, $AVE = .786$)	
These brands of products instill a sense of assurance in me	.854
I am confident about the quality of these brands of products	.910
Purchasing these brands of products is a guarantee of quality	.894
3. Brand capital ($\alpha = .944$, $\rho = .934$, $AVE = .826$)	
Even if products by other brands featured the same characteristics, I would prefer to purchase these	.901
Even were I to come upon other brands with products just as good, I would prefer these	.913
If products by other brands were similar on all counts, it would be preferable to purchase these	.912
4. Loyalty ($\alpha = .978$, $\rho = .979$, $AVE = .939$)	
I resonate more with these products	.951
I am more attached to these products	.986
I am more loyal to these products	.970
<i>(Lead-in statement: Please indicate whether or not you generally adopt this type of behaviour respecting day-to-day purchases)</i>	
5. Purchase ($\alpha = .896$, $\rho = .924$, $AVE = .755$)	
I favour products which use less packaging	.748
I favour the purchase of products sold in reusable or recyclable containers or packages	.819
I favour the purchase of goods made from recyclable materials	.944
I favour the purchase of recyclable products	.948

Note: $\chi^2_{(307)} = 1254.6832$, CFI = .951, TLI = .944, RMSEA = .057 [.051; .064], GFI = .930, AGFI = .914. ^a α denotes Cronbach's alphas;

^b ρ denotes Jöreskog's Rhos; ^c AVE denotes average variance extracted; ^d λ_i denotes path loadings.

Table 3. Correlation matrix and average variance extracted for principal constructs

	1	2	3	4	5
1. Perceptions of eco-packaging	.802				
2. Trust	.486*	.887			
3. Brand equity	.634*	.694*	.909		
4. Trust	.467*	.777*	.686*	.969	
5. Purchases	.627*	.594*	.717*	.596*	.869

Note: *denotes significant correlations at the $p < .01$ level. Diagonal elements in bold represent square root of AVE.

Table 4. Results of multivariate and bootstrap mediation tests^a

	Path	Trust (mediator)	Brand equity (mediator)	Loyalty (mediator)	Purchase behaviour
Perceptions of eco-packaging → DV	<i>c</i>				.300***
Perceptions of eco-packaging → Mediators	<i>a</i>	.528***	.678***	.625***	
Trust → DV	<i>b1</i>				.063*
Brand equity → DV	<i>b2</i>				.348***
Loyalty → DV	<i>b3</i>				.130***
Perceptions of eco-packaging → DV	<i>c'</i>				.650**
Overall F					526.64***
R ²					.733
Adj R ²					.538
Mediation 95%	<i>ab</i>				.350
Confidence Interval					(.29, .41)
Mediation					Partial

* $p < .05$ ** $p < .01$ *** $p < .001$

^a Path *a* = direct effect of independent variable on mediating variable

Path *b* = direct effect of mediating variable on dependent variable

Path *c* = direct effect of independent variable on dependent variable

Path *c'* = overall effect ($ab + c$)

Path *ab* = indirect effect of independent variable on dependent variable through proposed mediator

Effects of mediators on purchase behaviour. H2b, H3b and H4b predicted that trust, brand equity and loyalty would positively impact purchase behaviour respecting eco-packaged goods. Results fully support these hypotheses. The significant relationships between trust and purchase ($\beta = .063, t = 1.989, p < .050$), brand equity ($\beta = .348, t = 10.778, p < .001$) and loyalty ($\beta = .130, t = 4.370, p < .001$) lend support to H2b, H3b and H4b. Collectively, these results

indicate that the three mediators under study lead to greater levels of purchases of eco-packaged goods, in a direct relationship.

Mediation test. According to earlier literature [e.g. 36], full mediation occurs whenever a non-significant direct path from an independent variable to a dependent variable (*c* path) occurs together with a significant indirect path (*ab* path); partial mediation is found when both the indirect (*ab*) and direct (*c*) paths are significant. The coefficient estimates for the direct and indirect effects appear in Column 6 of Table 4. Brand equity partially mediates the path from perceptions of eco-packaging to purchase behaviour since there is both a significant indirect effect ($\beta = .236, z = 9.738, p < .001$) and a significant direct effect ($\beta = .300, t = 9.831, p < .001$). Likewise, loyalty partially mediates the path from perceptions of eco-packaging to purchase behaviour since there is both a significant indirect effect ($\beta = .081, z = 4.224, p < .001$) and a significant direct effect ($\beta = .300, t = 9.831, p < .001$). However, trust does not mediate the relationship between perceptions of eco-packaging and purchase behaviour; whereas the direct path ($\beta = .300, t = 9.831, p < .001$) and indirect path are significant ($\beta = .033, z = 1.969, p < .05$), zero as a value is included in the 95% confidence interval provided by the bootstrap analysis (-.009, .077). Given that bootstrap results are more robust; findings can be said to substantiate non-mediation. Three additional distinct models were tested with each mediator alone. Results confirm a partial mediation effect when either brand equity or loyalty is inserted as the mediator, but no mediation effect when trust is inserted as the mediator.

