Title	Can ecosystem services certification enhance brand competitiveness of certified products?
Author(s)	Jaung, Wanggi; Putzel, Louis; Naito, Daisuke
Citation	Sustainable Production and Consumption (2019), 18: 53-62
Issue Date	2019-04
URL	http://hdl.handle.net/2433/242945
Right	© 2018 The Authors. Published by Elsevier B.V. on behalf of Institution of Chemical Engineers. This is an open access article under the CC BY license(http://creativecommons.org/licenses/by/4.0/).
Type	Journal Article
Textversion	publisher

Sustainable Production and Consumption 18 (2019) 53–62

Contents lists available at ScienceDirect

Sustainable Production and Consumption

journal homepage: www.elsevier.com/locate/spc

Research article

Can ecosystem services certification enhance brand competitiveness of certified products?

Wanggi Jaung [a,*], Louis Putzel [b], Daisuke Naito [b,c]

[a] Department of Biological Sciences, National University of Singapore, Singapore
[b] Center for International Forestry Research, Bogor, Indonesia
[c] Center for Southeast Asian Studies, Kyoto University, Kyoto, Japan

ARTICLE INFO

Article history:
Received 22 July 2018
Received in revised form 8 December 2018
Accepted 8 December 2018
Available online 13 December 2018

ABSTRACT

Many ecolabels support sustainable production and consumption related to ecosystem services and could be used as a basis to develop ecosystem services certification. To generate a price premium and attract buy-in from producers, such a certification would need to boost the brand equity of the certified product above the competition. This study tests the feasibility of such an effect by analyzing the brand equity of certified bottled water using a choice experiment with 529 households in Lombok, Indonesia. Our results revealed enhanced brand equity of certified bottles, indicating an impact of ecolabel logos used to represent certification. However, the enhancement neither exceeded brand equity of competing brands of bottled water, nor reflected different values associated with the ecolabel logos. These results imply challenges for certification uptake in a competitive market, a need for branding and marketing of certification, and the importance of brand-competitiveness analysis in price premium studies.

1. Introduction

Ecosystem services[1] certification is a potential tool to support the integration of ecosystem services conservation into sustainable consumption and production. However, launching a certification system from scratch is costly. Existing ecolabels could support the development of ecosystem services certification[2] by sharing the systems they have already put in place. For example, the Forest Stewardship Council (FSC)'s label on wood products is connected to standards of practice influencing the management of biodiversity, non-timber forestry products, water, and soil in forests (Jaung et al., 2016a). This connection led to interest in testing a potential expansion of the FSC certification scheme to develop ecosystem services certification (Jaung et al., 2016a,b,c, 2018; Meijaard et al., 2014; Savilaakso and Guariguata, 2017). Such a certification scheme would explicitly require ecosystem services management and quantification. Associated standards might specify how forest managers should ensure and quantify incremental carbon storage in woody biomass and soil, or specify the delivery of clean water to downstream users.

If a certification scheme could effectively improve delivery of ecosystem services and help consumers identify sustainable products, it would support multiple agendas of the United Nations' Sustainable Development Goals (Griggs et al., 2013) as a market-based tool. Indeed, market-based thinking has resulted in a considerable level of debate, first because it tends to shift responsibility for public goods to private corporations and consumers, and second because it can easily fail if not supported by consumer demand and associated economic incentives to producers (Jaung et al., 2016c; Meijaard et al., 2014; Pierce et al., 2003). Without taking a position on the first point, this paper addresses the second by demonstrating an approach to assessing the market potential of a certification system.

As a market-based tool, ecosystem services certification should be able to help certified product brands compete with other brands (Fig. 1). One measure of a product's competitiveness is brand equity, i.e. "brand assets (or liabilities) linked to a brand's name and symbol that add to (or subtract from) a product or service" (Aaker, 1991). This study assumes that to produce a price premium in a competitive market, certification should provide *a competitive boost to the brand equity of certified products*. Some consumers prefer only certified products due to sensitivities about certain attributes of these products (e.g. they prefer organic products) or because of moral tendencies (e.g. they prefer sustainable products). If the brand equity of certified products is low (e.g. Rex and Baumann, 2007), however, these products are unlikely to be chosen

* Corresponding author.
E-mail address: w.jaung@alumni.ubc.ca (W. Jaung).

[1] Ecosystem services refers to all the benefits generated by ecosystems that contribute to human well-being, such as forest ecosystems providing clean water to cities, and mitigating climate change by sequestering carbon (MA [Millennium Ecosystem Assessment], 2005).

[2] For the rest of the paper, *ecosystem services certification* indicates a certification scheme potentially developed from existing ecolabels.

https://doi.org/10.1016/j.spc.2018.12.003

over products with higher brand equity. This not only limits consumer demand for certified brands, but also fails to generate a price premium, thereby reducing the economic incentive for producers to adopt certification. Certainly, price premiums reflect only one of the benefits of certification to producers; some producers use certification to reduce business risk and increase the sustainability of production (Jaung et al., 2016b; Overdevest and Rickenbach, 2006). However, only large or financially secure producers are likely to bear the costs of certification, which are often high (Durst et al., 2006). For this reason, price premiums are a key motivation for producers to enroll in ecosystem services certification (Jaung et al., 2016c). To attract consumers and thereby generate price premiums, a market-based certification would likely need to boost the brand equity of certified products above a certain "competitiveness threshold" defined by the value of competitors' brand equity (Fig. 1).

Under what conditions and to what degree, would ecosystem services certification boost the brand equity of certified products past that competitiveness threshold? For several reasons, this question has not been answered satisfactorily. First, even though ecolabels have been applied as a market-based tool for decades in various industries (Barry et al., 2012; Esteves et al., 2017; Onozaka and McFadden, 2011), *brand-competitiveness analyses* have been dismissed in market studies of certification. This is because the main uptake strategies of ecolabels have been political (e.g. boycotts on producers) rather than market based (e.g. marketing of ecolabels to consumers) (Archambault, 2006; Barry et al., 2012; Rex and Baumann, 2007). In addition, most market studies of certification are *individual product-level analyses* focusing on consumers' willingness to pay price premiums on certified products (e.g. Galarraga Gallastegui, 2002; Jaung et al., 2018; Sedjo and Swallow, 2002). Estimations of price premiums made through this product-level analysis (i.e. how much extra a consumer would be willing to pay for certified local coffee) might fail to reflect the price premiums that would be capturable in a competitive marketplace (i.e. whether consumers choose certified local coffee over noncertified top-shelf brands). This failure would contribute to the limited price premiums of ecolabels in practice, even though many market studies expect these premiums (Durst et al., 2006; Overdevest and Rickenbach, 2006; Sedjo and Swallow, 2002; Thøgersen et al., 2012).

Second, we do not know the degree to which existing branding values of ecolabels might enhance the brand equity of certified products when these labels are expanded to ecosystem services certification. For instance, ecolabels may have direct-use values (e.g. signaling that using a product poses reduced health risks to consumers) and/or indirect-use values (e.g. informing consumers that a product was sustainably produced). While one study has assessed consumer preferences for direct- and indirect-use values associated with ecosystem services certification (Jaung et al., 2018), we do not know how the values of existing ecolabels would affect these consumer preferences. The branding of a particular ecolabel is likely to affect the degree to which its extra certification for ecosystem services would elevate the overall brand equity of a product. Such information would be useful to ecolabel initiatives in deciding whether and how to expand their scope to ecosystem services certification.

