Assessing the potential price range for bioactive food additives from wood by using the van Westendorp method

Erhebung der Preispotentiale bioaktiver Lebensmittelzusätze aus Holz unter Verwendung der van Westendorp Methode

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Summary

Plant-based food additives in functional foods can improve consumer's nutrient uptake and promote optimal health effects. Considering the ongoing development of new technologies for extracting bioactive substances the potential pricing of these substances plays a major role in assessing the overall profitability of new technologies. The study therefore assessed potential prices for not yet commercially existing bioactive substances from wood by carrying out a business-to-business-survey. Applying the van Westendorp method the study identified a potential price in context of varying product properties like different health claims or increasing purities. The Indifference Price of 101.5 €/kg can be considered as a guide value to assess the overall profitability. The study identified potential price ranges for such products and provided information that can be used for according pricing strategies.
Keywords: bioactive substances, van Westendorp method, price potential, dietary supplements, functional foods.

Zusammenfassung

Pflanzenbasierte Zusatzstoffe in ***funktionellen Lebensmitteln*** werden als gesundheitsförderlich erachtet und unterstützen damit eine gesundheitsbezogene Werbebotschaft. Da ständig an der Entwicklung neuer Prozesse zur Gewinnung bioaktiver Substanzen gearbeitet wird, ist das Interesse an der potentiellen Preisgestaltung groß, um somit die

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Rentabilität der Neuentwicklungen messen zu können. Diese Studie erhebt im Rahmen einer Business-to-Business-Umfrage potenzielle Preise für noch nicht existierende bioaktive Substanzen aus Holz. Mittels der van Westendorp Methode wurden mögliche Preisspannen im Kontext verschiedener Produkteigenschaften wie gesundheitlichen Wirkungen oder Reinheit der Substanzen ermittelt. Der indifferente Preis bei 101,5 €/kg kann als Orientierungswert sowie als grundlegende Information für zukünftige Preisstrategien dienen.
Schlagworte: Bioaktive Substanzen, van Westendorp Methode, Marktpotenzial, Nahrungsergänzungsmittel, Functional Foods.

1. Introduction

One of the fastest growing segments of the food industry is the discovery, development and marketing of functional food, dietary supplements and related products (NICOLETTI, 2012). Due to the consumers demand for a healthy life style, food industry companies have high expectations in such food products (MENRAD et al., 2000). In this context Functional Food as well as dietary supplements play a specific role.

The most often explored bioactive substances from wood are terpenes and lignans (DOMINGUES et al., 2011; HOLMBOM et al., 2003). These substances are supposed to provide health effects, such as antioxidant potential, supporting weight loss, active agent against osteoporosis and positive cardiovascular effects (LI et al., 2010; SARAVANAN and PUGALENDI, 2006; KANGAS et al., 2002; KREIJKAMP-KASPERS et al., 2004; KIM et al., 2002).

The techno-economic feasibility of newly developed production processes is often assessed by analysing the calculated production costs through a system-analysis-approach. In order to widen economic assessment of technical development, this study produces market information by carrying out a business-to-business-survey (B2B-survey) Considering the successful development of new bioactive substances for use in health-related products the potential pricing of these substances plays a major role in assessing not just costs but profitability. In order to fill the gap between existing information and potential strategic meaning, the following research question was investigated:

''What is the price potential of certain bioactive substances derived from wood in dietary supplement and functional food applications?''
The major achievement of the study, based on HAYDN (2012) was therefore to perform a practical assessment of potential prices for not yet commercially existing (and hence not yet specified in detail) bioactive substances. Against this background, this article addresses three audiences: academics, industrial practitioners and policy-makers involved in the fields of product development.

2. Method

Due to the limited model cases on pricing expectations among potential buyers for bioactive substances from wood, a B2B-survey as method for primary data generation was chosen.
For answering questions related to price expectations, several techniques based on contingent valuation approaches (MITCHELL and CARSON, 1989) are available, like direct approach or conjoint analysis (WEINER and ZACHARIAS, 2004; BACKHAUS and VOETH, 2004). In this B2B-survey the price sensitivity meter (PSM) developed by van Westendorp (WESTENDORP, 1976; LIPOVETSKY et al., 2011) was used. In comparison to other methods, this PSM indicates an "acceptable price range"[2] as a result. The method has been recently applied in context of consumer attitudes on electric cars (LARSON et al., 2014) or fresh squeezed orange juice (KIM et al., 2012). The method has been criticized for its weak theoretical foundation (ISAACSON, 2012) addressing several associated problems like unrealistic and hypothetical questions by asking for too low prices, like a lack of knowledge regarding the "new" product at responding companies and strategic bias in answers. However, the former issue is very much case related while the latter two issues apply to most methods used in context of new product pricing evaluations. While for example the conjoint analysis is avoiding much of the strategic bias, it struggles usually with the required independence of factors (if

[2] An acceptable price range within PSM is defined as all prices that are perceived as neither too cheap nor too expensive by the majority of respondents. It does neither indicate the sensitivity on changing prices nor indicate the theoretic or true willingness to pay.

price is one of them). Therefore, LIPOVETSKY et al. (2011) consider it as an extension of direct and indirect measuring approaches in terms of "psychological price" modelling specifically focused on finding an acceptable price as a quality indicator. According to them, taking into account concerns about too low prices possibly indicating low quality is a special feature of the method.

