

Article

On the Mechanics of the Organic Label Effect: How Does Organic Labeling Change Consumer Evaluation of Food Products?

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Abstract: The literature on the effect of organic labels on consumers' perception of food products has grown significantly over the last two decades. Since the number of empirical studies has also increased greatly, a literature review revealing the operational definitions of the organic label effect (OLE), which have evolved among researchers, has become necessary. Accordingly, in the current article, 82 studies are reviewed. It was found that studies cluster around two interpretations: they define the OLE either as a change in the evaluation of a given product or as a change in the evaluation of the difference between an organic and a conventional product resulted from organic labeling. We term the first approach the absolute OLE and the latter the relative OLE. Our analysis shows that, when applied separately, these two interpretations might lead to significantly different measurement results, but they can be merged into one concept. We argue that organic labeling affects not only the evaluation of products receiving the organic label but the evaluation of competing products without such a label as well. We reveal that the relative OLE is equivalent to the difference between the absolute effects of organic labeling on the labeled and on the unlabeled products.

Keywords: labeling effect; food labeling; organic label; absolute effect; relative effect; conceptualization; consumer evaluation



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1. Introduction

Examinations of organically produced goods have gained great popularity in recent years (see, for example, Aschemann-Witzel and Zielke [1]; Hemmerling et al. [2]; Romano et al. [3]; Ezhilvani and Jayakumar [4]). One strand among these studies has dealt with the consumer evaluation of these goods and not with the products themselves. The literature on consumer evaluation of organic food products has a very wide spectrum. Within this (see Figure 1), the present study belongs to a narrower range of papers studying the organic label effect (hereinafter, the OLE).

Since no universally accepted definition of the OLE can be found in the literature (see Sections 3.1 and 3.2), for the time being, our paper will paraphrase it (based on Yiridoe et al. [5], Schuldt and Schwarz [6], and Lee et al. [7]) as all changes in a consumer's perception, beliefs, opinions, or attitudes about a product or its attributes (both sensory and non-sensory attributes and features) that occur because the product or one of its competitors acquires a label signaling its organic origin.

Although the literature dealing with the organic label effect has been continuously broadened with a growing number of results, only a small part of it deals with modelling this effect, with its mechanism, and with understanding what happens during the occurrence of the effect. Exceptions to this are, for example, the studies of Larceneux et al. [8] and Sörqvist et al. [9], which explicitly aim to gain a better understanding of this mechanism. Several articles extend their examinations to one or another influencing factor, even if not to the whole mechanism. For example, the role of social expectations had already been examined by Sörqvist et al. [10], and subsequently by Sörqvist et al. [9]. Several studies (e.g., Schuldt and Schwarz [6]; Van Loo et al. [11]; Sörqvist et al. [10]; Schuldt and Hannahan [12];

Lee et al. [7]; Rousseau and Vranken [13]; Rousseau [14]) examined the role of preliminary engagement (previous choice, health consciousness, environmental consciousness) and that of social background variables in the occurrence of the OLE. Mondelaers et al. [15] showed that, beside the direct effect, the label can have an indirect effect through sensory product attributes, which have a mediating role.

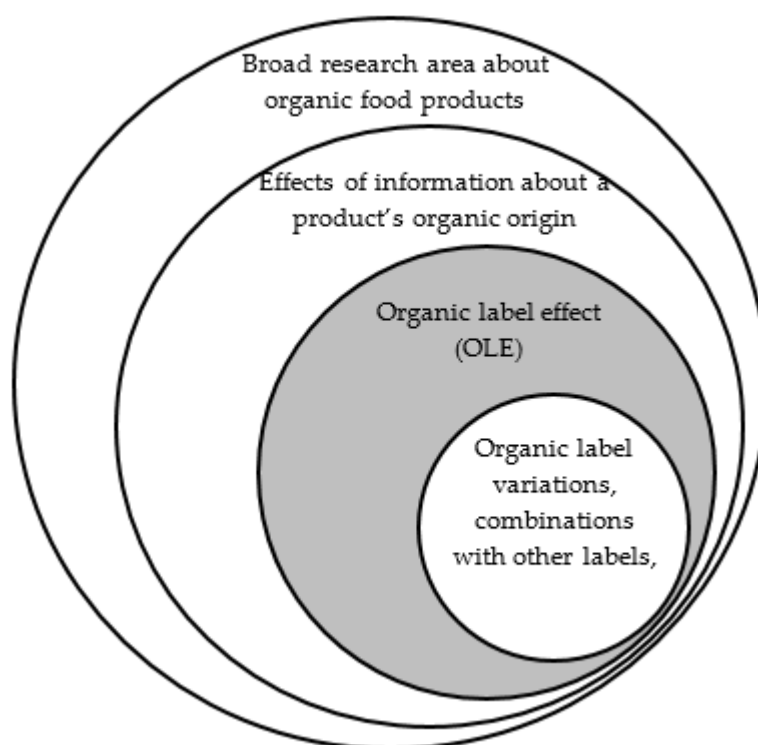


Figure 1. The “onion” of the literature about organic labels.

The present paper focuses on another aspect of the understanding of the phenomenon, which has not been analyzed so far. We argue that any study that empirically examines the presence of the OLE and/or provides an estimation of its intended extent, does not, in fact, face one, undivided effect but one or more elements of a phenomenon combining several effects. In the current literature, there is no single unified OLE concept that researchers can turn to for guidance as to what part of the complex phenomenon of the OLE to address and how to measure it. If the individual studies do not examine the same elements of the OLE (and, as we will see, this is the general situation), then their results cannot be compared directly. Thus, it is necessary to identify those effects belonging to the complex phenomenon of the OLE and to reveal the relations among them, because in this way, we can clarify what the OLE really is and how it works and compare the study results. A unified concept can also help in planning future research studies. Based on the above considerations, our main research objectives that are built on each other are formulated as follows.

- To reveal what implicit and/or explicit operational OLE definitions exist in the literature, then analyze and compare them, and develop distinct definition types, if possible.
- To analyze the definition types developed above in terms of whether the organic label effect is measured separately from other effects.
- To form a unified operational organic label effect definition from the “pure” organic label effect definitions identified above.

It is important to point out that we are not dealing with any particular impact of organic origin or production method; we are focusing solely on the effect of signaling a product’s organic nature to customers.

2. Materials and Methods

To reveal and then unify the existing (operational) definitions, a review of the empirical literature on the OLE is necessary. In the first step, the empirical literature is narrowed down to those papers that examined the “pure” OLE, which is separated from any other effects. The purpose of our review is to reveal the implicit or explicit operational definitions of the OLE already applied in the literature, but the actual findings are out of our field of interest in the current analysis. This exploratory aim requires neither a total nor a representative review but does need a sample of empirical research articles that is large and wide enough to cover as many approaches as possible. Second, based on the descriptions of the methodology adopted in the examined papers, we establish what exactly was meant/measured by the OLE or intended to be measured by the authors, i.e., how they defined the OLE phenomenon *de facto* in the various articles reviewed. In the third step, a general concept of the OLE is developed that unifies the existing operational definitions into one, complex approach.

In the literature, various forms of sustainability labels (ecological, green, all natural, etc.) are examined. All of these labels belong to the broader group of sustainability claims for food (distinctive marks, marketing labels, and brands) that are present on the market with various meanings [16–18], including ethical or social claims (e.g., animal welfare, free range, and fair trade labels), and claims that address the environmental dimension of sustainability (e.g., local food production, carbon footprint, food miles, or sustainable aquaculture and fisheries). Organic food labels combine both environmental and ethical aspects of sustainability [16].

Different sustainability labels can overlap to some extent; moreover, some studies use them interchangeably (e.g., Delmas and Lessem [19]). We involved only organic labels in our analysis or labels that are treated as equivalents of organic labels in the actual research. In order to accomplish this, we started with a broader scope of search, and then we narrowed it down by excluding papers that are clearly not connected to our area of interest.

The primary database for our literature search was Scopus. First, we searched for combinations of the following two groups of terms in titles, abstracts, or keywords (TITLE-ABS-KEY).

- organic OR eco OR ecological OR sustainable OR sustainability OR bio OR green OR natural.
- label OR claim OR cue OR certificate OR certification OR premium OR signal.

Second, we narrowed down the pool of sources involving the following field codes:

- TITLE: eco OR organic OR green OR natural OR sustainable OR sustainability OR ecological.
- KEY: eco OR organic OR green OR natural OR sustainability OR sustainable OR ecological OR bio.
- AUTHKEY: organic OR eco OR natural OR sustainability OR sustainable OR green.
- SUBJAREA (LIMIT-TO): AGI, ENVI, SOCI, BUSI, ECON, MULT, PSYC, DECI.
- SUBJAREA (EXCLUDE): ENGI, ENER, EART, CHEM, MEDI, COMP, IMM, NEUR, CENG, MATE, PHAR, NURS, PHYS, VETE.
- LANGUAGE: English.

In sum, 3261 studies fitted the search criteria above. These papers were limited to 1602 with the use of further refining options (EXACTKEYWORD). The EXACTKEYWORD filters were applied in order to exclude articles that are definitely not connected to the current research (see Appendix A). The exact keywords were selected from the list offered by the “Refine results > Keyword > Filter” by keyword option. Finally, the authors manually discarded studies that were not empirical, were not about organic labeling of food products, and were not connected to product evaluation by customers. After the manual selection, 95 papers remained in the list. An additional 35 relevant studies found in Google Scholar were also included. The literature collection phase was closed on 03.01.2021.