To mitigate these challenges, this study examines the enhanced brand equity of certified bottled water with ecosystem services certification in West Lombok, Indonesia. To examine this hypothetical certification scheme, the study assumed that: it was developed from existing ecolabels at the study site; it adopts identical logos of these ecolabels; it claims ecosystem services managed by certified bottles; and no marketing efforts were made as is the case for many ecolabels in a market (Archambault, 2006; Cruz and Boehe, 2008; Ham, 2006; Macqueen et al., 2008). Relying on these assumptions, we developed an image-based choice experiment and conducted a face-to-face survey with 529 households. The water bottle images were presented with no emphasis on certification so that consumer demand could be analyzed in a realistic shopping environment. This study has two hypotheses:

- Hypothesis 1: Ecosystem services certification would elevate the brand equity of certified bottled water *above the competitiveness threshold* (i.e. above the brand equity of noncertified competitors) (Fig. 1).
- Hypothesis 2: *Ecolabels with direct-use values* would support ecosystem services certification better than *ecolabels with indirect-use values* in terms of their boost to brand equity.

Hypothesis 1 was designed to test whether ecosystem services certification would generate capturable price premiums for certified bottled water in a competitive market. This certification capacity will affect the feasibility of it functioning as a market-based tool to promote sustainable consumption and production. Hypothesis 2 was built to identify certification design and values that would increase certification demand and improve market performance. Identification of such a design would support improved certification performance. In addition, testing these hypotheses demonstrates the important roles of brand-competitiveness analysis in price premium studies in comparison with product-level analysis, and contributes to empirically explaining why many ecolabels face low price premiums in practice, even though market studies indicate they generate positive price premiums.

2. Literature review

2.1. Brand definition and functions

Branding plays a vital role in business (Aaker, 1991; Aaker and Joachimsthaler, 2012; Keller, 2013). Aaker (1991) defines a brand as "a distinguishing name and/or symbol intended to identify the goods or services of either one seller or a group of sellers, and to differentiate those goods or services from those of competitors". Branding allows consumers to evaluate product characteristics based on previous experiences, saving their time and reducing the risk of purchasing unsatisfactory products (Keller, 2013; Thøgersen et al., 2012). Although it is possible to replicate products and their design, copying a brand is not feasible, making it a valuable business asset in a competitive market (Keller, 2013). Brand equity is the sum of assets or liabilities associated with a brand (Aaker and Joachimsthaler, 2012) and can be measured in terms of the price premium associated with a brand, impact on consumer preferences, replacement value, the stock price, and/or earning power (Aaker, 1991). Brand equity is affected by consumers' brand awareness, perceived quality, brand loyalty, and brand associations (e.g. product quality and organizational associations).

2.2. Enhanced brand equity of certified products

Several studies have addressed the effect of product certification on brand equity. Barry et al. (2012) assert that ecolabels should help companies differentiate their certified products and elevate brand equity. According to Rex and Baumann (2007), marketing is a vital component of ecolabel implementation since changing consumer preferences is a conventional but key strategy in business. Larceneux et al. (2012) consider certification branding as a form of co-branding with product brands, and could have a "halo effect" if it generates strong positive associations. Analyzing the impacts of an organic label on different salmon brands in France, they found that an organic label had a larger positive impact on a product with lower brand equity than one with higher brand equity. Onozaka and McFadden (2011) analyze values of the United States

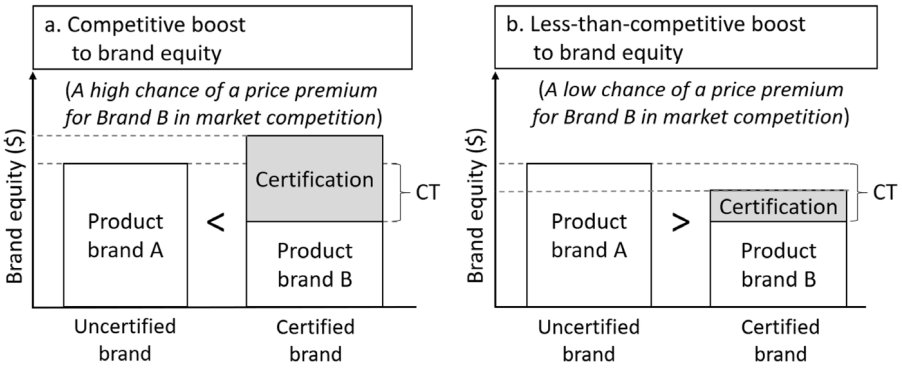


Fig. 1. Competitive and less-than-competitive boost made by certification to brand equity of certified products. (a) shows a case that certification helps a certified brand (or Brand B) increase its brand equity above the brand equity of a competing brand (or Brand A). In this case, a consumer would purchase Brand B so that the certified brand can capture the price premium of certification. (b) shows a case that certification fails to increase the brand equity of Brand B above the brand equity of Brand A. In this case, a consumer would choose Brand A over Brand B so that there is a low chance for Brand B to capture the price premium of certification in market competition. (CT: Competitiveness threshold.)

Department of Agriculture (USDA) organic and Fairtrade labels in comparison with values of "local" and "low carbon" production on apples and tomatoes in the United States. They found that a claim of local origin increased consumers' willingness to pay for the products more than the USDA label, while the Fairtrade label increased the willingness to pay for certified apples but decreased it for tomatoes. In contrast to the above studies, this one conceives of a new approach, i.e. assessing the potential "competitive boost" to brand equity of certified products. Assessment of this attribute of certification contributes to filling a gap in the literature.

3. Methods

3.1. Choice experiment

To test the hypotheses, this study employed a choice experiment as it allows estimates to be made of demand for nonmarket goods or services, such as ecosystem services certification, in terms of their expected or scenario-based characteristics (Bateman et al., 2002; Louviere et al., 2000). Choice experiments have been used in a number of certification studies (e.g. Onozaka and McFadden, 2011; Thøgersen and Nielsen, 2016) and have also been used to analyze brand equity, using the measure of marginal willingness to pay (e.g. Aaker, 1991; Erdem et al., 2002; Erdem and Swait, 1998).