Alternative model. In order to rule out alternative modelling of our variables, we conducted a moderation analysis using trust, brand equity and loyalty as moderators instead of mediators on the perception-purchase relationship. We used the bootstrap script PROCESS for moderation analysis, on 5,000 resamples and found that a moderation model provides insignificant results. Although each moderator exerts a significant and directional direct effect on the dependent variable, the indirect moderation effects with perceptions of eco-packaged goods, are non-significant and non-directional for trust ($\beta = -.027, t = -1.837, n.s.$), brand equity ($\beta = -.002, t = -.182, n.s.$), and loyalty ($\beta = -.005, t = -.357, n.s.$). Collectively, these findings rule out a potential moderation configuration for trust, brand equity and loyalty, and lend further support to a mediation effect instead.

An interpretation of the mediation results therefore provides a deeper explanation of the role of trust, brand equity and loyalty. Partial mediation of perceptions of eco-packaging on purchases of eco-packaged goods means, first and foremost, that brand equity, followed by loyalty, strengthens the positive effect of perceptions of eco-packaging on purchases of eco-packaged goods because both direct and indirect effects are positive and significant. These results support both H3c and H4c. Surprisingly, the lack of a significant indirect effect of perceptions of eco-packaging on purchases of eco-packaged goods indicates that trust does not strengthen the positive effect of perception of eco-packaged goods on purchase behaviour since the indirect effect, albeit directional, is non-significant. This result invalidates H2c.

Discussion

In the current context in which consumers over-estimate the positive impact of eco-packaged goods and under-estimate the functional value of packaging, businesses may simultaneously face growing demands from regulators and society alike for eco-packaging [3, 4,

5]. Managers, especially, ethically-oriented ones, are therefore increasingly confronted with the issue of replacing conventional packaging, criticized for being highly polluting, with a more ecological alternative [1, 2]. Yet, the literature provides little guidance with regards to consumer reaction to eco-packaging, especially with regards to the process underlying eco-packaged goods purchase behaviour [10, 37, 38]. This study is based on the assumption that a better understanding of consumers' reactions to eco-packaging may provide useful guidance to managers, in order to make more enlightened decisions, with regards to eco-packaging adoption.

This study investigates, therefore, the impact of consumer perceptions of ecological packaging on actual purchases of eco-packaged goods, through three key influencing variables in consumer decision-making. The research thus has direct implications for the decision-making processes pertaining to the introduction of eco-packaged goods. Our findings first reveal how eco-packaging is different from green packaging. Further, the results reveal that actual purchasing behaviour can be generated through enhanced consumer perception of brand equity and loyalty to a company. More concretely, the study evidences that perception of brand equity and loyalty are mediators of the relationship between perceptions of eco-packaging and purchases of eco-packaged goods. These research outcomes warrant further discussion.

We answer the first question of this study by providing a definition of eco-packaging. We find that ecological packaging is more inclusive than green packaging, since eco-packaging entails deep-seated change of the entire packaging process from raw materials extraction to end-of-life disposal. Eco-designed packaging or eco-packaging can therefore be defined as a form of eco-design of the packaging which requires deep-seated change intended to enhance packaging by means of a process extending from the procurement of raw materials to end-of-life management. Informative prompts should therefore be inserted on packaging in keeping with the signalling model by Spence [14] to ensure that consumers are able to distinguish the non-observable characteristics of eco-packaging (e.g. materials used to produce packaging derive from sustainably managed sources) from observable signals (e.g. label), thereby reducing uncertainty. The exploratory study of perceptions of eco-packaging further suggests a 12-item construct which captures most facets of perceptions of eco-packaging in respect to the five-stage lifecycle designed to render packaging truly ecological.

These results have important implications because we provide empirical evidence that purchases of eco-packaging can be enhanced by building perceptions of trust among consumers through open disclosure of the sustainable nature of the packaging and production process, and responding to consumer queries in a timely, perceptive manner. Purchases may also be enhanced by building stronger brand equity which entails positioning a brand as sustainable and environmentally responsible. Lastly, sales may be augmented by bolstering loyalty through portrayal of the company as a responsible corporate citizen intent upon taking action to improve the environment for the betterment of consumers and the community at large (e.g. provide facts detailing reduced waste production or the proportion of reusable raw materials in eco-package recycling).