The assumption underlying PSM is that respondents are capable of envisioning a pricing landscape and that price is an intrinsic measure of value or utility. In order to identify the price range, the PSM approach asks four questions, which are then evaluated as a series of four cumulative distributions (REINECKE et al., 2009). These four questions are related to the price expectations for the product:

- Price at which product is too expensive to consider,
- Price at which the product would start to get expensive,
- Price at which the product would be too cheap (lacking quality),
- Price at which the product would be a bargain.

The answers to those four questions are grouped into frequency distributions and then the cumulative frequencies are plotted on a graph. The percentage of respondents is shown on the vertical axis, the price points on the horizontal axis. The cumulative distributions "cheap" and "expensive" are presented in the graph in such a way that they will cross each other, showing the point of indifferent price, which is based on the people's experience with price levels. The two distributions "too cheap" and "too expensive" show the "Optimal pricing Point" (OPP). At this price point an equal number of people believe a product is too cheap or too expensive. It is the price point with graded resistance from the market participants and the highest market penetration. The graphs "expensive" and "cheap" can be reversed, yielding the "not-expensive" and "not-cheap" distributions. If they were combined with the original "too expensive" and "too cheap" distributions we got two new intersections. These points are called "Point of Marginal Cheapness" (PMC) and "Point of Marginal Expensiveness" (PME). The PMC gives the price where the number of people which experiences a product as "too cheap" is larger than the number which experiences it merely as "cheap". The same thing happens at PME, where the number of people experiencing the product as "too expensive" is larger than the number of those experiencing the product as expensive. The range between those two points is called the

range of acceptable prices. The share of sales below or above these points is very small.
Normally, the method is used when the product marketer needs flexibility of evaluating how the product will perform along a range of prices. If the acceptable range of prices fits with the expectation of the product marketer, they can move forward with product development. This method also allows to experiment with trial and revenue along a range of prices (WEINER and ZACHARIAS, 2004). In case of this study, the method is advantageous for investigating the case of new products in a fragmented market in which no exhaustive secondary data are available and in which the number of responding companies is most likely too small for conducting e.g. conjoint experiments. Major disadvantages are related to the hypothetic nature of the main questions (ISAACSON, 2012), the limitation on descriptive analytics and the lacking macro-economic context e.g. utility change, substitution and income effects.

2.1 Population base of the survey

An online survey among relevant companies in Germany, Switzerland and Austria was the main method to acquire basic data. The survey was limited to these three countries in order to obtain a manageable population in terms of language, available time, and performance results. The population included many international companies operating all over the world; therefore the results are not restricted to this base area. Companies were identified using the information found on 'Datamonitor's Research Store'. Accordingly, only companies with a webpage were included to the population. In total 164 companies were identified, of which 36 were producers of functional additives and plant extracts, 58 companies operating in the food industry and 70 companies in the dietary supplement industry.

2.2 Data collection and questionnaire

A structured questionnaire was developed and first pretested by four telephone interviews with relevant companies (HAYDN, 2012). The pretest showed that companies were interested in the topic but reluctantly answered sensitive questions regarding prices and sales volumes. Therefore, an online survey to increase the anonymity of the respondents was chosen. Finally, the full questionnaire consisted of 22

questions covering type of business, relation to bioactive substances, basic product requirements, health claims, purity, current price, sales volumes, interest in new products, preference for certain health claims, purities, the four questions on prices (too cheap, cheap, expensive, too expensive), expected sales volume and some information on the company. However, only results of few selected questions are covered in this paper.

First, the companies received an e-mail followed by a phone call some days later in order to identify contact persons for the survey and arrange appointments. As an incentive for participating in the study, a short report on the survey results via e-mail was offered. Target persons were employees involved in bioactive substances business such as R&D managers, product or production managers.

Of the 164 total companies contacted, a group of 55 firms declined to cooperate in the online survey. About 22% of the producers from functional additives and plant extracts took part, as well as 22% from the food industry (functional food) and 49% of the companies from the dietary supplement industry. The overall response rate can be rated as satisfactory. This paper focuses merely on one aspect of the survey, as the survey had a broader scope and not all questions posed are relevant for the specific question mentioned above. Also, not all respondents replied to all questions posed, therefore results presented in the subsequent sections do not fully match with the here mentioned response rate.