A random utility model was established to conduct a choice experiment with potential buyers of bottled water in Lombok, Indonesia, expressed as Eq. (1) (Train, 2009):

$$U_{ni} = V_{ni} + \varepsilon_{ni} \forall j \tag{1}$$

where U_{ni} is the random utility of a buyer n with a brand of bottled water i. The utility is the sum of V_{ni} and ε_{ni}, where V_{ni} is a random utility observable from a buyer and ε_{ni} is her unobservable random utility. The model assumed that a buyer is a rational decision maker and will select a brand maximizing her random utility. If there are J number of brands, the buyer would select the brand i offering the highest random utility among brands of bottle water in a market. If we apply maximum likelihood estimation, the probability for a buyer to prefer the brand i to the brand j is denoted as:

$$P_{ni} = \text{Prob}(V_{ni} + \varepsilon_{ni} > V_{nj} + \varepsilon_{nj} \; \forall j \neq i) \tag{2}$$
$$= \int_{\varepsilon} I(V_{ni} + \varepsilon_{ni} > V_{nj} + \varepsilon_{nj} \; \forall j \neq i) f(\varepsilon_{nj}) d\varepsilon_n$$

where $I(\cdot)$ is a probability function and $f(\cdot)$ is a distribution function of ε_n. If $f(\varepsilon_n)$ is logistically distributed, the probability can be:

$$P_{ni} = \frac{\exp^{V_{ni}}}{\sum_j \exp^{V_{nj}}} \tag{3}$$

Different assumptions of a distribution of ε_n result in different choice experiment models. A multinomial logit model assumes that ε_n is independently and identically distributed (iid). This iid assumption can be tested with the Hausman–McFadden test (Hausman and McFadden, 1984). A mixed logit model assumes that ε_n is randomly distributed following a distribution defined by researchers.

To test the hypotheses, we developed four groups of certification attributes: (1) brands of bottled water, (2) ecolabel brands, (3) ecosystem services claims, and (4) prices of bottled water (Table 1). The first attribute group was designed to estimate the brand equity of major water bottle brands in West Lombok. *No brand* – or blank brand – was used to establish a baseline for all attributes. This bottle bore text only ("a water bottle company") without a logo. The other three brands were: *Narmada*, a local Lombok water bottle brand; *Cleo*, a national Indonesian water bottle brand; and *Aqua*, a regional Southeast Asian water bottle brand. All attributes were analyzed in comparison with the baseline brand. All of these brands produce diverse sizes of bottled water from 600 ml to 19L. The choice experiment was designed based on 600 ml.

The second attribute group was established to measure the impacts that existing ecolabels have on their potential expansion to ecosystem services certification. Three certification brands were selected based on their direct-use values (e.g. production quality or health risk reduction), and/or indirect-use values (e.g. forest safeguards). All these brands were also available at the study site. *No ecolabel brand* was used as a baseline for all attributes. Asosiasi Perusahaan Air Kemasan Indonesia (ASPADIN) is a certification scheme run by an association of bottled water companies in Indonesia (ASPADIN [Asosiasi Perusahaa Air Kemasan Indonesia], 2018). The association supports improving water bottle production and the business of the members; although it is not an ecolabel, it was considered to provide direct-use values (e.g. quality control) to consumers. USDA runs an organic certification scheme (USDA [The United States Department of Agriculture], 2018). As an ecolabel, it provides both direct-use values (e.g. low health risk) and indirect-use values (e.g. environmental protection). This scheme can be also applied to downstream water quality management if it is used to certify a procedure of upstream farms to reduce their harmful impacts on watersheds (e.g. a reduced runoff of pesticide to watersheds), as in the PES case in Munich, Germany (Barataud et al., 2014; Vlahos and Schiller, 2014). The FSC runs a forest certification scheme designed to certify sustainable timber products (Cashore et al., 2006). It specializes in indirect-use values (e.g. environmental, social, and economic forest safeguards) and has the potential to support downstream water management if used to certify upstream forest safeguards.

Table 1
Choice experiment design.

Attribute group		Attribute	Description
1	Brands of bottled water	– No brand – Narmada – Cleo – Aqua	– No brand, or blank brand (baseline) – Brand in Lombok (local) – Brand in Indonesia (national) – Brand in Southeast Asian countries (multinational)
2	Certification brands	– No certification – ASPADIN – USDA – FSC	– No brand (baseline) – Certification by a water company association (D) – Certification for organic products (D & I) – Certification for sustainable wood products (I)
3	Ecosystem services claims	– No claim – Biodiversity – Low CO_2 – Watershed conservation	– No claim (baseline) – Claim on biodiversity conservation – Claim on low carbon emission – Claim on watershed conservation
4	Prices of bottled water	– IDR 1250 – IDR 2500 – IDR 3750 – IDR 5000	– Prices of bottled water

D: Certification providing direct-use values (e.g. controlling water quality or health risk).
I: Certification providing indirect-use values (e.g. environmental or forest safeguards).

The third attribute group was designed to visually show three different claims of ecosystem services promised by certification, with bottles of water bearing the text "*biodiversity*", "*low CO_2*", and "*watershed conservation*". In addition, *no claim* was used as a baseline. These ecosystem services are common targets of market-based policy instruments, such as payment for ecosystem services (PES) schemes (Ezzine-de-Blas et al., 2016).

The fourth attribute group indicated prices of bottled water, set at Indonesian rupiah (IDR) 1250, IDR 2500, IDR 3750, and IDR 5000, respectively. This range was based on observed prices of bottled water at several supermarkets in Lombok. Unlike the other attribute groups, this group was treated as a continuous variable to measure marginal willingness to pay for brand equity of bottled water and certification.

A fractional factorial design was used to develop images of certified and noncertified bottled water (Louviere et al., 2000) featuring the defined attributes (Fig. 2). These images were used to develop choice experiment questions. Each question had three choices: Water bottle 1, Water bottle 2, and neither of them (or *status quo*). The fractional factorial design generated a total of 32 choice experiment questions based on SAS 9.3 (Kuhfeld, 2010). *D*-deficiency of the design was 100%. The 32 questions were divided into four blocks, each containing 8 questions (4 blocks × 8 questions = 32 questions). Each participant was asked to complete 1 block, or 8 choice experiment questions. During the survey, no emphasis was placed on certification so that participants' preferences could be measured in a realistic shopping environment of bottled water.

The study design had both pros and cons. On the one hand, it had inevitable shortcomings. First, the estimated certification demand would not represent the demand with successful marketing of certification, or perfect market information. Second, the impacts of ecolabels would have been limited on ecosystem services certification since they were originally designed to certify specific products (e.g. organic food, or sustainable wood products). Third, the design did not reflect all potential factors affecting buyers' decisions to choose certified products, such as culture, consumption habits, shopping time, and label design (e.g. Thøgersen and Nielsen, 2016; Thøgersen et al., 2010, 2012).

On the other hand, the design had advantages for testing the hypotheses. First, it allowed a brand-competitiveness analysis for certified products by comparing the brand equity of both certified and noncertified bottled water. Second, it enabled consumer demand for water bottle brands to be estimated in a realistic shopping environment. If consumers had been informed of certification meanings, the information could have altered their preferences. In effect, such provision of information to consumers participating in the survey would have prevented an accurate estimation of certification demand reflecting actual market conditions in which consumer awareness of certification is low (e.g. Archambault, 2006; Cruz and Boehe, 2008; Ham, 2006; Macqueen et al., 2008). Third, it supported testing the impacts of ecolabel values on ecosystem services certification. Ecosystem services certification was hypothetical and new to consumers; meanwhile, the ecolabels used to present the certification scheme have been available in the study site for some time. Thus, consumer preferences for the certification scheme would have been affected by their experiences with these ecolabels and their values.