However, the above restricted area of research on the OLE is diversified too. To identify the range of the literature being studied in the current paper, we first excluded studies that are not designed to examine the isolated OLE, which is separated from any other effects. For example, a great number of papers intend to measure the effect of not (or not only) the labels themselves but the effect of organic production on consumers in a wider sense. The authors must state at the outset that the degree to which a given study is developed properly with regard to the OLE says nothing about its appropriateness with regard to its own research questions.

A considerable fraction of OLE research concentrates on the effect of consumers' awareness of and knowledge (information) about organic production on the evaluation of organic products. In these studies, the role of the organic label is only ancillary. Here, the label serves as the identifier of the organic products, and its effect is inseparable from the effect of awareness and knowledge. These investigations can examine the potential relationship between a given a priori awareness level and the consumer evaluation of the organic products or can focus on the impact of providing such information during the research. Papers by Annett et al. [20], Napolitano et al. [21], Onken et al. [22], Bazoché et al. [23], Wiedmann et al. [24], Costanigro et al. [25], McFadden and Huffman [26], Gassler et al. [27], and Curtis et al. [28], for example, measure the label effect together with the effect of providing information for the customers about organic products. As a result, the effect of the label cannot be separated from the additional information given about the production methods; thus, this type of experiment is not appropriate for the estimation of the isolated OLE. The studies by Magnusson et al. [29], Štefanić et al. [30], Cicia et al. [31], Arvanitoyannis et al. [32], Ward et al. [33], Krystallis et al. [34], Batte et al. [35], Kim et al. [36], Padilla-Bernal and Pérez-Veyna [37], Akgüngör et al. [38], Wang et al. [39], Annunziata et al. [40], Weibel et al. [41], Haghjou et al. [42], Hamzaoui-Essoussi and Zahaf [43], Kai et al. [44], Klöckner et al. [45], Lillywhite et al. [46], Zanolli et al. [47], Huang and Lee [48], Cerda et al. [49], Hasselbach and Roosen [50], Becker et al. [51], Silva et al. [52], Zhou et al. [53], Anisimova et al. [54], Asioli et al. [55], Study 1 by Besson et al. [56], Bhattarai [57], and Denver et al. [58] should also be excluded from the current analysis, as they have a similar problem in isolating the OLE. Although, here, the assessors did not receive any additional information about the production methods, they were asked to fill in a questionnaire or answer interview questions about organic food products. These kinds of inquiries likely made the respondents more sensitive to labels and able to modify their evaluations. Other excluded papers both conducted surveys on the knowledge of the participants and provided additional information about the organic production method before assessing customer evaluations (e.g., Kihlberg et al. [59]; Bernard and Bernard [60]; Bernard and Bernard [61]; Gifford and Bernard [62]; He and Bernard [63]; Díaz et al. [64]; Probst et al. [65]).

The current research belongs to a different line of study that intends to identify and measure the pure effect of organic labels isolated from the potential influence of any other factors. In these research studies, any impacts on consumers' knowledge about, attitude towards, or awareness of organic products are considered to be confounding and should be excluded or controlled for. It is worth mentioning, however, that the separation of the information effect and the pure label effect is an interesting scientific challenge. The second and third stages of the experiment by Rousseau and Vranken [13] deal specifically with the question of how to separate this information transfer effect from the pure OLE.

A third type of study that is also out of our current scope is the one in which the OLE in general is not examined, but a specific sub-area of it is focused on. For example, examinations described in the articles by Hearne and Volcan [66], Tagbata and Sirieix [67] (stage 3), and Anagnostou et al. [68] and the research study by Silva et al. [52] measured the effect of organic labels applied together with other types of labels. The authors of these papers did not separate the effects of the different labels, thus the OLE is not identifiable. In the studies by Stanton and Cook [69], the organic label was inseparably combined with a product brand. Other studies (Ward et al. [33]; Kim et al. [36]; Janssen and Hamm [70];

Karahan Uysal et al. [71]; Janssen and Hamm [72]; Richetin et al. [73]; Meyerding and Merz [74]; Yin et al. [75]; Parker et al. [76], Study 1a; Gaylord et al. [77]) compared products with several organic label variants, rather than products with no (or a conventional) label and those with an organic label; i.e., they examined whether there is a difference in consumers' evaluation as a result of the type of label on the product, not the effect of the organic label. The examination by Mather et al. [78], Gifford and Bernard [62], and Onken et al. [22] had a similar setting, with the difference that instead of comparing various organic label types, they involved labels connected to more diverse production systems (e.g., natural, free-range, not GM fed). Because products with no or conventional labels were not involved, only the relations among different labels' effects were measurable; distinct label effects (other types of labels have their own effects) remained hidden.

Altogether we excluded 62 papers (and 2 studies within two otherwise accepted papers) from further analysis. Sixty-eight papers remained in our analysis. We attempt to classify these articles into several clearly distinguishable groups that use different operational OLE concepts. These definition groups will be identified, described, and analyzed, and their relationships will also be examined in Section 3.

In the description of the studies analyzed (to help later comparison and classification), formal notations of each measured indicator will be introduced, which are developed as follows:

$$v_{\text{type,phase,label}}$$

where “ v ” is the value of the consumer evaluation (a monetary value, an opinion about a product attribute, an overall preference, etc.). The first index (type) is the type of the examined product, which can be organic (O), conventional, i.e., not organic (C), or hypothetical (H), i.e., not real. The second index (phase) indicates if the measurement was made before the label was introduced into the examination when neither product had yet received this label (B) or after one product had received a label of this kind (A). The third index (label) shows what type of label was assigned to the product to which the given measurement corresponds and can be interpreted only after labeling measurements (i.e., if the second index is B, then there is no third index). The label can indicate organic origin (O) or conventional origin (C). If a product does not receive any labels in the phase when other products already have a label, then this is indicated by an “N” letter in the third index. Consequently, a given measurement can show the following 12 notations: v_{OB} , v_{CB} , v_{HB} , v_{OAO} , v_{OAC} , v_{OAN} , v_{CAO} , v_{CAC} , v_{CAN} , v_{HAO} , v_{HAC} , v_{HAN} . (For example, v_{CB} indicates the consumer evaluation of a conventional product in the (blind) phase before labeling, while v_{HAN} shows the value of a not real (hypothetical) product without a label in the phase after labeling.) If the measurement was conducted in the same way for several attributes, only one indicator is presented. If a paper includes several studies, we will indicate which one our description is concerned with. When the determination of the OLE is shown for a given study, the OLE is always presented as a difference for the sake of comparability, irrespective of whether it was calculated as a difference, a coefficient, or in any other way.

Since the primary aim here is to examine the notion itself, our study will not mention any unrelated details of the examinations nor any methodological specificities or problems that do not affect our main question. The literature review also does not intend to be complete, since we only want to demonstrate that the OLE has several implicit interpretations, and that the examination results regarding the OLE as broadly defined cannot always be compared directly with one another (not even as regards the object being measured), without it being identified and broken down into its constituent elements.

In the Results section, an accurate OLE concept for future studies is developed, which integrates the widest possible range of studies carried out so far and makes them comparable. The concept is also illustrated by empirical results from the literature.

3. Results

The Results section has two subsections. In the first one (Section 3.1), the selected group of studies is investigated for operational OLE concepts; then, in the second subsection

(Section 3.2) a general concept of OLE is presented that unifies the existing operational definitions into one, complex approach.

3.1. Analysing the Operational OLE Definitions in the Literature

Bearing in mind the considerations mentioned in the previous section, we analyzed 82 empirical studies in 68 papers to reveal how researchers define the OLE. First, we scanned the papers for conceptual definitions of the OLE, and we found that none of the examined articles provided a clearly distinguished, explicit definition of what is meant by the OLE. However, this was often compensated for by a paraphrase of the phenomenon, and more importantly, actual measurements were taken in these studies to estimate the OLE. Through an analysis of the applied measurement methods, one could deduce the implicit operational definitions of the OLE.

Thus, in this subsection, we examine and organize what is really measured by the reviewed articles and how. We disregard the elements not essential to our question (where the research took place, the sampling method and sample size, etc.).

We must note that an actual label was not applied in every case. In some cases it was substituted by verbal information (see Sörqvist et al. [10], 1st experiment; Schuldt and Schwarz [6], Stage 2; Romano et al. [3]), and sometimes the organic origin was mentioned in the advertisement text repeatedly (e.g., Schuldt and Hannahan [12]). We have no opportunity here, however, to examine the distortions originating from this fact [79,80], so we consider these cases to be ones in which labels had also been applied by the researchers.

Applying the symbols introduced in the Materials and Methods section, Table 1 shows which of the 12 notations of customer evaluations (i.e., $v_{\text{type,phase,label}}$) were measured by the reviewed studies (in column 2) and the operational definitions used (in column 3).

Table 1. Measured evaluations and calculated organic label effect (OLE) in the reviewed literature.