In response to the second and third research question, we find that eco-packaging exerts both direct and indirect effects on eco-packaged goods purchase, especially through brand equity and loyalty.

First, in line with previous studies [10, 37, 38], we find that perceptions of eco-packaging boost purchase behaviour. We also enrich previous results in topical literature by highlighting the indirect effects of perceptions of eco-packaging through important predictors. In keeping with

previous literature on the positive impact of brand equity on purchases [27], which represents added product value [5], we find a significant effect of brand equity on purchase behaviour. However, in contrast to previous research efforts, the results of this study show that brand equity enhances the positive and directional effect of eco-packaging perceptions on purchases of eco-packaged goods. Brand equity notably displays the most important indirect effect when compared with that of either loyalty. This finding supports prior research with respect to the role of sustainable efforts made by companies in relation to brand equity [31]. Whereas previous research emphasizes that companies can improve brand equity through the creation of a “cause”, the latter generally represents a distinct departure from core company activities [39]. Based on our findings relating to brand equity, sustainability efforts by companies aimed at enhancing brand equity need not necessarily be remote, far-fetched causes with no link to the company. Rather, efforts could actually be deployed within company ranks in keeping with core business processes, such as company products and the packaging pertaining to these products.

Second, previous literature demonstrates that environmental signals emanating from packaging combined with loyalty may exert an impact [37]. Our results lend empirical support to that claim by showing a positive indirect effect of perceptions of eco-packaging and purchases of eco-packaged goods through loyalty. This finding is substantiated by prior research which examines the nature of loyalty and defines the latter as the result of a comparison of benefits within a specific category of goods [30]. Past research therefore illuminates our results suggesting that perceptions of eco-packaging lead consumers to perceive higher benefits, spurring the likelihood of re-purchases, which is a form of loyalty, and boosting overall purchases. Based on this finding, a company’s appealing, straightforward mention of the ecological nature of packaging may enhance perceptions of the benefits associated, not only with the packaging, but also with the goods themselves. This may ultimately help boost overall purchases of eco-packaged goods.

Third, eco-design and eco-packaged goods are considered responsible corporate initiatives [5]. Prior research points to a positive relationship between responsible company initiatives, in general, and consumer trust [18]. Our results support this positive relationship. However, we find the mediating role of trust on the relationship between perceptions of eco-packaging and purchases of eco-packaged goods to be non-significant. This is rather surprising given the central importance of trust as an antecedent and mediating variable for conventional purchases [20]. Our study suggests that action taken to provide more salient eco-packaging prompts and signals would not increase sales as a result of increased consumer trust in the company.

Overall, the findings indicate that consumers do not base purchases of eco-packaged goods on trust in a company’s efforts but rather, on increased brand equity and loyalty. It is through the perception of more positive associations ascribed to the brand or company, as well as greater perceived benefits related to eco-packaged goods, that perceptions of eco-packaging translate into increased purchases of eco-packaged goods.

Managerial Implications

This research provides insights into the role played by the eco-packaging characteristics perceived by consumers in generating perceptions of trust, brand equity and loyalty towards eco-packaged goods. Results show that perceptions of eco-packaging positively impact

purchases of eco-packaged goods. In sum, goods displaying eco-packaging characteristics are more likely to be purchased.

In addition to findings that perceptions of eco-packaging, trust, brand equity and loyalty directly and positively impact purchases of eco-packaged goods, our research reveals, for the first time, two indirect routes leading to purchases of eco-packaged goods. In the first instance, perceptions of eco-packaged goods can positively impact purchase behaviour through the mediating role of brand equity. This finding identifies perceptions of brand equity as the most important mediating construct in the context of responsible purchasing. According to Yoo, Donthu and Lee [28], the four variables of the marketing mix which matter the most, in terms of modulating brand equity and packaging, relate to the 'P' for product. It would therefore appear relevant to combine the offering of eco-packaged products with other, often overlapping elements of the marketing mix such as, responsible communications ('P' for promotion), sustainable supply and distribution ('P' for place), and lower pricing as a result of a decrease in materials required for packaging and/or product ('P' for pricing). From a global perspective, these variables may need to be adjusted based on the international markets in which a company sells goods. However, past research points out that there are discrepancies with respect to concerns over and attitudes towards the environment in regions across the globe, with some countries and populations being more sensitive to the issue than others owing to a variety of transnational factors and determinants [40]. Hence, stressing efforts deployed to achieve eco-packaging through responsible communications (promotion) or even on-package information may be less relevant and appropriate in some countries. Managers need to carefully assess the sensitivity of consumer markets to the environment and issues relating thereto. They must further ascertain the extent to which environmental concerns have been integrated into national level politics [40].