In developing choice experiment models, we used an alternative specific constant (*ASC*) to capture the average impacts of potential attributes of bottled water that were not included in the choice experiment design (Train, 2009). *ASC* was coded as 1 for the choices of bottled water and 0 for the *status quo* option. Except for the price variable, the choice experiment attributes were also coded as dummy coding. These dummy–coded variables were

Table 2
Descriptive statistics of survey participants ($n = 529$).

Variable	Mean	Std.[b]
Sociodemographic factors		
Age (year)	37.13	11.60
Female (1: yes, 0: no)	0.65	0.50
Education (year)	9.46	4.37
Urban resident (1: yes, 0: no)	0.24	0.42
Monthly household income (IDR)	1,790,566	2,181,401
Monthly bill for piped water (IDR)	51,904	39,376
Satisfaction with bottled water		
Regular purchase as drinking water (1: yes, 0: no)	0.48	0.50
Satisfaction with taste (1: low, 5: high)[a]	3.74	0.99
Satisfaction with smell (1: low, 5: high)[a]	3.78	0.97
Satisfaction with price (1: cheap, 5: expensive)[a]	2.87	0.97
Familiarity with sustainability terms		
Climate change (1: low, 5: high)	2.59	1.46
Recycling (1: low, 5: high)	2.34	1.46
Payments for ecosystem services (1: low, 5: high)	2.15	1.41
Conservation area (1: low, 5: high)	1.57	1.14
Bioenergy (1: low, 5: high)	1.47	0.96
REDD+ or forest carbon market (1: low, 5: high)	1.05	0.31

[a]From regular buyers of bottled water.
[b]Standard deviation.

Fig. 2. Example of choice experiment questions.

defined as either 1 for yes or 0 for no. The models were developed based on R 3.4.1 and the R package mlogit (Croissant, 2015).

Marginal willingness to pay was calculated to estimate the brand equity of bottled water and certification. It was estimated as $(\beta_k/-\beta_c)$, where β_k is a coefficient for the welfare estimation of non-price variables in choice experiment models (e.g. brands of bottled water and ecolabels), and β_c is a coefficient of the water bottle price variable, indicating a change of buyers' incomes (or welfare) from selecting a bottled water scheme due a price of the scheme. Consequently, $\beta_k/-\beta_c$ shows a change of buyers' welfare in a ratio between a non-price variable (β_k) and the price variable (β_c) in the choice experiments. We assumed that the mean estimation (β_c) of the price variable was a constant rather than being a random variable including zero in order to avoid a singularity from dividing β_k by a zero value (Train and Weeks, 2005). Brand equity of bottled water was calculated as the sum of marginal willingness to pay for a brand of bottled water and *ASC*. Marginal willingness to pay for *ASC* supported explaining preferences for bottled water not captured by the choice experiment attributes (Train, 2009). Enhanced brand equity of certified bottled water was calculated as the sum of marginal willingness to pay for certification brands and for their interactions with water bottle brands. Marginal willingness to pay for ecosystem services was excluded in testing the hypotheses, in that it equally affects both product and certification brands, so that its exclusion simplified the tests.

3.2. Data collection

The choice experiment surveys were conducted with households that used piped water in West Lombok, Indonesia. These households were selected for four main reasons. First, West Lombok was a pilot site of a project to analyze a potential expansion of FSC forest certification to ecosystem services (Jaung et al., 2016b). Second, there was interest in the market feasibility of certifying protection of upstream forests related to bottled water production in West Lombok. If available, price premiums for certified bottled water might motivate the producer to join a PES scheme in Lombok. This PES scheme has been implemented in West Lombok since 2009 to reward upstream forest communities for the service of forest watershed protection benefitting piped water users downstream (Diswandi, 2017; Jaung et al., 2016b; Jaung et al., 2018). Third, these households represented consumers of bottled water, relying on bottled water as a main source of drinking water (Prasetiawan et al., 2017). Finally, Jaung et al. (2018) analyze demand of these households for PES certification providing an explanation of the certification meanings, so it was academically intriguing to see whether these preferences would change when they faced other certification schemes.

A face-to-face survey was conducted with 529 households in West Lombok from March to May 2015. A list of households was obtained from a local state water company (known as a "PDAM") who manages the piped water in Indonesia. The survey employed two-stage random sampling. The first stage was based on sub-villages ("dusun" in Indonesian). The second stage was based on households ("rumah tangga"). Six local enumerators supported the survey. All of them received training for choice experiment surveys and could speak both Indonesian and a local language in Lombok (the Sasak language).

Several efforts were made to reduce biases in the choice experiment (e.g. Arrow et al., 1993; Bateman et al., 2002). The payment vehicle of the choice experiment reflected actual market prices of bottled water at supermarkets in Lombok. A consent form was given and explained to participants, and those who agreed were interviewed. A pre-test of the survey was done in Lombok. The survey was conducted in Indonesian, or the local language if preferred by participants. To reduce response biases, we reminded participants of the cost whenever they selected expensive brands of bottled water (e.g. IDR 5000) so that they could reconsider their choice. To decrease random responses, we asked participants to explain the reasons for their choices. To minimize the order effects of choice experiment questions, we shuffled the choice experiment questions once every 2 or 3 days during the survey. To verify the consistency of survey results, we tested the link between participants' incomes and their MWTP for a bottle of water, as well as compared choice experiment results with their regularly consumed brands of bottled water and their awareness of ecolabels.

In addition to the choice experiment, the survey asked about bottled water brands, ecolabels, and socioeconomic conditions of

participants (Table 2). First, the survey asked an open-ended question about brands that participants regularly consumed, regardless of bottle sizes. It was asked to gain insights about their experiences with brands of bottled water. Second, the survey asked questions about their awareness of ecolabel brands using the Likert scale, where 1 was "not very familiar" and 5 was "very familiar". Unfortunately, these questions did not analyze their familiarity with USDA, as in these questions, Rainforest Alliance (RA) certification was used to analyze their familiarity with an organic label. Third, the socioeconomic questions asked about participants' age, education, income, water consumption patterns, satisfaction with bottled water, and familiarity with sustainability terms. On average, they were satisfied with bottled water in terms of taste, smell, and price. However, they were not familiar with sustainability terms.

4. Results

4.1. Enhanced brand equity of certified bottled water

The choice experiment resulted in two mixed logit models (Table 3). The first model included the choice experiment attributes and interactions among brands of bottled water and certification. The second model additionally examined sociodemographic factors. The study did not adopt a multinomial logit model since the Hausman–McFadden test rejected the iid assumption (Hausman and McFadden, 1984). The mixed logit models utilized 4,232 choice experiment samples (=8 questions[3] × 529 participants): 71% of them yielded a choice of either Water bottle 1 or 2, while 29% generated the *status quo* choice. Both models randomized the variables of *ASC*, *Narmada*, *Aqua*, *Cleo*, *ASPADIN*, *USDA*, and *FSC*, assuming normal distributions. A normal distribution provided more robust and significant modeling results than other distributions, including truncated normal, uniform, and log-normal distributions. We used Halton draws of 1000 repetitions for the randomization since the log-likelihoods of the models became worse (or lower) with higher numbers of repetitions. Both models achieved an acceptable goodness of fit: their log-likelihood ratio tests were significant at the 1% level in comparisons with a null model, and both models achieved 0.44 and 0.46 of McFadden *pseudo*-R^2, respectively. In addition, the second model showed a higher chance for participants to buy bottled water as their incomes increased. This verified that the choice experiment results were consistent with a welfare economics theory (Arrow et al., 1993; Bateman et al., 2002). As both models obtained similar coefficients, we selected the first model to test the hypotheses.