Studies ¹	Measured Consumer Evaluations	Operational Definition of the OLE ²
Tagbata and Sirieix [67], Stage 2; Mondelaers et al. [15]; Schuldt and Schwarz [6], Stage 1; Onozaka and McFadden [81]; Van Loo et al. [11]; Rousseau and Vranken [13]; Meas et al. [82]; Rousseau [14]; Van Loo et al. [83]; Bello and Abdulai [84]; Gorissen and Weijters [85], Study 4; Hidalgo-Baz et al. [86]; Meyerding [87]; Troiano et al. [88]; Delmas and Lessem [19]; Lu and Gursay [89]; Poelmans and Rousseau [90]; Kim et al. [91]; Meyerding et al. [92], Stage 3; Yeh, et al. [93]; Giannoccaro et al. [94]; Gilmour et al. [95]; Jeong and Jang [96]; Jongmans et al. [97]; Yin et al. [98]	$v_{\text{HAO}}, v_{\text{HAN}}$	$v_{\text{HAO}} - v_{\text{HAN}}$
Van Doorn and Verhoef [99], Stage 1 and 2; Larceneux et al. [8]; Bauer et al. [100]; Schuldt and Hannahan [12], Stage 2; Ellison et al. [101]; Gorissen and Weijters [85], Study 3; Prada et al. [102], Experiment 1 and 2; Lee et al. [103], Study 1 and 2; Scholl-Grissemann [104], Study 1 and 2; Amos et al. [105], Study 1; Besson et al. [56], Study 2; Küst [106]; Septianto et al. [107], Study 1 and 2; Nadricka et al. [108], Study 1, 2, and 3; Parker et al. [76], Study 1b	$v_{\text{HB}}, v_{\text{HAO}}$	$v_{\text{HAO}} - v_{\text{HB}}$

Table 1. Cont.

Studies ¹	Measured Consumer Evaluations	Operational Definition of the OLE ²
Zhang et al. [109]; Smith et al. [110]; Schröck [111]; Gerrard et al. [112]; Connolly and Klaiber [113]; Schröck [114]; Ankamah-Yeboah et al. [115]; Hoang et al. [116]; Monier-Dilhan and Bergès [117]; Ay et al. [118]; Gschwandtner [119]; Schäufele and Hamm [120]	$v_{\text{OAO}}, v_{\text{CAN}}$	$v_{\text{OAO}} - v_{\text{CAN}}$
Sörqvist et al. [10], Experiment 1, 2, and 3; Sörqvist et al. [9], Experiment 2 and 3	$v_{\text{CAO}}, v_{\text{CAC}}$	$v_{\text{CAO}} - v_{\text{CAC}}$
Canavari et al. [121]; Carroll et al. [122]; Gassler [123]	$v_{\text{HAO}}, v_{\text{HAC}}$	$v_{\text{HAO}} - v_{\text{HAC}}$
Bernard and Liu [124]	$v_{\text{OAO}}, v_{\text{OAN}}, v_{\text{CAN}}$	$v_{\text{OAO}} - v_{\text{OAN}}$
Macht [125], Stage 1 and 2	$v_{\text{OAO}}, v_{\text{OAN}}$	
Van Doorn and Verhoef [99], Stage 3; Apaolaza et al. [126]	$v_{\text{OB}}, v_{\text{OAO}}$	$v_{\text{OAO}} - v_{\text{OB}}$
Hemmerling et al. [127]; Laureati et al. [128]	$v_{\text{OB}}, v_{\text{CB}}, v_{\text{OAO}}, v_{\text{CAN}}$	$v_{\text{OAO}} - v_{\text{OB}}, v_{\text{CAN}} - v_{\text{CB}}$
Lee et al. [7]; Schouteten et al. [129]	$v_{\text{OAO}}, v_{\text{OAC}}$	$v_{\text{OAO}} - v_{\text{OAC}}$
Sörqvist et al. [9], Experiment 1; Romano et al. [3]	$v_{\text{OAO}}, v_{\text{OAC}}, v_{\text{CAO}}, v_{\text{CAC}}$	$v_{\text{OAO}} - v_{\text{OAC}}, v_{\text{CAO}} - v_{\text{CAC}}$
Johansson et al. [130]	$v_{\text{OB}}, v_{\text{CB}}, v_{\text{OAO}}, v_{\text{OAC}}, v_{\text{CAO}}, v_{\text{CAC}}$	$v_{\text{OAO}} - v_{\text{OB}}, v_{\text{CAO}} - v_{\text{CB}}$
Scholderer et al. [131]	$v_{\text{OAO}}, v_{\text{OAN}}, v_{\text{OAC}}, v_{\text{CAO}}, v_{\text{CAN}}, v_{\text{CAC}}$	$(v_{\text{OAO}} + v_{\text{CAO}})/2 - (v_{\text{OAN}} + v_{\text{CAN}})/2$
Guilabert and Wood [132]	$v_{\text{OB}}, v_{\text{OAO}}, v_{\text{OAN}}$	$v_{\text{OAO}} - v_{\text{OB}}, v_{\text{OAO}} - v_{\text{OAN}}$
Kiss et al. [133]	$v_{\text{OB}}, v_{\text{CB}}, v_{\text{OAO}}, v_{\text{CAN}}$	$v_{\text{OAO}} - v_{\text{OB}}, v_{\text{CAN}} - v_{\text{CB}}, (v_{\text{OAO}} - v_{\text{CAN}}) - (v_{\text{OB}} - v_{\text{CB}})$

¹ The studies are organized by definition type (in a descending order of frequency) and in chronological order within the definition groups.

² In the last column, we show how the OLE was explicitly calculated in the article.

Based on Table 1, one can group the operational OLE definitions used in the empirical literature. We identified the following five types of definition.

1. Operational definition type 1 (D1): $v_{\text{HAO}} - v_{\text{HB}}$ or $v_{\text{OAO}} - v_{\text{OB}}$ or $v_{\text{CAO}} - v_{\text{CB}}$ or $v_{\text{CAN}} - v_{\text{CB}}$ or $v_{\text{HAN}} - v_{\text{HB}}$ or $v_{\text{OAN}} - v_{\text{OB}}$.

A change in the consumer evaluation of the same product after any product on the market without a label receives an organic label. Altogether, twenty-nine of the examined studies applied this definition. Twenty-two of them (Studies 1 and 2 by Van Doorn and Verhoef [99]; Larceneux et al. [8]; Bauer et al. [100]; Schuldt and Hannahan [12], Stage 2; Ellison et al. [101]; Gorissen and Weijters [85], Study 3; Prada et al. [102], Experiments 1 and 2; Lee et al. [103], Studies 1 and 2; Scholl-Grissemann [104], Studies 1 and 2; Amos et al. [105], Study 1; Besson et al. [56], Study 2; Küst [106]; Septianto et al. [107], Study 1 and 2; Nadricka et al. [108], Studies 1, 2, and 3; Parker et al. [76], Study 1b) examined the effect of an organic label on hypothetical products ($v_{\text{HAO}} - v_{\text{HB}}$), and six (Van Doorn and Verhoef [99], Study 3; Guilabert and Wood [132]; Hemmerling et al. [127]; Laureati et al. [128]; Kiss et al. [133]; Apaolaza et al. [126]) on organic products ($v_{\text{OAO}} - v_{\text{OB}}$). One study (Johansson et al. [130]) investigated the effect of a false organic label appearing on a conventional product ($v_{\text{CAO}} - v_{\text{CB}}$). Among the previously mentioned twenty-nine studies, three papers (Hemmerling et al. [127]; Laureati et al. [128]; Kiss et al. [133]) specifically examined the change in the value of a conventional product, which remained without a label ($v_{\text{CAN}} - v_{\text{CB}}$). The authors could not find any published studies investigating changes in the customer evaluation of an organic or hypothetical product remaining unlabeled after the organic labeling of any of its (organic, conventional, or hypothetical) competitors

($v_{OAN} - v_{OB}$; $v_{HAN} - v_{HB}$); however, this case would logically belong to definition D1. Since organic origin is a credence attribute [134], which means that there is no way for the consumer to perceive this attribute in any time horizon, in terms of the effect of the label the origin of the labeled product is marginal. As a consequence, if all product features are identical except the organic label (or its absence), then $v_{HAO} - v_{HB} = v_{OAO} - v_{OB} = v_{CAO} - v_{CB}$ and $v_{HAN} - v_{HB} = v_{OAN} - v_{OB} = v_{CAN} - v_{CB}$. In other words, this D1 definition has two subcategories: when the given product receives an organic label and when its competitor does.

2. Operational definition type 2 (D2): $v_{HAO} - v_{HAN}$ or $v_{OAO} - v_{OAN}$ or $v_{CAO} - v_{CAN}$ when it is certain that the compared organic-labeled and unlabeled versions of the products are identical.

The difference between the consumer evaluation of a product with an organic label and a product without a label, but which are in every other respect identical, is when the customer is aware of both products' features, including the label. Although examinations based on this definition were conducted with hypothetical products in most of the (twenty-four) cases (Mondelaers et al. [15]; Schuldt and Schwarz [6], Study 1; Onozaka and McFadden [81]; Van Loo et al. [11]; Rousseau and Vranken [13]; Meas et al. [82]; Rousseau [14]; Van Loo et al. [83]; Bello and Abdulai [84]; Gorissen and Weijters [85], Study 4; Hidalgo-Baz et al. [86]; Meyerding [87]; Troiano et al. [88]; Delmas and Lessem [19]; Lu and Gursay [89]; Poelmans and Rousseau [90]; Kim et al. [91]; Meyerding et al. [92]; Yeh et al. [93]; Giannoccaro et al. [94]; Gilmour et al. [95]; Jeong and Jang [96]; Jongmans et al. [97]; Yin et al. [98]), due to the credence attribute nature of the organic origin, it can be applied to organic and conventional products in the same way ($v_{HAO} - v_{HAN} = v_{OAO} - v_{OAN} = v_{CAO} - v_{CAN}$); naturally, the definition includes the indistinguishability of the labeled and unlabeled products in these cases too. In the examinations (Guilabert and Wood [132]; Macht [125]) using a real (not hypothetical) product, we have found presented the same organic product to the participants, with and without an organic label ($v_{OAO} - v_{OAN}$).