In regard to the second route, perceptions of eco-packaging positively impact purchase behaviour through the mediating role of loyalty. Drawing upon past findings which indicate that loyalty derives from comparisons of benefits within a specific category of goods [30], it therefore matters that companies demonstrate the superiority of eco-packaged goods compared with their conventionally packaged counterparts. In so doing, consumers may perceive higher levels of benefits for eco-packaged goods than for others, possibly leading to more frequent purchases. Ultimately, the eco-packaged goods might become the habitual choice and represent the habitual purchase behaviour, indicating a form of brand loyalty. From an international perspective, it might be interesting for managers to determine the ecological footprint and environmental impact of competing goods, especially those which are imported and which typically require not just more, but heavier duty packaging to survive lengthy transport routes. In so doing, managers could include this aspect as an additional variable with respect to which consumers can compare goods, hopefully in favour of companies advocating the benefits of eco-packaging.

Limitations and direction for future research

This research has several limitations. Although generalizability is ensured to the best of our ability by using a sample representative of the population, generalizability of population-related findings is limited because of the use of cross-sectional instead of experimental methodology. Cross-sectional methods typically lack the causality inherent to experiments. Furthermore, the cross-sectional nature of the work does not allow for the testing of the longer

term effects of the different mediators. To overcome both limitations, future research might consider implementing experiments as well as longitudinal studies which could better test for causality and provide a more thorough understanding of the role of the mediators with respect to eco-packaging purchases over time.

The exploratory study conducted to identify the key characteristics of eco-packaging did not enable us to identify the motivations which drive consumers to choose eco-packaging over conventional packaging. In addition, we only used actual purchases of eco-packaged goods as a dependent variable and did not include purchases of conventionally packaged goods as well. We were therefore not able to identify actual consumer preference for eco-packaged goods as opposed to conventionally packaged goods. Future studies might include other potential antecedents for the purchase of eco-packaged goods and examine actual preferences for them by controlling variables such as brand preferences and perceived quality, as well as demographic variables such as age and gender.

Lastly, we measured only the behavioural aspect of consumers with respect to the dependent variable. However, certain effects of eco-packaging are translated at an attitudinal level (i.e. affect). Future research might measure affective reactions of consumers with regard to eco-packaged goods to explain purchasing behaviour more fully.

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Examination of a Specific Form of Eco-design

The Case of Eco-packaging

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Abstract

Eco-packaging can be defined as packaging designed to have a lesser environmental and ecological impact with a view to meeting more stringent environmental regulations and responding to ever increasing public sensitivity to environmental issues. For managers, investment in an eco-packaging process remains debatable given uncertainty linked to real return on investment. A study by a representative panel of 936 consumers reveals that perceptions of eco-packaging directly impact consumer propensity to purchase. Besides, the positive relationship between perceptions of eco-packaging and purchases of eco-packaged goods is indirectly supported by an increase in an organization's perceived brand equity and enhanced customer loyalty towards the organization. Collectively, these results provide a priori support for a managerial orientation towards eco-packaging.

Keywords: Eco-packaging; eco-design; brand equity; loyalty; purchase behaviour; mediation analysis.

French abstract*

Examination of a Specific Form of Eco-design: The Case of Eco-packaging

Examen d'une forme spécifique de l'éco-conception: le cas de l'éco-emballage

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Résumé

Les emballages écologiques peuvent être définis comme des emballages conçus pour avoir un moindre impact environnemental et écologique en vue de respecter des réglementations environnementales strictes et de répondre à une sensibilité toujours plus grande du public aux questions environnementales. Étant donné l'incertitude quant au retour réel sur investissement, pour les managers l'investissement dans l'éco-emballage reste discutable. Une étude réalisée auprès d'un panel représentatif de 936 consommateurs révèle que la perception d'un éco-emballage influe directement sur l'intention d'achat des consommateurs. Par ailleurs, la relation positive entre les perceptions de l'éco-emballage et les achats de biens éco-emballés est indirectement favorisée par une amélioration de l'image de marque perçue d'une organisation et par une fidélisation accrue de la clientèle envers l'organisation. Dans l'ensemble, les résultats appuient *a priori* une orientation managériale vers l'éco-emballage.

Mots-clés: Eco-packaging; éco-conception; capital de marque; fidélité; habitudes d'achat; médiation.