The study results rejected Hypothesis 1, which is, that ecosystem services certification would elevate brand equity of certified bottled water above the equity of competing brands (i.e. the competitiveness threshold). Although consumers were not familiar with this hypothetical certification, interestingly, several certified bottled water brands achieved enhanced brand equity (Fig. 3), suggesting that the ecolabels used to present certification had an impact the brand equity. However, the resulting positive price premiums neither made certified Aqua competitive with Narmada, nor made certified Cleo competitive with Aqua and Narmada (Fig. 4). Thus, these results showed a less-than-competitive boost of certification to the brand equity of certified bottled water, under conditions with no product or brand marketing.

The study results also rejected Hypothesis 2, which is, that ecolabels with direct-use values would support ecosystem services certification better than ecolabels with indirect-use values in terms of its boost to brand equity. Most of the certified bottled water generated positive price premiums (Fig. 5), indicating that the ecolabel brands had an impact on the brand equity. On average, USDA (the ecolabel providing direct-use values) generated a higher price premium than FSC (the ecolabel providing indirect-use values). Among individual bottled water brands, however, this pattern disappeared. In certifying Cleo, for instance, FSC generated a higher price premium than did USDA and ASPADIN. In certifying Narmada, FSC generated a higher premium than did USDA. This inconsistency caused Hypothesis 2 to be rejected and showed that although ecolabels had impacts on ecosystem services certification, consumers could not recognize the different ecolabel values.

4.2. Consumption and awareness of brands

The choice experiment results were consistent with the brand choices made regularly by consumers when purchasing bottled water; as well as their familiarity with ecolabels (Fig. 6). Participants regularly consumed branded bottled water, with Narmada at number one (41%), Aqua at number two (7%), and Cleo at number three (0.4%). These results supported the comparison of brand equity as reflected in marginal willingness to pay per bottle: i.e. Narmada (IDR 10,446), Aqua (IDR 6749), and Cleo (IDR 1490). Awareness of certification schemes was lower than the "medium" score (=3) and even close to "very low" (=1). These results also corroborated the low brand equity of certification brands in the choice experiment (Fig. 5). Although not included in the survey, we expected that low awareness of USDA considering their overall awareness of other certification schemes.

5. Discussion

5.1. Low brand-equity elevation of certified bottled water

The rejection of Hypothesis 1 shows that ecosystem services certification built on existing ecolabels could not enhance the brand equity of certified bottled water above the competitiveness threshold (i.e. the brand equity of competing brands in West Lombok). This result implies (1) a challenge for certification uptake without marketing efforts, and (2) the important roles of brand-competitiveness analysis in price premium studies.

First, a less-than-competitive boost to brand equity would not support uptake of ecosystem services certification in a competitive market where low awareness of certification is prevalent. Even when consumers were not familiar with this hypothetical certification, they mostly indicated positive price premiums for certified bottled water (Fig. 5), potentially due to the ecolabel logos presented with certification. Without considering brand competition, these results suggest the existence of positive price premiums for certified bottled water. In a competitive market, however, these price premiums would not be fully accessible for low-equity brands (Fig. 4). Two factors might have caused this low accessibility: *highly-diverse brand equity* among brands of bottled water raising the competitiveness threshold (Fig. 1) and *small price premiums* insufficient to exceed this threshold. With no successful marketing of certification, the low probability of capturing price premiums might therefore discourage producers from obtaining certification and result in low market share.

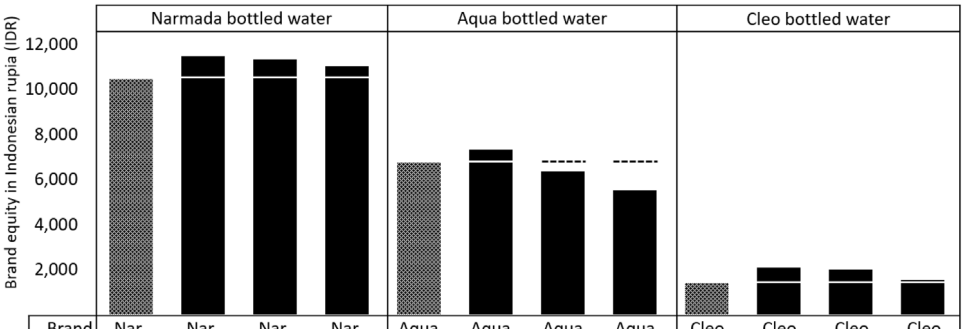
Second, the study results illustrate the critical roles of brand-competitiveness analysis in comparison with product-level analysis in studying price premiums in a competitive market. *Product-level analysis* allows price premiums for certified products to be identified and for these premiums to be compared over various certifiable products. For example, ecosystem services certification is applicable to diverse products and services, from a PES scheme to bottled water production affected by the scheme. This comparison helps identify products and services that certification might target in promoting sustainable consumption and production. On

[3] Each participant completed one of the four blocks of the choice experiments. Each block obtained 8 choice experiment sets.

Table 3
Results of the choice experiment ($n = 529$).