Beside the twenty-four plus two explicit cases mentioned above, the graphical analysis by Sholderer et al. [131] also implies a similar definition. According to their analysis ($v_{OAO} + v_{CAO}$)/2 was compared to ($v_{OAN} + v_{CAN}$)/2. Because of the credence nature (see the detailed explanation at D1) of organic production, $v_{OAO} = v_{CAO}$ and $v_{OAN} = v_{CAN}$, thus ($v_{OAO} + v_{CAO}$)/2 = ($v_{OAN} + v_{CAN}$)/2 = $v_{OAO} - v_{OAN} = v_{CAO} - v_{CAN}$. In the case of Tagbata and Sirieix [67] (Stage 2) and Bernard and Liu [124], only this definition could have been identified directly, even though the authors did not do so, as only v_{HAO} and v_{HAN} [67] and v_{OAO} and v_{OAN} [124] were measured.

3. Operational definition type 3 (D3): ($v_{OAO} - v_{CAN}$) - ($v_{OB} - v_{CB}$).

The change in the difference in consumer evaluation between organic and conventional products after and before labeling. In the literature reviewed, only Kiss et al. [133] employed this definition.

4. Operational definition type 4 (D4): $v_{OAO} - v_{CAN}$ when $v_{OB} - v_{CB}$ is unknown.

The difference between the consumer evaluation of a product with an organic label and a product without a label, is when the customer is aware of both products' features, including the label. As opposed to D3, this definition does not include the potential differences between the organic and the conventional products (v_{OB} and v_{CB} can be equal or different, this is not taken into consideration). This operational definition is represented by Zhang et al. [109], Smith et al. [110], Schröck [111], Gerrard et al. [112], Connolly and Klaiber [113], Schröck [114], Ankamah-Yeboah et al. [115], Hoang et al. [116], Monier-Dilhan and Bergès [117], Ay et al. [118], Gschwandtner [119], and Schäufele and Hamm [120].

5. Operational definition type 5 (D5): $v_{OAO} - v_{OAC}$ or $v_{CAO} - v_{CAC}$ or $v_{HAO} - v_{HAC}$ by ensuring $v_{OB} = v_{CB}$ (and trivially: $v_{HB} = v_{HB}$) or the same product is labeled both as organic and as a conventional product.

The difference between the customer evaluations of two products that are absolutely identical except that one of them possesses an organic label, while the other has a conventional label. It is important to underline that the conventional product is explicitly labeled as conventional, and it is not only the lack of the organic label that indicates it is conventional. Twelve studies in seven articles employed this definition of the OLE. In two of them (Lee et al. [7]; Schouteten et al. [129]) an organic product was labeled as organic and as conventional too ($v_{OAO} - v_{OAC}$), and in five studies (Sörqvist et al. [10] Experiments 1, 2, and 3; Sörqvist et al. [9], Experiments 2 and 3) conventional products were labeled both as organic and as conventional products ($v_{CAO} - v_{CAC}$). In the studies by Romano et al. [3] and Sörqvist et al. [9] (Experiment 1), both organic and conventional products were labeled in both ways. Examinations comparing hypothetical products labeled as organic and as conventional do belong to this definition group as well (see Canavari et al. [121], Carroll et al. [122], and Gassler [123]).

One should note that D2 and D3 are equivalent in situations in which it is impossible for the consumer to differentiate between the organic and the conventional products without labels ($v_{OB} = v_{CB}$), because in D3, the value of ($v_{CB} - v_{OB}$) equals zero. In other words, D2 is a special case of D3, when $v_{OB} = v_{CB}$. In the case of D4, ($v_{CB} - v_{OB}$) is not measured, therefore the effect of organic labeling is inseparable from other potential differences between the organic and the conventional product. These differences that are unrelated to the organic label but related to the production method will henceforth be termed the “organic origin effect” (OOE). As a consequence of the inseparability of the OLE and the OOE, D4 is excluded from further analysis. It is also interesting that D5 does not only describe the organic label’s impact but rather a summation of two effects of two different labels in an inseparable way: the organic label effect (only the effect of the organic label) and the conventional label effect (the effect on customer evaluation of applying a “conventional” or “non-organic” label on a product, instead of leaving it unlabeled). Consequently, D5 does not define a pure OLE, hence it is excluded from further investigation in this study too.

We must also note that, in the real world, we could not find a single example of a “conventional” label in the sense of “non-organic”. Excluding D5 from our analysis is, therefore, done on a solely theoretical basis. Scholderer et al. [131] found that there is no significant empirical difference between the effect of a conventional label and the effect of the lack of an organic label. If their result is supported by other examinations, then studies using D5 will be comparable with those building on D2 or D3. In other words, if there is no significant conventional label effect in the real markets, then D5 is practically capable of identifying the OLE, because $v_{OAC} = v_{OAN}$, $v_{CAC} = v_{CAN}$, and $v_{HAC} = v_{HAN}$.

The purpose of our current paper is not only to identify the explicit and implicit OLE definitions in past studies but also to propose a new concept of the OLE that could cover the widest possible range of the simultaneously existing—explicit or implicit—approaches listed above. This proposed concept is discussed in the following section.

3.2. Forming a General Concept of the OLE

To make it easier to follow our analysis, first, we compare D1 and D2 operational definitions introduced above using a schematic figure (Figure 2). To make the illustration easier, we need to make four assumptions (these will be gradually removed in the subsequent analysis):

1. An organic label leads to a higher consumer evaluation of the product (i.e., it does not reduce it nor is it neutral);
2. Consumer evaluation of products without an organic label is worse if competing products possess an organic label than it is if no other product has an organic label;
3. A product is evaluated by consumers as a whole or on the basis of just one feature (i.e., we temporarily set aside the possibility that labeling affects the evaluation of different features in different ways);

4. There is no such thing as “fake labeling” (e.g., conventional products cannot acquire an organic label).

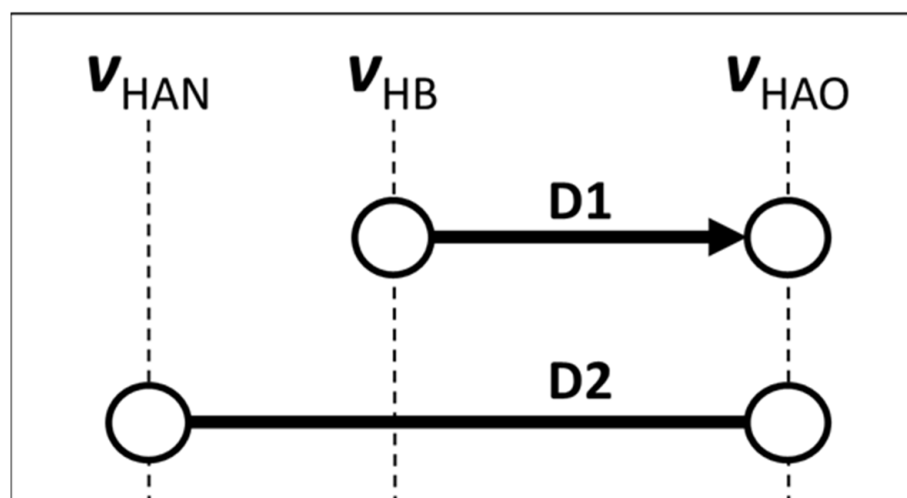


Figure 2. Comparing definitions D1 and D2 in the case of hypothetical products.

Although the assumptions introduced above describe the most typical market situation, naturally, all of them can be violated. The simplification of Figure 2 has the sole purpose of focusing our attention on the core of the OLE phenomenon. For the sake of simplicity, we will use the example of hypothetical products to compare the definitions (D1 and D2) in Figure 2 to ensure that the two products are identical to the consumers except for their labels.

The most important lesson from our schematic illustration (Figure 2) is that the two definitions (D1 and D2) do not overlap completely. In other words, the choice of definition determines the size of the OLE revealed; in this example, the size of the OLE according to D2 is larger than that according to D1. If the researcher is not aware of this, it can lead to incorrect comparisons among the results of studies built on different definitions. Another important point here is that, when plotting D1, we applied an arrow, while in the case of D2, we used a simple line. With this, we would like to highlight the fact that the first definition describes the OLE as a change (consumer evaluation is modified after the labeling compared to the earlier, unlabeled situation), while D2 is describing the difference between the evaluations of the labeled and unlabeled products at the same time (i.e., there is no temporal dimension, no “before and after” situation).

Regarding the literature, this means that the OLE estimations from examinations built on the operational definition D1 (e.g., Bauer et al. [100]; Schuldt and Hannahan [12], Stage 2; Hemmerling et al. [127]; Laureati et al. [128]; Kiss et al. [133]; Ellison et al. [101]; Apaolaza et al. [126]; Küst [106]; Nadricka et al. [108], Studies 1, 2, and 3) are necessarily not comparable to others built on the definition D2 (e.g., Scholderer et al. [131]; Tagbata and Sirieix [67], Stage 2; Mondelaers et al. [15]; Van Loo et al. [11]; Rousseau and Vranken [13]; Rousseau [14]; Bernard and Liu [124]; Poelmans and Rousseau [90]; Yin et al. [98]), even if other dimensions (the type of the product, the research methodology, etc.) of the research studies are similar.