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German abstract*

Examination of a Specific Form of Eco-design: The Case of Eco-packaging

Untersuchung einer spezifischen Form von Öko-Design Der Fall der Öko-Verpackung

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Kurzfassung

Öko-Verpackung kann definiert werden als Verpackung die entworfen wurde, um geringere ökologische Auswirkungen zu haben, mit dem Ziel strengerer ökologischer Regularien gerecht zu werden und als Antwort auf eine stetig steigende öffentliche Sensibilität für Umweltaspekte. Für Manager bleibt die Investition in einen Öko-Verpackungsprozess aufgrund der Ungewissheit bezüglich der tatsächlichen Rendite der Investition umstritten. Eine Studie eines repräsentativen Panels von 936 Konsumenten zeigt, dass die Wahrnehmung von Öko-Verpackung einen direkten Einfluss auf die Kauffreudigkeit der Konsumenten hat. Zudem wird die positive Beziehung zwischen der Wahrnehmung von Öko-Verpackung und dem Kauf von Waren in Öko-Verpackung indirekt unterstützt durch die Steigerung des wahrgenommenen Markenwerts der Organisation und wird durch die Kundenloyalität gegenüber der Organisation unterstützt. Zusammengefasst liefern diese Ergebnisse a priori Unterstützung für eine Managementorientierung in Richtung Öko-Verpackung.

Keywords: Öko-Verpackung; Öko-Design; Markenwert; Loyalität; Kaufverhalten; Mediationsanalyse

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Spanish abstract*

Examination of a Specific Form of Eco-design: The Case of Eco-packaging

Evaluación de una Forma Específica de Diseño Ecológico

El caso del Eco-packaging

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Resumen

Los envases ecológicos pueden definirse como envases diseñados para tener un menor impacto medioambiental y ecológico con el fin de cumplir con las regulaciones medioambientales más estrictas y responder a la creciente sensibilidad del público hacia las cuestiones ambientales. Para los directivos, la inversión en un proceso de envasado ecológico sigue siendo discutible dada la incertidumbre vinculada al rendimiento real de la inversión. Un estudio realizado por un panel representativo de 936 consumidores revela que las percepciones de los envases ecológicos impactan directamente la propensión del consumidor a comprar. Además, la relación positiva entre las percepciones de envasado ecológico y las compras de bienes envasados ecológicamente está respaldada indirectamente por un aumento en la percepción del valor de marca de una organización y una mayor lealtad del cliente hacia la organización. En conjunto, estos resultados proporcionan un apoyo a priori para una orientación gerencial hacia el eco-packaging.

Keywords: Eco-embalaje; Diseño ecológico; Marca de equidad; Lealtad; Comportamiento de compra; Análisis de mediación.

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Italian abstract*

Examination of a Specific Form of Eco-design: The Case of Eco-packaging

Esame di una Modalità Specifica di Eco-design il Caso di Eco-packaging

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Abstract

L'Eco-packaging può essere definito come il packaging che un impatto ambientale ed ecologico inferiore in proiezione di rispettare normative ambientali più stringenti e rispondere ad una sensibilità sempre maggiore da parte del pubblico sul tema ambientale. Per i manager, l'investimento in un processo eco-packaging resta tema di dibattito a causa dell'incertezza legata al ritorno reale sull'investimento. Uno studio fatto su un gruppo di 936 consumatori rivela che le percezioni di eco-packaging hanno un impatto diretto sulla propensione di acquisto del consumatore. Inoltre, la relazione positiva fra le percezioni rispetto all'eco-packaging e gli acquisti di prodotti imballati in eco-packaging è indirettamente supportata da un incremento nel valore del brand aziendale e incrementa la fidelizzazione della clientela verso l'organizzazione. Nell'insieme, questi risultati danno in se supporto per un orientamento manageriale verso l'eco-packaging.

Keywords: Eco-packaging; eco-design; valore del brand; fidelizzazione; comportamento di acquisto; analisi della mediazione.

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Chinese abstract*

Examination of a Specific Form of Eco-design: The Case of Eco-packaging

检验生态设计的具体形式： 环保包装的情况

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摘要

环保包装定义为以满足更严格的环境法规和响应不断增加的公众对环境问题的敏感性为目的，具有较小的环境和生态影响的包装设计。对于管理者来说，由于投资回报的不确定性，对环保包装过程的投资仍然存在争议。由936名消费者构成的一项研究表明，对环保包装的认知直接影响消费者的购买倾向。此外，环保包装的认知和购买环保包装产品的积极关系间接得到了组织感知品牌资产的增加和不断提高的客户忠诚度的支持。总的来说，本文的研究结果为对于环保包装的管理导向提供理论支持。

Keywords: 关键词，环保包装，生态设计，品牌资产，忠诚，购买行为，中介分析。

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