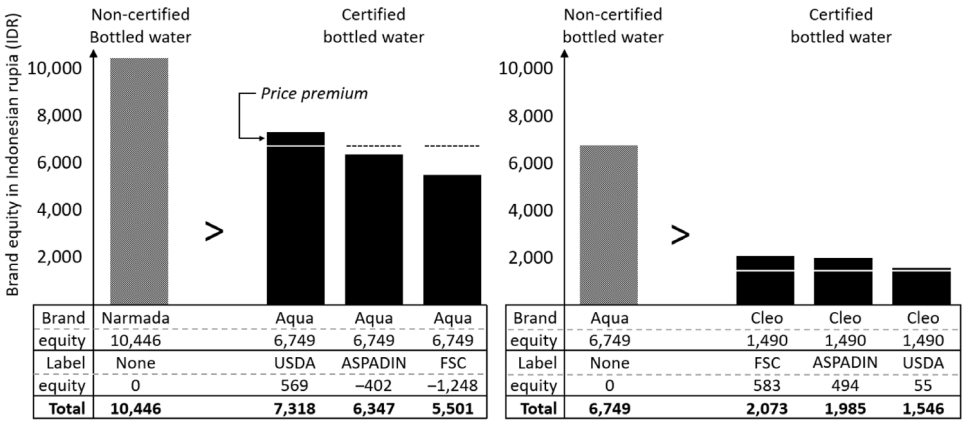
Variables	Mixed logit model 1				Mixed logit model 2		
	Coeff.		Std. error	MWTP[a]	Coeff.		Std. error
ASC	2.053	***	0.266	2645	3.185	***	0.436
Narmada (water brand)	6.055	***	0.367	7800	6.048	***	0.363
Aqua (water brand)	3.185	***	0.211	4104	3.184	***	0.209
Cleo (water brand)	−0.897	***	0.136	−1155	−0.909	***	0.137
ASPADIN (certif.)	0.384	***	0.115	494	0.383	***	0.114
USDA (certif.)	0.442	***	0.128	569	0.444	***	0.130
FSC (certif.)	−0.151		0.137	–	−0.147		0.136
Biodiversity (ES[b])	0.088		0.110	–	0.092		0.110
Carbon (ES)	0.235	**	0.116	303	0.230	**	0.117
Water (ES)	−0.119		0.133	–	−0.115		0.133
Price	−0.001	***	0.000	–	−0.001	***	0.000
Brand interactions							
Narmada × ASPADIN	0.409	**	0.165	527	0.408	**	0.165
Narmada × USDA	−0.331		0.286	–	−0.330		0.287
Narmada × FSC	0.690	***	0.198	888	0.677	***	0.195
Aqua × ASPADIN	−0.696	***	0.198	−896	−0.706	***	0.198
Aqua × USDA	0.113		0.206	–	0.105		0.207
Aqua × FSC	−0.969	***	0.219	−1248	−0.960	***	0.219
Cleo × ASPADIN	−0.160		0.260	–	−0.150		0.260
Cleo × USDA	−0.399	**	0.181	−514	−0.402	**	0.183
Cleo × FSC	0.452	**	0.216	583	0.451	**	0.215
Socio-demo. interactions							
ASC × Age	–		–	–	−0.049	***	0.009
ASC × Regular buyers	–		–	–	0.340	*	0.202
ASC × Income	–		–	–	0.283	***	0.044
Standard deviation of random parameters							
ASC	4.478	***	0.288	–	4.453	***	0.286
Narmada	4.540	***	0.329	–	4.670	***	0.341
Aqua	2.529	***	0.196	–	2.550	***	0.195
Cleo	3.531	***	0.275	–	3.501	***	0.273
ASPADIN	0.479	**	0.235	–	0.444	*	0.245
USDA	0.033		0.383	–	0.043		0.405
FSC	0.546	***	0.178	–	0.532	***	0.177
McFadden *pseudo*-R^2	0.46				0.46		
Log-Likelihood (LL)	−2434				−2426		
LL ratio test	$\chi^2 = 4085$, $p < 0.001$				$\chi^2 = 4111$, $p < 0.001$		

[a]Marginal willingness to pay (MWTP) in Indonesian rupiah (IDR).
[b]Ecosystem services (ES).
***Significant at a 1% level.
**Significant at a 5% level.
*Significant at a 10% level.



Brand	Nar.	Nar.	Nar.	Nar.	Aqua	Aqua	Aqua	Aqua	Cleo	Cleo	Cleo	Cleo
equity	10,446	10,446	10,446	10,446	6,749	6,749	6,749	6,749	1,490	1,490	1,490	1,490
Label	*None*	ASPADIN	FSC	USDA	*None*	USDA	ASPADIN	FSC	*None*	FSC	ASPADIN	USDA
equity	0	1,022	888	569	0	569	−402	−1,248	0	583	494	55
Direct * value	-	V	-	V	-	V	V	-	-	-	V	V
Indirect † value	-	-	V	V	-	V	-	V	-	V	-	V
Total	**10,446**	**11,468**	**11,334**	**11,015**	**6,749**	**7,318**	**6,347**	**5,501**	**1,490**	**2,073**	**1,985**	**1,546**

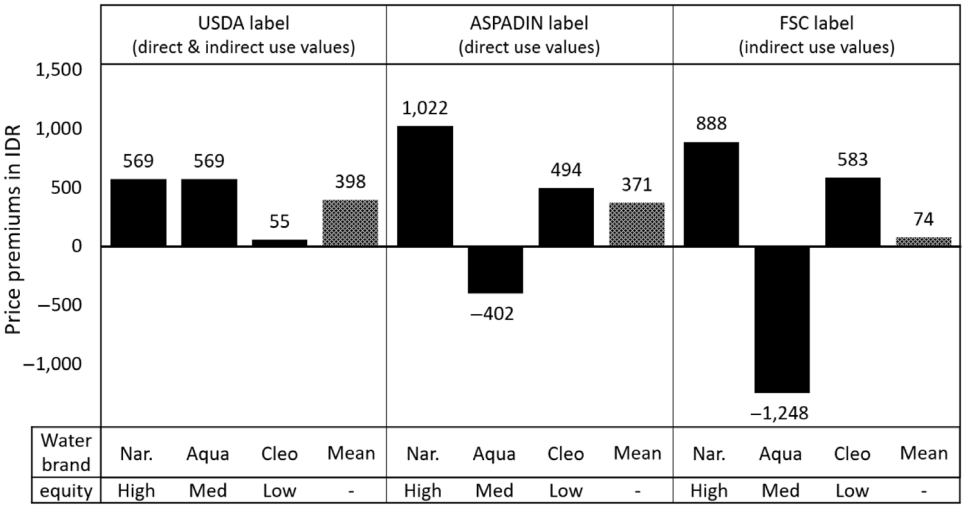
Fig. 3. Comparison of brand equity among three brands of bottled water certified with ecosystem services certification. * Certification built from ecolabels that provide direct-use values (e.g. controlling water quality or health risk). † Certification built from ecolabels that provide indirect-use values (e.g. environmental or forest safeguards).



Brand	Narmada	Aqua	Aqua	Aqua
equity	10,446	6,749	6,749	6,749
Label	None	USDA	ASPADIN	FSC
equity	0	569	−402	−1,248
Total	**10,446**	**7,318**	**6,347**	**5,501**

Brand	Aqua	Cleo	Cleo	Cleo
equity	6,749	1,490	1,490	1,490
Label	None	FSC	ASPADIN	USDA
equity	0	583	494	55
Total	**6,749**	**2,073**	**1,985**	**1,546**

Fig. 4. Comparison of brand equity of noncertified and certified bottled water with ecosystem services certification.



Water brand	Nar.	Aqua	Cleo	Mean	Nar.	Aqua	Cleo	Mean	Nar.	Aqua	Cleo	Mean
equity	High	Med	Low	-	High	Med	Low	-	High	Med	Low	-

Fig. 5. Impacts of ecolabel values on brand-equity enhancement of ecosystem services certification.