Now, we will bring our example closer to real situations by eliminating the use of identical hypothetical products that can be met only under laboratory circumstances. Let us assume that $v_{CB} < v_{OB}$ (this is a simplification, since the opposite relationship can also occur in a real-life situation). D1 and D2 definitions under this assumption are shown in Figure 3.

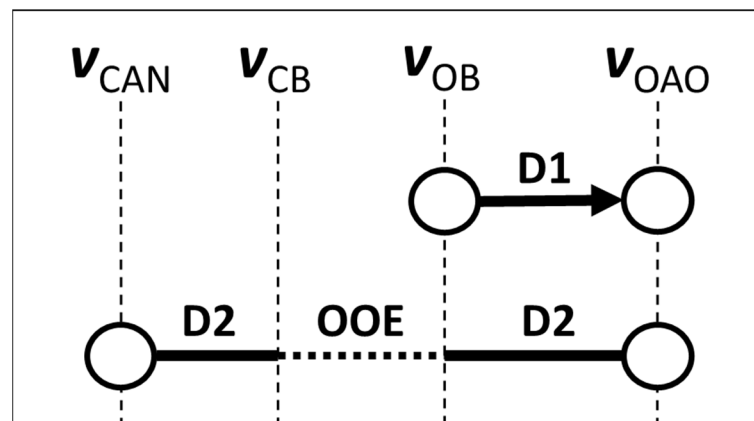


Figure 3. Comparing definitions D1 and D2, where $v_{CB} < v_{OB}$.

The obvious lesson of Figure 3 is that in a situation in which the organic and the conventional products are potentially different even if they are not labeled, the OLE is no longer identifiable as the simple difference between v_{OAO} and v_{CAN} , as was the case in D2. This was exactly the reason why we excluded D4 from the group of OLE definitions selected for further analysis. We have pointed out that $v_{OAO} - v_{CAN}$ contains a difference in the products' consumer evaluation that is independent of labeling, so it is definitely not a part of the OLE. In Figure 3, this "organic origin effect" (OOE) is $v_{OB} - v_{CB}$ and is represented by the dotted line segment. We can formulate the OLE definition that generalizes D2 to situations when it is not assured that $v_{CB} = v_{OB}$ as $(v_{OAO} - v_{CAN}) - OOE = (v_{OAO} - v_{CAN}) - (v_{OB} - v_{CB})$. Notice that this is definition D3. One can rearrange the latter formula to describe the same definition as the sum of continuous lines on the left and right sides of OOE: $(v_{OAO} - v_{OB}) + (v_{CB} - v_{CAN})$, which can be rearranged as $(v_{OAO} - v_{OB}) - (v_{CAN} - v_{CB})$.

Because definition D1 is not affected by the OOE, it remains the same in this more general case, as it was in the previously discussed special case with a hypothetical product.

Moreover, we must also notice that the OLE measured by D1 is included in both the D2 and D3 definitions, and also because D2 is only a special case of D3, therefore a general concept of the OLE should be built on the widest (i.e., D3) definition. On the other hand, it would not be reasonable to call D3 "the ultimate OLE", because it is not obvious that every researcher is interested in the OLE in this way. Since D3 is interpretable only when examining the relationships between at least two products, we will henceforth term it the "relative organic label effect" (ROLE), formally defined as:

$$ROLE = (v_{OAO} - v_{OB}) - (v_{CAN} - v_{CB}). \quad (1)$$

On the right side of Equation (1), the term between the first parentheses ($v_{OAO} - v_{OB}$) contains the D1 definition of the OLE. Since D1 describes the impact of the organic label exclusively on the labeled product's customer evaluation (in Figure 3, the labeled product is the organic product) and does not describe its relative impact on the labeled product's customer evaluation in comparison to other products, we will henceforth call D1 the "absolute organic label effect" (AOLE). Note that the term between the second parentheses on the right side of Equation (1) formulates a similar phenomenon: the change in the customer evaluation of the unlabeled product (in Figure 3, this is the conventional product) caused by labeling the other product (in Figure 3, the organic product). Since this impact of labeling also affects one product only, the term AOLE is applicable to the $(v_{CAN} - v_{CB})$ term as well. This second type of the AOLE has already been identified in the literature by Hemmerling et al. [127], Laureati et al. [128], and Kiss et al. [133], although these authors did not describe its connection to the ROLE.

We will identify the two types of the *AOLE* by subscripts. The $AOLE_O$ is the effect of the organic label on the labeled product's customer evaluation, while the $AOLE_N$ is the effect of the organic labeling of a product on the unlabeled product. Consequently:

$$AOLE_O = v_{OAO} - v_{OB}, \quad (2)$$

$$AOLE_N = v_{CAN} - v_{CB}. \quad (3)$$

Substituting the $AOLE_O$ and the $AOLE_N$ into Equation (1), one can see that the *ROLE* equals the difference between the two *AOLEs*:

$$ROLE = AOLE_O - AOLE_N. \quad (4)$$

Let us rearrange Equation (1) as follows (soon we will see that it can be useful in empirical examinations):

$$ROLE = (v_{OAO} - v_{CAN}) - (v_{OB} - v_{CB}). \quad (5)$$

In previous parts of this study, the right side of Equation (5) was applied to reveal the relationship between the D2 and D3 definitions of the OLE. The practical importance of writing *ROLE* in the form it takes in Equation (5) is that it is possible to eliminate the term $(v_{OB} - v_{CB})$ by using identical hypothetical products in the investigations or by involving the same product with and without an organic label (since the latter case is deception by fake labeling, ethical considerations are necessary), as was achieved in several studies in the literature reviewed (e.g., Mondelaers et al. [15]; Schuldt and Schwarz [6]; Van Loo et al. [11]; Rousseau and Vranken [13]; Rousseau [14]; Poelmans and Rousseau [90]). The elimination of $(v_{OB} - v_{CB})$ from Equation (5) means that the *ROLE* is practically measurable if the pre-labeling customer evaluations of the products are known, supposing identical products.

It should be mentioned that using either of these two ways of measuring the *ROLE* (i.e., by involving the measurement of all four values in Equation (5) or by ensuring the equality of v_{OB} and v_{CB} and measuring the *ROLE* as the difference between v_{OAO} and v_{CAN}) is a compromise. When using identical hypothetical products, neither of the two *AOLEs* is identifiable (both pre-labeling values are missing). Even when using fake labeling, only one of the two *AOLEs* is measurable: the $AOLE_O$ when the true origin of the product is organic and the $AOLE_N$ when it is conventional.

Beyond practical considerations, Equation (5) has a theoretical consequence as well. Since its first term $(v_{OAO} - v_{CAN})$ is the difference between the two products' post-labeling customer evaluations, while the second term $(v_{OB} - v_{CB})$ is the difference between the same two products' evaluations before labeling, the *ROLE* can, thus, be defined as the impact of organic labeling on customer perception of the difference between the two products. In essence, this is the same effect that Kiss et al. [133] termed the "separating effect". In addition to the previous study's findings, the present paper formally defines the *ROLE* and also identifies its relationship with the two types of the *AOLE*, establishing a framework for the operational definitions of the OLE. Furthermore, it reveals that the D2 and D3 definitions are essentially the same, and they describe a more specific (D2) and a general (D3) *ROLE*.

According to Equation (5), the *ROLE* does not define the OLE as a static but as a dynamic phenomenon: it describes a change perceived by customers in the difference between two products that is exclusively caused by marking one of the products with an organic label. It has to be noted that since both D2 and D3 are the *ROLE* (D3 is general, D2 is a specific case), thus D2 necessarily describes a change as well, even if it not obvious from the actual research settings. According to these conclusions, Figure 4 uses arrows to plot the different definitions of the OLE.

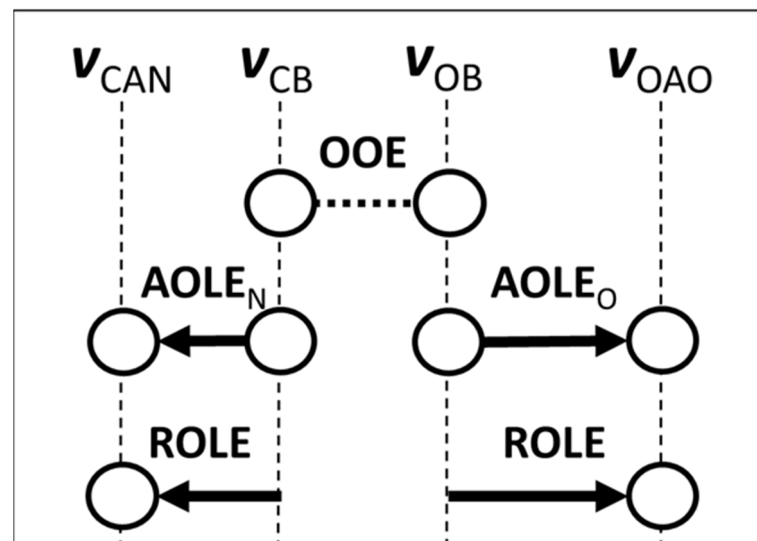


Figure 4. Relationships among absolute and relative organic label effects.