3. Results

The results on estimation of a market price for the bioactive substances from wood are shown in figure 1. Responses to each question are plotted on the Price Map. The prices mentioned by the producers of functional additives and plant extracts were separated from the functional foods and dietary supplement industry, because of the different position in the value added chain. Hence, figures refer to responses from the functional foods and dietary supplement industry.

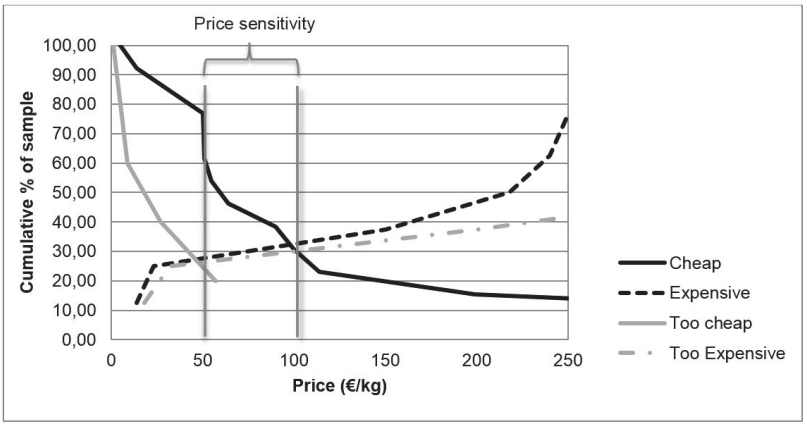

Fig. 1: Price map (Cheap, n1=14, Expensive, n2=10, Too cheap n3=5, Too Expensive n4=10). The y-axis shows the cumulative percentage of the sample agreeing with the statement (cheap, expensive, …) at a given price.
Source: OWN CALCULATION

The y-coordinate shows the sampling rate and therefore the expected increase of additional market shares. It is the intersection of key data points that yields insight about the Optimal Price Point (OPP) as well as the Price Sensitivity. In the example below, the OPP is shown to be about 54 € per kilogram, as indicated by the intersection of the lines for "too cheap" and "too expensive" in figure 1. The Indifference Price is about 101.50 € per kilogram, the intersection of the lines "cheap" and "expensive". It is the price for reference products on the market. The higher the difference between optimal and indifferent price, the lower is the price sensitivity.

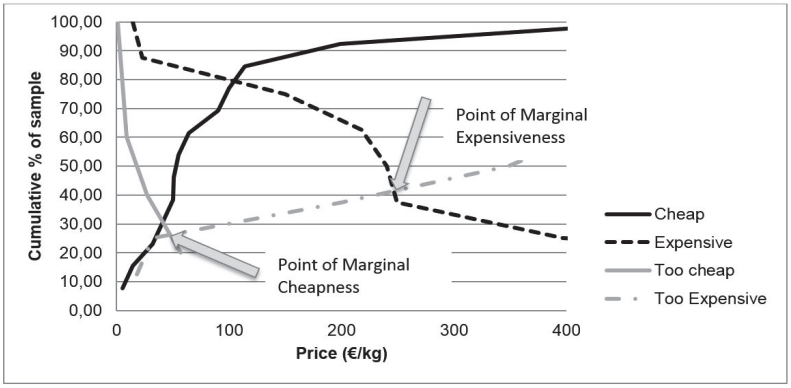

Fig. 2: Price map with inverse charts "too cheap" and "cheap" indicating the Point of Marginal Cheapness and Expensiveness
Source: OWN CALCULATION

In figure 2, the "Point of Marginal Cheapness" and the "Point of marginal Expensiveness" are shown. For this illustration, the charts "too cheap" and "cheap" have to be inverted.
The Point of Marginal Cheapness is at 40 € per kilogram active agent (intersection of the charts cheap and too cheap). At a more favourable price the image of the company could suffer because of the lack of credibility. The Point of Marginal Cheapness is at 248 € per kilogram active agent, at this point an equal number of interviewees consider the price either to be "expensive" or "too expensive". An increase of the price above 248.5 € is inadmissible (MÜLLER, 2006).

4. Conclusion

Given the rising demand for new plant-based bioactive substances in functional food, as dietary supplement and pharmaceutical applications, many research and development activities aim at new extraction technologies and products. The targeted products are of high value while the extraction and purification technologies are frequently cost intensive. Techno-economic assessments are usually cost oriented but potential product prices are required to assess process profitability.
The van Westendorp method provided information on potential prices in context of varying product properties like different health claims or

increasing purities. While the Indifference Price of 101.5 €/kg can be considered as a guide value to assess the overall profitability (STERN et al., 2015) of an overall process producing different purities and substances, this survey provides additional information on more specific products. By applying the van Westendorp method the study identified a potential price range for such products and provided information that can be used for according pricing strategies.

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