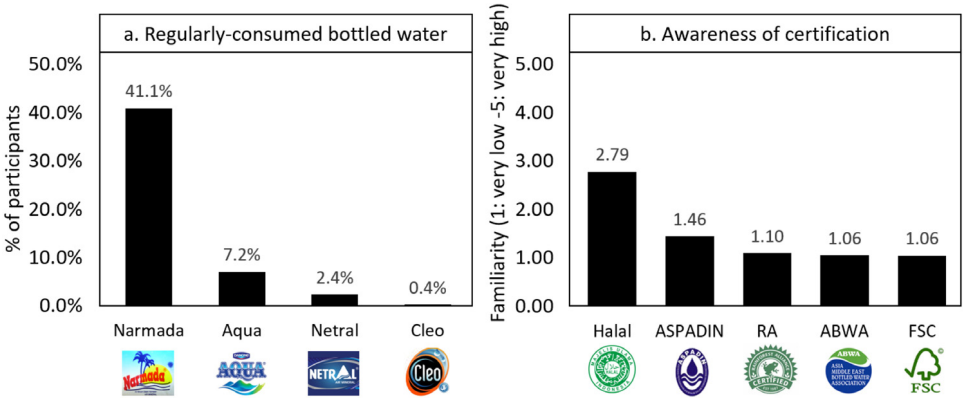


Fig. 6. Regularly consumed brands of bottled water, and awareness of certification ($n = 529$).

the other hand, as this study demonstrated, *brand-competitiveness analysis* reveals whether these price premiums would be realizable or not, given competition among brands. In a competitive market, it would be hard to assume that product-level analysis can replace brand-competitiveness analysis. Consequently, the lack of brand-competitiveness analysis in the literature would be one reason why many certified products attract low price premiums in practice, whereas market studies indicate positive price premiums for these products (Durst et al., 2006; Overdevest and Rickenbach, 2006; Sedjo and Swallow, 2002; Thøgersen et al., 2012). Thus, brand-competitiveness analysis would reduce this gap between expected performance of certification as per studies and actual performance in a market, in addition to helping individual producers to examine their chance to capture price premiums from certification adoption.

5.2. Limited impacts of ecolabel values

The rejection of Hypothesis 2 indicates that values of ecolabels might not affect market performance of ecosystem services certification, mainly due to consumers' low awareness of certification. A previous study on PES certification showed that when consumers understood the meaning of certification, they preferred certification schemes with direct-use values (e.g. quantifying ecosystem services) to schemes offering indirect-use values (e.g. improving the environmental safeguards of watersheds) (Jaung et al., 2018). However, these preferences were not captured in this study, even when ecolabel logos generated positive price premiums for certified bottled water (Fig. 5). This might result from participants' low awareness of ecolabels being insufficient to allow them to distinguish between ecolabel values, and/or the fact that the original targets of these ecolabels (e.g. organic food or wood products) are not ecosystem services. Thus, an expansion of ecolabels to ecosystem services certification is not expected be influenced by the ecolabel values. Ultimately, the original design of ecolabels – or their direct-use values – are unlikely to increase demand for ecosystem services certification, particularly when market awareness of certification is low.

5.3. Need for better branding of certification

Better branding of ecosystem services certification would mitigate the above obstacles to uptake. As branding is based on increased consumer awareness, higher perceived quality, brand loyalty, and positive associations (Aaker, 1991), branding efforts could help consumers to discern certification values and elevate the brand equity of certified products. Unfortunately, however, branding of certification is not straightforward. First, it requires co-branding with products (Larceneux et al., 2012), and product brands can affect the brand equity of certification brands (Barry et al., 2012). However, certification initiatives would have limited control over the branding strategies of certified producers (i.e. the clients of certification systems). In addition, certification demand would differ among regions due to varying socio-demographic conditions, such as different income levels. These challenges pose several questions for future research. For example, which product characteristics (e.g. food versus non-food) would support co-branding of product and certification? Which branding strategies and certification values might attract *non*-green consumers and *non*-early adopters (e.g. Thøgersen et al., 2010)? Under what conditions, is branding of certification capable of altering cultural or habitual consumption patterns (e.g. Thøgersen et al., 2012)? How can international organizations managing certification systems improve branding at the global scale? How do different socio-demographic factors among regions affect certification demand? Finally, is branding a cost-effective means to improve the brand equity of certified products? Answers to these questions would support testing whether certification is applicable as a market-based tool to promote sustainable consumption and production.

6. Conclusions

This study examined the potential of ecosystem services certification built on existing ecolabels to increase the competitiveness of certified products. To achieve this, certification should boost the brand equity of certified products above that of competing products (i.e. the competitiveness threshold). It is also important to understand the contribution of existing ecolabel values, since the hypothetical certification is based on an expansion of the scope of those ecolabels. The choice experiment in West Lombok, Indonesia, indicated that certification enhanced the brand equity of certified bottled water even though consumers were not familiar with its benefits. This was partially due to its associations with the ecolabels used to present certification. However, this enhancement of brand equity neither exceeded the competitiveness threshold, nor reflected different use values of ecolabels, even though consumers had indicated a preference for direct-use values over indirect-use values in a previous study. These results highlight the importance of branding of certification if it is to be successful as a market-based tool. The need for certification branding poses several questions for future studies in terms of analyzing impacts of diverse product characteristics on certification's capacity to boost their brand equity, identification of certification values supporting competitive certified brands, potential impacts of certification branding on cultural and habitual consumption behaviors, and cost-effectiveness of certification branding. Answers to these questions would contribute to branding strategies for certification and testing the feasibility of applying certification as a market-based tool to promote sustainable consumption and production. Finally, this study demonstrates the utility of brand-competitiveness analysis to assess price premiums, and supports reducing inconsistencies between the results of market studies and the realities of ecolabel implementation.

Acknowledgments

We thank all the householders who participated in the survey. We are grateful to John Thøgersen for his valuable comments on the paper.

Funding

This work was supported by the Global Environmental Facility, the US through the United Nations Environment Programme, Faculty of Forestry Strategic Recruitment Fellowships from the University of British Columbia, Canada, the CGIAR, France Program on Forests, Trees and Agroforestry, and the Government of Japan, Japan through its funding to CIFOR, Indonesia.

Declarations of interest

None.

References

Aaker, D.A., 1991. Managing Brand Equity: Capitalizing on the Value of a Brand Name. The Free Press, New York.
Aaker, D.A., Joachimsthaler, E., 2012. Brand Leadership. The Free Press, New York.
Archambault, M.L., 2006. Making the brand: Using brand management to encourage market acceptance of forestry certification. NYUL Rev. 81 (1400).
Arrow, K., Solow, R., Portney, P.R., Leamer, E.E., Radner, R., Schuman, H., 1993. Report of the NOAA panel on contingent valuation. Fed. Regist. 58 (10), 4601–4614.
ASPADIN [Asosiasi Perusahaa Air Kemasan Indonesia], 2018. Organization. http://aspadin.com/index.html. (Accessed 16 December 2018).
Barataud, F., Aubry, C., Wezel, A., Mundler, P., 2014. Management of drinking water catchment areas in cooperation with agriculture and the specific role of organic farming. Experiences from Germany and France. Land Use Policy 36, 585–594.
Barry, M., Cashore, B., Clay, J., Fernandez, M., Lebel, L., Lyon, T., . . . Whelan, T., 2012. Toward Sustainability: The Roles and Limitations of Certification. RESOLVE, Inc, Washington, DC.
Bateman, I.J., Carson, R.T., Day, B., Hanemann, M., Hanley, N., Hett, T., et al., 2002. Economic Valuation with Stated Preference Techniques: A Manual. Edward Elgar Publishing Limited, Cheltenham.
Cashore, B., Gale, F., Meidinger, E., Newsom, D., 2006. Confronting Sustainability: Forest Certification in Developing and Transitioning Countries (No. 8). Yale School of Forestry & Environmental Studies, New Haven.
Croissant, Y., 2015. mlogit: multinomial logit model: R package version 0.2-4.
Cruz, L.B., Boehe, D.M., 2008. CSR in the global marketplace: Towards sustainable global value chains. Manage. Decis. 46 (8), 1187–1209.
Diswandi, D., 2017. A hybrid coasean and pigouvian approach to payment for ecosystem services program in west lombok: Does it contribute to poverty alleviation? Ecosyst. Serv. 23, 138–145.