It was assumed in the previous example that there is no such thing as fake labeling. The only purpose of this assumption was to make the explanation and the illustration easier to follow. The main findings will not change even if this assumption is removed, because a product's organic or conventional origin is a credence attribute [134]: in practice, it cannot be perceived by customers even after consumption. Additionally, when customers cannot differentiate between fake and genuine organic labels, then an organic label will trigger the same effect on any products, independently of its origin. Consequently, the OLE definitions introduced above could also be written in a more general form:

$$AOLE_O = v_{KAO} - v_{KB}, \quad (6)$$

$$AOLE_N = v_{JAN} - v_{JB}. \quad (7)$$

$$ROLE = (v_{KAO} - v_{KB}) - (v_{JAN} - v_{JB}) \quad (8)$$

and after rearrangement

$$ROLE = (v_{KAO} - v_{JAN}) - (v_{KB} - v_{JB}). \quad (9)$$

In the equations above, K and J subscripts can mark any kind of product, even identical ones, or exactly the same one. Let us mention here only two examples from the literature. Rousseau and Vranken [13] demonstrated that $K = J = H$ via the use of hypothetical products, thus the $ROLE = (v_{HAO} - v_{HAN}) - (v_{HB} - v_{HB})$, and consequently, the $ROLE = (v_{HAO} - v_{HAN})$. Bernard and Liu [124] could have calculated the $ROLE$ as the difference between the consumer evaluations of the labeled and unlabeled versions of the same organic product ($K = J = O$): $ROLE = (v_{OAO} - v_{OAN}) - (v_{OB} - v_{OB}) = (v_{OAO} - v_{OAN})$.

To illustrate our concept on empirical results, we will use applicable measurement data from previous studies. First, we will assess what kind of OLE definitions were or could be measured in each study from Table 1, according to their research method(s). The result of this review is presented in Table 2, sorted by the explicit or implicit OLE approach the researchers used. We do not use examinations where neither an $AOLE$ nor a $ROLE$ is identifiable. If an OLE variant was de facto identified by the researchers, then the study is marked with three dots. We also present studies where the given type of OLE was not identified by the authors, but the data necessary to calculate it were published (marked with two dots). A single dot indicates those studies where the necessary data were not published, but the methodology suggests that the authors should have collected the necessary information. Numerical results are not published here, because they are irrelevant from the perspective of this study.

Table 2. OLE concepts in the literature, according to the *AOLE-ROLE* framework.

Examination	<i>AOLE_O</i> ¹	<i>AOLE_N</i> ¹	<i>ROLE</i> ¹
Tagbata and Sirieix [67], Stage 2			•
Scholderer et al. [131]			••
Bernard and Liu [124]			••
Mondelaers et al. [15]			•••
Schuldt and Schwarz [6], Study 1			•••
Onozaka and McFadden [81]			•••
Van Loo et al. [11]			•••
Rousseau and Vranken [13]			•••
Meas et al. [82]			•••
Rousseau [14]			•••
Van Loo et al. [83]			•••
Bello and Abdulai [84]			•••
Gorissen and Weijters [85], Study 4			•••
Hidalgo-Baz et al. [86]			•••
Meyerding [87]			•••
Troiano et al. [88]			•••
Delmas and Lessem [19]			•••
Lu and Gursoy [89]			•••
Poelmans and Rousseau [90]			•••
Kim et al. [91]			•••
Meyerding et al. [92], Stage 3			•••
Yeh et al. [93]			•••
Giannoccaro et al. [94]			•••
Gilmour et al. [95]			•••
Jeong and Jang [96]			•••
Jongmans et al. [97]			•••
Macht [125], Stage 1 and 2			•••
Yin et al. [98]			•••
Guilabert and Wood [132]	•••		•••
Kiss et al. [133]	•••		•••
Laureati et al. [128]	•••	•••	••
Hemmerling et al. [127]	•••	•••	••
Van Doorn and Verhoef [99], Study 1, 2, and 3	•••		
Larceneux et al. [8]	•••		
Bauer et al. [100]	•••		
Schuldt and Hannahan [12], Study 2	•••		
Ellison et al. [101]	•••		
Gorissen and Weijters [85], Study 3	•••		
Prada et al. [102], Experiment 1 and 2	•••		
Apaolaza et al. [126]	•••		
Lee et al. [103], Study 1 and 2	•••		
Scholl-Grissemann [104], Study 1 and 2	•••		
Amos et al. [105], Study 1	•••		
Besson et al. [56], Study 2	•••		
Küst [106]	•••		
Septianto et al. [107], Study 1 and 2	•••		
Nadricka et al. [108], Study 1, 2, and 3	•••		
Parker et al. [76], Study 1b	•••		
Johansson et al. [130]	••		

¹ ••• The given OLE concept is identified by the authors; •• the given OLE concept is not identified, but the necessary information is published; • according to the description of the research methodology of the study, the necessary data to identify the given OLE concept should have been collected, but they are not published in the article.

Although we could find research studies capable of measuring both the absolute and the relative concept (even if their authors did not actually identify both of them), most of the papers still focused on only one of the two. Considering only those studies where the OLE values have been actually computed by their authors (indicated by ••• in Table 2), 26 of the reviewed examinations identified only the *ROLE*, 24 only the *AOLE_O*, two both

AOLEs but not the *ROLE*, and one the $AOLE_O$ and the *ROLE*. Only one study identified both the *ROLE* and the two *AOLEs*. However, three of the reviewed studies (Hemmerling et al. [127]; Laureati et al. [128]; Kiss et al. [133]) provide the opportunity to compute all three OLE concepts and, thus, to illustrate their relationships on real life empirical data. From these three, we chose Hemmerling et al. [127] for demonstration.

Hemmerling et al. [127] studied the organic label effect on the perceived flavor of yoghurts. First, they conducted a blind tasting of a conventional and an organic product, without any labels on them. During this pre-labeling test (a seven-point hedonic liking test from -3 to $+3$), the customers evaluated the conventional product's taste as $v_{CB} = 0.60$, and the organic one as $v_{OB} = 0.41$. Second, they applied an organic label to the organic product, while the conventional product remained unlabeled. After this modification, the customers evaluated the products as: $v_{CAN} = 0.46$ and $v_{OAO} = 0.73$. The researchers found the change in the mean evaluations between the two tests significant in the case of both products. The difference between the organic and the conventional product's mean customer evaluation was only tested in the blind test, and it was found to be significant. Based on the previously presented values, Hemmerling et al. [127] found the three OLE measures to have the following values: According to Equations (2) and (3)

$$AOLE_O = v_{OAO} - v_{OB} = 0.73 - 0.41 = 0.32, \quad (10)$$

$$AOLE_N = v_{CAN} - v_{CB} = 0.46 - 0.60 = -0.15. \quad (11)$$

and based on Equation (4)

$$ROLE = AOLE_O - AOLE_N = 0.32 - (-0.15) = 0.47. \quad (12)$$

Using Equation (5)

$$ROLE = (v_{OAO} - v_{CAN}) - (v_{OB} - v_{CB}) = (0.73 - 0.46) - (0.41 - 0.60) = 0.27 - (-0.19) = 0.46. \quad (13)$$

The 0.01 difference between the two *ROLE* calculations derives from a rounding problem.

4. Discussion

In our study, we have investigated how researchers in the empirical literature measure the organic label effect, and how the different existing concepts could be unified. We have identified five de facto definitions (D1, D2, D3, D4, and D5).

Definition D1 describes the change in the customer evaluation of a given product in an absolute sense (i.e., not compared to other products' evaluations), caused by the introduction of organic labeling to the market. We have termed this the "absolute organic label effect" (*AOLE*). It was pointed out that the *AOLE* could appear not only with a product acquiring an organic label ($AOLE_O$), but with an unlabeled product as well ($AOLE_N$).

Definitions D2, D3, and D4 are built on the same basic idea and describe a practical approach to the relative organic label effect (*ROLE*), which is calculable as the difference between the $AOLE_O$ and the $AOLE_N$ (see Equation (4)). D2 is a special case of D3, where the organic-labeled product's competitor is exactly the same (unidentifiable by the customers) with the only exception being that it does not possess an organic label. D4 was excluded from our analysis, since we have pointed out that it mixes the OLE with the organic origin effect.

In the case of D5, the definitions differ from those of D2 and D3 in that the OLE is understood as the difference between an organic-labeled product and its competitor possessing a conventional label (thus, the competitor is not simply unlabeled). This concept differs from the approach of D2 and D3, because two effects are mixed here inseparably: the effect of the organic label and the effect of the conventional label. A problem with definition D5 is that in real markets "non-organic" (equivalent to "conventional") labels practically do not exist. Because of these two issues (inseparable effects, non-existent label), we have left D5 out of our analysis.

Based on the findings above, the studies reviewed can be sorted into at least two clearly separable groups employing different OLE concepts. Some studies focused on the *AOLE* (only on the *AOLE_O* or on the *AOLE_O* and the *AOLE_N* together), others on the *ROLE*, and a few intended to investigate both.