Durst, P., McKenzie, P.J., Brown, C.L., Appanah, S., 2006. Challenges facing certification and eco-labelling of forest products in developing countries. Int. Forestry Rev. 8 (2), 193–200.
Erdem, T., Swait, J., 1998. Brand equity as a signaling phenomenon. J. Consumer Psychol. 7 (2), 131–157.
Erdem, T., Swait, J., Louviere, J., 2002. The impact of brand credibility on consumer price sensitivity. Int. J. Res. Market. 19 (1), 1–19.
Esteves, M.C., Dean, D., Balzarova, M., 2017. Assessment of building products attributes- A comparative study between eco-labelled and non-eco-labelled products available in the New Zealand market. Sustain. Prod. Consum. 10, 100–109.
Ezzine-de-Blas, D., Wunder, S., Ruiz-Pérez, M., Moreno-Sanchez, R.D.P., 2016. Global patterns in the implementation of payments for environmental services. PLoS One 11 (3), e0149847.
Galarraga Gallastegui, I., 2002. The use of eco-labels: a review of the literature. Eur. Environ. 12 (6), 316–331.
Griggs, D., Stafford-Smith, M., Gaffney, O., Rockström, J., Öhman, M.C., Shyamsundar, P., et al., 2013. Policy: Sustainable development goals for people and planet. Nature 495 (7441), 305.
Ham, C., 2006. Forest certification in south africa. In: Cashore, B., Gale, F., Meidinger, E., Newsom, D. (Eds.), Confronting Sustainability: Forest Certification in Developing and Transitioning Countries. Yale Publishing Services Center, New Haven, pp. 477–506.
Hausman, J., McFadden, D., 1984. Specification tests for the multinomial logit model. Econometrica 52 (5), 1219–1240.
Jaung, W., Bull, G.Q., Sumaila, U.R., Markum, Putzel, L., 2018. Estimating water user demand for certification of forest watershed services. J. Environ. Manag. 212, 469–478.
Jaung, W., Putzel, L., Bull, G.Q., Guariguata, M.R., Sumaila, U.R., 2016a. Estimating demand for certification of forest ecosystem services: A choice experiment with Forest Stewardship Council certificate holders. Ecosyst. Serv. 22 (Part A), 193–201.
Jaung, W., Putzel, L., Bull, G.Q., Kozak, R., Elliott, C., 2016b. Forest stewardship council certification for forest ecosystem services: An analysis of stakeholder adaptability. Forest Policy Econ. 70, 91–98.
Jaung, W., Putzel, L., Bull, G.Q., Kozak, R., Markum, 2016c. Certification of forest watershed services: A Q methodology analysis of opportunities and challenges in Lombok, Indonesia. Ecosyst. Serv. 22 (Part A), 51–59.
Keller, K.L., 2013. Strategic Brand Management: Building, Measuring, and Managing Brand Equity. Pearson, Boston.
Kuhfeld, W.F., 2010. Marketing research methods in SAS. In: Experimental Design, Choice, Conjoint, and Graphical Techniques. SAS-Institute TS-722, Cary, NC.
Larceneux, F., Benoit-Moreau, F., Renaudin, V., 2012. Why might organic labels fail to influence consumer choices? Marginal labelling and brand equity effects. J. Consumer Policy 35 (1), 85–104.
Louviere, J.J., Hensher, D.A., Swait, J.D., 2000. Stated Choice Methods: Analysis and Applications. Cambridge University Press, Cambridge.
MA [Millennium Ecosystem Assessment], 2005. Ecosystems and Human Well-being: Current State and Trends. Island Press, Washington, DC.
Macqueen, D., Dufey, A., Gomes, A.P.C., Hidalgo, N.S., Nouer, M.R., Pasos, R., et al., 2008. Distinguishing Community Forest Products in the Market: Industrial Demand for a Mechanism that Brings together Forest Certification and Fair Trade. International Institute for Environment and Development (IIED), Edinburgh.
Meijaard, E., Wunder, S., Guariguata, M.R., Sheil, D., 2014. What scope for certifying forest ecosystem services? Ecosyst. Serv. 7, 160–166.
Onozaka, Y., McFadden, D.T., 2011. Does local labeling complement or compete with other sustainable labels? A conjoint analysis of direct and joint values for fresh produce claim. Am. J. Agricult. Econ. 93 (3), 693–706.
Overdevest, C., Rickenbach, M.G., 2006. Forest certification and institutional governance: An empirical study of forest stewardship council certificate holders in the United States. Forest Policy Econ. 9 (2), 93–102.
Pierce, A., Shanley, P., Laird, S., 2003. Certification of non-timber forest products: Limitations and implications of a market-based conservation tool. In: The International Conference on Rural Livelihoods, Forests and Biodiversity, Bonn.
Prasetiawan, T., Nastiti, A., Muntalif, B.S., 2017. 'Bad' piped water and other perceptual drivers of bottled water consumption in Indonesia. Wiley Interdiscip. Rev.: Water 4, 1–12.
Rex, E., Baumann, H., 2007. Beyond ecolabels: What green marketing can learn from conventional marketing. J. Cleaner Prod. 15 (6), 567–576.
Savilaakso, S., Guariguata, M.R., 2017. Challenges for developing forest stewardship council certification for ecosystem services: How to enhance local adoption? Ecosyst. Serv. 28 (Part A), 55–66.
Sedjo, R.A., Swallow, S.K., 2002. Voluntary eco-labeling and the price premium. Land Econ. 78 (2), 272–284.
Thøgersen, J., Haugaard, P., Olesen, A., 2010. Consumer responses to ecolabels. Eur. J. Market. 44 (11/12), 1787–1810.
Thøgersen, J., Jørgensen, A.-K., Sandager, S., 2012. Consumer decision making regarding a green everyday product. Psychol. Market. 29 (4), 187–197.
Thøgersen, J., Nielsen, K.S., 2016. A better carbon footprint label. J. Cleaner Prod. 125, 86–94.
Train, K., 2009. Discrete Choice Methods with Simulation. Cambridge University Press, Cambridge.
Train, K., Weeks, M., 2005. Discrete choice models in preference space and willingness-to-pay space. In: Scarpa, R., Alberini, A. (Eds.), Applications of Simulation Methods in Environmental and Resource Economics. Springer, Dordrecht, pp. 1–16.
USDA [The United States Department of Agriculture], 2018. USDA organic. https://www.usda.gov/topics/organic. (Accessed 1 February 2018).
Vlahos, G., Schiller, S., 2014. Transition processes and natural resource management. In: Sutherland, L.-A., Darnhofer, I., Wilson, G., Zagata, L. (Eds.), Transition Pathways Towards Sustainability in Agriculture: Case Studies from Europe. CABI International, pp. 113–126.