After we had revealed that the concept of the *ROLE* includes both concepts of the *AOLE* (the *ROLE* is equivalent to the difference between *AOLE_O* and *AOLE_N*), we examined the reviewed papers to find out how frequent it is in the literature to present the data or do the calculations necessary for each concept. We have found only three studies where all the three OLE types were identified, although the relationships among the concepts were not discussed in detail by either of them. The results of these three papers provided us the opportunity to present our three-element OLE framework (*AOLE_O*, *AOLE_N*, *ROLE*) using real data. Since the differences among the three concepts (*ROLE*, *AOLE_O*, *AOLE_N*) have not only been theoretically but also empirically supported, it seems to be unarguably important to explicitly define the concept utilized in every empirical research study on the OLE. Thus, we have confirmed that the two separate OLE definitions (*AOLE* and *ROLE*) implicitly present in the literature can be synthesized to form a unified concept, formally described in Equation (4).

An important managerial implication of our research findings is that decomposing OLE into relative and absolute sub-effects could provide an important input for understanding business situations before decisions are made about investing into an organic label. Finding a significant, positive *AOLE_O* indicates that the investment in an organic label increases the consumer value of the organic product (see Equation (2)). A significant negative *AOLE_N* shows that the appearance of the organic label on a product will decrease the consumer value of the competing product without a similar label (see Equation (3)). If the *ROLE* is significantly positive, the difference between the consumer evaluations of the organic and the conventional product will increase (see Equation (5)). In other words, a significant positive *ROLE* indicates that organic labeling is expected to improve the organic product's competitive advantage over the competitor without an organic label. We know from Equation (4) that the *ROLE* is the difference between the *AOLE_O* and the *AOLE_N*. However, if we measure only the *ROLE* directly without measuring the *AOLEs*, we will have no information on the source of this change in the competitive advantage. The same positive *ROLE* can result from an increase in the *AOLE_O*, a decrease in the *AOLE_N*, or a combination of changes in both *AOLEs*. By re-analyzing the data from Hemmerling et al. [127], we illustrated at the end of Section 3 that, on the one hand, both *AOLEs* were significant, and on the other hand, the *AOLE_O* was twice the absolute value of the *AOLE_N*, i.e., the organic label increased the value of the organic product twice as much as it decreased the value of the non-labeled one.

If a manager expects some degree of change in the *AOLE_O*, the *AOLE_N*, or both, he or she will be able to plan a decision whether to invest in an organic label more accurately than if he or she only knew that the two products' evaluations compared to each other would change. In cases where an organic product does not have a relevant competitor, it is enough to pay managerial attention to the *AOLE_O*, but if the competition is fierce, the *ROLE* will be decisive. Conclusively, a producer thinking about organic labeling may need knowledge of the *AOLE_O*, the *AOLE_N*, or the *ROLE*, depending on the market situation; thus, knowing the relationships among them, he or she can determine exactly what data and analysis are the most useful. Moreover, the absolute–relative concept of the OLE provides an opportunity to compare the effect of each specific organic label not only overall, but also based on individual OLE elements (*AOLE_O*, *AOLE_N*, and *ROLE*). The more detailed information enables an organic producer intending to choose from organic labels to make a more accurate decision.

5. Conclusions

The aim of this research was to reveal different operational definitions of the OLE in the existing empirical literature, and based on the findings, to provide a unified approach

in order to facilitate the comparison of various research results and the design of future research in the field of the OLE. In sum, we have contributed to the literature on the OLE with the following results.

Divergent definitions of the OLE in the literature have been revealed. In the literature, researchers define the OLE in two essentially different ways; however, these concepts are never explicitly stated. The first one is the absolute organic label effect ($AOLE$), which is applicable to the change in the customer evaluation of the features of an organic product caused by its organic labeling ($AOLE_O$) or to the change in the evaluations of a non-labeled (conventional) product due to the organic labeling of its competitor ($AOLE_N$). The second is the relative organic label effect ($ROLE$), which is the change in the size of the difference between customer evaluations of an organic-labeled and an unlabeled product's features compared to a previous situation in which none of the two products were labeled.

It has been proven that the OLE always means change. Both revealed definitions of the OLE ($ROLE$, $AOLE$) imply a change in evaluation due to the organic labeling of one or more products, not simply a perceived difference between the organic-labeled and the unlabeled products at a given moment. Thus, it should always be interpreted as a change, even if this is not obvious, because the actual examination setting only contains one phase with simultaneous customer evaluations of the same product with and without an organic label by two different customer groups.

We have introduced two interpretations of the relative organic label effect. The $ROLE$ could be formulated, as the sum of the effects organic labeling has on the customer evaluations of labeled and unlabeled products (see Equation (4)), as well as the effects of organic labeling on the difference between customer evaluations of the two products (the one that acquires an organic label and the other one that does not) (Equation (5)).

Two methods of measuring the OLE have been identified. As a consequence of the abovementioned dual interpretation, there are at least two ways to measure the $ROLE$. First, to be able to apply Equation (4), one has to identify both the $AOLE_O$ and the $AOLE_N$ and then subtract the second from the first. To identify the two $AOLEs$, the customer evaluations of both products have to be measured before and after organic labeling. Second, in the case of Equation (5), the same product (hypothetical or real) can be employed in an organic-labeled and in a non-labeled version. If a researcher does this, there is no need for a pre labeling measurement. These two measurement variants are equivalent in reference to the $ROLE$; however, this is not true as regards the $AOLEs$. The second method does not provide the opportunity to identify both types of the $AOLE$; therefore, it is advisable to use the first method whenever possible.

A problem of conventional labeling has been revealed. We have argued (see Section 3.1) that in laboratory examinations, it is not advisable to employ a conventional label to indicate non-organic origin. If a researcher applies the organic label to one product and the conventional label to the other one, then it is impossible to separate the two label effects (the organic label effect and the conventional label effect) from each other. Theoretically, these kinds of investigations are inappropriate to measure either the $AOLEs$ or the $ROLE$. From a practical viewpoint, however, there is as yet no empirical evidence on whether customers evaluate a conventional label and no-label differently.

A problem of the organic origin effect (OOE) has been revealed. We have pointed out that the potential effect of the organic and conventional origin of the products can distort the accurate evaluation of the OLE if it is not excluded (such as in definition D2) or measured (such as in definition D3) during the OLE estimation.

In brief, the decomposition of the OLE into two absolute and one relative components and revealing the relationships among them could be considered the main contribution of this paper to the literature on the OLE. This $AOLEs$ – $ROLE$ approach highlights the importance of designing empirical examinations in a way that is able to focus on both aspects of the organic label effect at the same time. The problems revealed in involving conventional labels in experiments, as well as of neglecting the OOE, could also be helpful when designing future examinations on the OLE. Identifying the absolute and relative

effects is also important when analyzing, understanding, and comparing previous results in the literature.

The strongest limitation of our results is simplification. This was, however, necessary and intentional. By simplifying the relationships among the elements of our OLE framework, we intended to ease understanding of the essential aspects of our study. The most important simplifications were the following: we did not deal with the quality of the organic label (i.e., which organization issued the organic certification represented by the label), and we ignored the possible interactions between organic and other labels (if there are other labels present on a product besides the organic label) and among different product features as well. Neither did we pay attention to the technical details of the studies reviewed that were not connected to the OLE concept. The abovementioned, not currently investigated details will become important only after an empirically testable theoretical model is established. The present study would like to contribute to the development of such a theoretical model by clarifying and decomposing the definition of the OLE.

The findings of the current research suggest several paths for future studies. First, we suggest conducting empirical research directly addressing the “problem of conventional labeling” presented above, which measures the difference in effects resulting from the lack of an organic label versus the existence of a “conventional”/“non-organic” label. Among the articles reviewed the authors have found only one experiment (Scholderer et al. [131]) in which products labeled as organic, products labeled as conventional and products without any label were compared to each other. Second, as the presence of at least two different OLE concepts (*AOLEs* and *ROLE*) in the literature was revealed, a further question is the practical usefulness of each concept. In our literature review, we could not find any study analyzing the *AOLEs* and the *ROLE* simultaneously in real market situations. Even among laboratory examinations, very few studies were suitable for detecting both absolute and relative effects. Third, choice experiments with hypothetical products prevalent in OLE studies typically do not include a blind test phase; thus, they are only suitable for estimating the *ROLE*, while they cannot test the *AOLEs*. Therefore, we recommend performing choice experiments extended by a blind test phase. Fourth, in the present paper, we focused only on organic labels, but the concept of absolute and relative label effects can be extended to various types of sustainability and other labels, taking into account their different characteristics. Fifth, a significant part of the sustainability labeling literature examines the co-inclusion of different sustainability labels. An analysis of the interactions between labels is also worthwhile at the level of absolute and relative effects. In this way, it would be possible to measure the impact of different combinations of sustainability labels on the absolute and relative effects of each label.

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Appendix A. EXACTKEYWORD Filters in Scopus Search

(EXCLUDE (EXACTKEYWORD,"Animals") OR EXCLUDE (EXACTKEYWORD,"Animal") OR EXCLUDE (EXACTKEYWORD,"Nonhuman") OR EXCLUDE (EXACTKEYWORD,"Humans") OR EXCLUDE (EXACTKEYWORD,"Animalia") OR EXCLUDE (EXACTKEYWORD,"Signal Transduction") OR EXCLUDE (EXACTKEYWORD,"Metabolism") OR EXCLUDE (EXACTKEYWORD,"Chemistry") OR EXCLUDE (EXACTKEYWORD,"Genetics") OR EXCLUDE (EXACTKEYWORD,"Biodiversity") OR EXCLUDE (EXACTKEYWORD,

"Environmental Protection") OR EXCLUDE (EXACTKEYWORD,"Climate Change") OR EXCLUDE (EXACTKEYWORD,"Forestry") OR EXCLUDE (EXACTKEYWORD,"Soil Organic Matter") OR EXCLUDE (EXACTKEYWORD,"Organic Matter") OR EXCLUDE (EXACTKEYWORD,"Environmental Monitoring") OR EXCLUDE (EXACTKEYWORD,"Eurasia") OR EXCLUDE (EXACTKEYWORD,"Unclassified Drug") OR EXCLUDE (EXACTKEYWORD,"Environmental Impact") OR EXCLUDE (EXACTKEYWORD,"Aves") OR EXCLUDE (EXACTKEYWORD,"Forest Management") OR EXCLUDE (EXACTKEYWORD,"Hexapoda") OR EXCLUDE (EXACTKEYWORD,"Carbon") OR EXCLUDE (EXACTKEYWORD,"Adaptation") OR EXCLUDE (EXACTKEYWORD,"Mouse") OR EXCLUDE (EXACTKEYWORD,"Organic Carbon") OR EXCLUDE (EXACTKEYWORD,"Mice") OR EXCLUDE (EXACTKEYWORD,"Phylogeny") OR EXCLUDE (EXACTKEYWORD,"Biogeochemistry") OR EXCLUDE (EXACTKEYWORD,"Fluorescence") OR EXCLUDE (EXACTKEYWORD,"Algae") OR EXCLUDE (EXACTKEYWORD,"Natural Resource") OR EXCLUDE (EXACTKEYWORD,"Soils") OR EXCLUDE (EXACTKEYWORD,"Nitrogen") OR EXCLUDE (EXACTKEYWORD,"Bacteria (microorganisms)") OR EXCLUDE (EXACTKEYWORD,"Conservation") OR EXCLUDE (EXACTKEYWORD,"Natural Killer Cell") OR EXCLUDE (EXACTKEYWORD,"Animal Cell") OR EXCLUDE (EXACTKEYWORD,"Conservation Of Natural Resources") OR EXCLUDE (EXACTKEYWORD,"Killer Cells, Natural") OR EXCLUDE (EXACTKEYWORD,"Phenotype") OR EXCLUDE (EXACTKEYWORD,"Gene Expression") OR EXCLUDE (EXACTKEYWORD,"Predation") OR EXCLUDE (EXACTKEYWORD,"Animal Experiment") OR EXCLUDE (EXACTKEYWORD,"Biomass") OR EXCLUDE (EXACTKEYWORD,"Chemical Cue") OR EXCLUDE (EXACTKEYWORD,"Natural Selection") OR EXCLUDE (EXACTKEYWORD,"Human Cell") OR EXCLUDE (EXACTKEYWORD,"Organic Compound") OR EXCLUDE (EXACTKEYWORD,"Governance Approach") OR EXCLUDE (EXACTKEYWORD,"Growth, Development And Aging") OR EXCLUDE (EXACTKEYWORD,"Land Use") OR EXCLUDE (EXACTKEYWORD,"Mass Spectrometry") OR EXCLUDE (EXACTKEYWORD,"Water Pollutants, Chemical") OR EXCLUDE (EXACTKEYWORD,"Phylogenetics") OR EXCLUDE (EXACTKEYWORD,"Biological Materials") OR EXCLUDE (EXACTKEYWORD,"Natural Resources") OR EXCLUDE (EXACTKEYWORD,"Volatile Organic Compound") OR EXCLUDE (EXACTKEYWORD,"Dissolved Organic Matter") OR EXCLUDE (EXACTKEYWORD,"Sexual Selection") OR EXCLUDE (EXACTKEYWORD,"Behavioral Response") OR EXCLUDE (EXACTKEYWORD,"Concentration (composition)") OR EXCLUDE (EXACTKEYWORD,"Enzyme Activity") OR EXCLUDE (EXACTKEYWORD,"Organic Compounds") OR EXCLUDE (EXACTKEYWORD,"Water Pollutant") OR EXCLUDE (EXACTKEYWORD,"Energy Efficiency") OR EXCLUDE (EXACTKEYWORD,"Gene Expression Regulation") OR EXCLUDE (EXACTKEYWORD,"Carbon Dioxide") OR EXCLUDE (EXACTKEYWORD,"Biological Evolution") OR EXCLUDE (EXACTKEYWORD,"Drug Effect") OR EXCLUDE (EXACTKEYWORD,"Nuclear Magnetic Resonance") OR EXCLUDE (EXACTKEYWORD,"Ecotourism") OR EXCLUDE (EXACTKEYWORD,"Evolutionary Biology") OR EXCLUDE (EXACTKEYWORD,"Environmental Factor") OR EXCLUDE (EXACTKEYWORD,"Resource Management") OR EXCLUDE (EXACTKEYWORD,"Insect") OR EXCLUDE (EXACTKEYWORD,"Ecosystem Service") OR EXCLUDE (EXACTKEYWORD,"Morphology") OR EXCLUDE (EXACTKEYWORD,"Human") OR EXCLUDE (EXACTKEYWORD,"Environmentalism") OR EXCLUDE (EXACTKEYWORD,"Smallholder") OR EXCLUDE (EXACTKEYWORD,"Building") OR EXCLUDE (EXACTKEYWORD,"Memory") OR EXCLUDE (EXACTKEYWORD,"Renewable Energy") OR EXCLUDE (EXACTKEYWORD,"Traffic Signals") OR EXCLUDE (EXACTKEYWORD,"Agroecology") OR EXCLUDE (EXACTKEYWORD,"Green Building") OR EXCLUDE (EXACTKEYWORD,"Decapoda (Crustacea)") OR EXCLUDE (EXACTKEYWORD,"Greenspace") OR EXCLUDE (EXACTKEYWORD,"LEED") OR EXCLUDE (EXACTKEYWORD,"Tourism") OR EXCLUDE (EXACTKEYWORD,"Ecological Approach") OR EXCLUDE (EXACTKEYWORD,"Ecosystem") OR EXCLUDE (EXACTKEYWORD,"Ecosystems") OR EXCLUDE (EXACTKEYWORD,"Life Cycle Analysis") OR EXCLUDE (EXACTKEYWORD,"Market Conditions") OR EXCLUDE (EXACTKEYWORD,"Natural Gas") OR EXCLUDE (EXAC-

TKEYWORD,"Greenwashing") OR EXCLUDE (EXACTKEYWORD,"Natural Disasters") OR EXCLUDE (EXACTKEYWORD,"Natural Language Processing Systems") OR EXCLUDE (EXACTKEYWORD,"Sustainable Tourism") OR EXCLUDE (EXACTKEYWORD,"Anura") OR EXCLUDE (EXACTKEYWORD,"Ecological Impact") OR EXCLUDE (EXACTKEYWORD,"Ecological Modeling") OR EXCLUDE (EXACTKEYWORD,"Green Bonds") OR EXCLUDE (EXACTKEYWORD,"International Trade") OR EXCLUDE (EXACTKEYWORD,"Pesticides") OR EXCLUDE (EXACTKEYWORD,"Recycling") OR EXCLUDE (EXACTKEYWORD,"Green Economy") OR EXCLUDE (EXACTKEYWORD,"Coleoptera") OR EXCLUDE (EXACTKEYWORD,"Green Hotels") OR EXCLUDE (EXACTKEYWORD,"Religion") OR EXCLUDE (EXACTKEYWORD,"Testudines") OR EXCLUDE (EXACTKEYWORD,"Crop Rotation") OR EXCLUDE (EXACTKEYWORD,"Yield") OR EXCLUDE (EXACTKEYWORD,"Crop Yield") OR EXCLUDE (EXACTKEYWORD,"Environmental Justice") OR EXCLUDE (EXACTKEYWORD,"Environmental Legislation") OR EXCLUDE (EXACTKEYWORD,"Environmental Performance") OR EXCLUDE (EXACTKEYWORD,"Germination") OR EXCLUDE (EXACTKEYWORD,"Phylogenetic Signal") OR EXCLUDE (EXACTKEYWORD,"Politics") OR EXCLUDE (EXACTKEYWORD,"Sustainable Development") OR EXCLUDE (EXACTKEYWORD,"Natural Law") OR EXCLUDE (EXACTKEYWORD,"Crop Production") OR EXCLUDE (EXACTKEYWORD,"Economic Analysis") OR EXCLUDE (EXACTKEYWORD,"Export") OR EXCLUDE (EXACTKEYWORD,"Developing Countries") OR EXCLUDE (EXACTKEYWORD,"Developing World") OR EXCLUDE (EXACTKEYWORD,"Farmers Attitude") OR EXCLUDE (EXACTKEYWORD,"Environmental Concern") OR EXCLUDE (EXACTKEYWORD,"Green Buildings") OR EXCLUDE (EXACTKEYWORD,"Information Management") OR EXCLUDE (EXACTKEYWORD,"Institutional Framework") OR EXCLUDE (EXACTKEYWORD,"Planning") OR EXCLUDE (EXACTKEYWORD,"Supply Chain Management") OR EXCLUDE (EXACTKEYWORD,"Sustainability Assessment") OR EXCLUDE (EXACTKEYWORD,"Urban Sustainability") OR EXCLUDE (EXACTKEYWORD,"Integrated Pest Management"))).

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