Acting in social consensus - An Analysis of the Reputation and Sustainability of the Horticultural Sector

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Abstract

Horticultural farms operate in a complex environment that is shaped, amongst other things, by the different stakeholders (e.g., consumers, trade, politics). Public approval of production and working methods is an important prerequisite for companies' actions. Therefore, knowledge of a society's expectations and perceptions of horticultural products, services and production methods is an important strategic resource for aligning business strategies and active communication with society. The aim of this work is to examine society's expectations and perceptions using the examples of "sustainability" and "reputation" in order to support this challenge.

The first study of this thesis provides a broad overview of different sustainability attributes for flowers and ornamental plants (non-food) as well as for fruits and vegetables (food) from the consumers' point of view. Sustainability attributes collected from the literature were grouped together in a first step. Based on these results, an exploratory online consumer survey was conducted in a second step for both food and non-food horticultural products. A confirmatory factor analysis confirmed the four dimensions of the literature research and highlighted the particular relevance of the ecological sustainability characteristics.

The additional studies comprise an analysis of the reputation of the horticultural sector. The initial focus of these additional studies was the development of a structural model for measuring reputation, specifically for horticulture. Based on a literature analysis, terms that are often used synonymously (image, identity) were defined and indicators of reputation measurement approaches from different areas (e.g., companies, branches) were collected. Reputation is epistemically related to the indicators (formative vs. reflective) that are represented in a "multiple indicators and multiple causes" (MIMIC) model and can be supplemented by the influence of moderating variables.

The following chapter describes how the theoretically elaborated model was evaluated and completed with the help of experts (n = 102). The statistical analysis using multiple regression and explorative factor analysis resulted in a model with a total of 15 indicators. A reputation map illustrating the greater influence of the service segments on the reputation of horticulture compared to the production segments was created.

The final study focuses on the evaluation of the model using the example of gardening and landscaping. Based on a consumer sample (n = 752), it could be shown that the reputation of gardening and landscaping was assessed as positive. The reputation of the segment is mainly shaped by production methods, economic performance and industry development. This shows that only some of the indicators are relevant for reputation management.

Keywords: sustainability, reputation, society, multiple regression, factor analysis, structural model

Kurzfassung

Gartenbaubetriebe agieren in einem komplexen Umfeld, das sich aus verschiedenen Anspruchsgruppen (z. B. Konsument, Handel, Politik) zusammensetzt. Eine öffentliche Zustimmung zur Arbeits- und Produktionsweise ist eine wichtige Voraussetzung für das unternehmerische Handeln. Deshalb ist Wissen über die Erwartungen der Gesellschaft und die Wahrnehmung der gärtnerischen Produkte, Dienstleistungen und Produktionsweisen eine wichtige strategische Ressource für eine aktive Kommunikation mit der Gesellschaft. Ziel dieser Arbeit ist es, die gesellschaftliche Erwartung und Wahrnehmung an den Beispielen „Nachhaltigkeit“ und „Reputation“ zu untersuchen.

Zunächst gibt eine erste Studie einen Überblick über verschiedene Nachhaltigkeitsmerkmale für Blumen und Zierpflanzen (Non-Food) sowie für Obst und Gemüse (Food) aus Sicht der Verbraucher. Anschließend werden die aus der Literatur gesammelten Nachhaltigkeitsmerkmale gruppiert und in einer explorativen Online-Verbraucherbefragung bewertet. Eine konfirmatorische Faktorenanalyse bestätigt die vier Dimensionen der zugrundeliegenden Literatur und stellt die besondere Relevanz der ökologischen Nachhaltigkeitsmerkmale heraus.

Weitere Studien fokussieren sich auf die Messung der Reputation des Gartenbausektors. Basierend auf einer Literaturanalyse werden zunächst vielfach synonym verwendete Begriffe (Image, Identität) definiert und Indikatoren von Reputationsmessansätzen aus verschiedenen Bereichen (z. B. Unternehmen, Branchen) gesammelt. Die Reputation steht zu den Indikatoren in einer epistemischen Beziehung (formativ vs. reflektiv), die in einem „multiple indicators and multiple causes“ (MIMIC) Modell dargestellt wird und durch den Einfluss von moderierenden Variablen ergänzt werden kann.

Im darauffolgenden Kapitel wird das theoretisch ausgearbeitete Modell mit Hilfe von Expert*innen (n = 102) evaluiert und vervollständigt. Die statistische Analyse mittels multipler Regression und explorativer Faktorenanalyse führt zu einem Modell mit insgesamt 15 Indikatoren. Eine Reputationslandkarte verdeutlicht den größeren Einfluss der Dienstleistungssegmente auf die Reputation des Gartenbaus im Vergleich zu den Produktionssparten.

Eine abschließende Studie konzentriert sich auf die Evaluierung des Modells am Beispiel des Garten- und Landschaftsbaus. Anhand einer Konsumentenbefragung (n = 752) konnte gezeigt werden, dass der Ruf des Garten- und Landschaftsbaus als positiv bewertet wird. Das Ansehen der Sparte wird vor allem durch die Produktionsweise, die wirtschaftliche Leistungsfähigkeit und die Branchenentwicklung geprägt. Daraus wird deutlich, dass nur wenige Indikatoren für das Reputationsmanagement relevant sind.

Schlagwörter: Nachhaltigkeit, Reputation, Gesellschaft, multiple Regression, Faktorenanalyse, Strukturmodell

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1 General Introduction

Companies and industries operate in an environment comprising various stakeholders, whereby society, incorporating both customers and consumers, represents a stakeholder group with diverse interests. For horticultural enterprises, public acceptance of the way they work, and in particular of their production methods, is an important prerequisite for their chosen actions. For this reason, horticultural enterprises must meet society`s expectations of horticultural products and services and their production methods. In this context, their own image is an important parameter for both the companies and the entire industry in order to influence their own reputation and the expectations of society. The plurality of society, e.g., with regard to different consumer groups, is also reflected in the expectations of companies and industries, which cover areas such as food safety, climate change, resource protection and working conditions. Concrete examples from horticulture can be found in the topics of CO_2 emissions, the use of plant protection products and the employment of seasonal workers. These individual topics are also reflected in discussions on sustainability in horticulture. All in all, society has many expectations of both the production methods and the products of horticulture, which make it difficult for an entrepreneur to act in accordance with social consensus.

This thesis addresses public expectations of sustainable production in horticulture (chapter 2) and analyses public perception of the industry as a whole with the help of reputation (chapter 3, 4) and the example of gardening and landscaping (chapter 5).

1.1 Developments and current challenges of horticulture in Germany

Horticulture, as a part of agriculture, can be classified as primary production. Horticulture can be further subdivided into horticultural production and services. Horticultural production includes fruit and vegetables, described in this text as food horticulture, as well as ornamental plants and nursery products, described in this text as non-food horticulture. The horticulture service segment includes floristry, trade, gardening and landscaping and cemetery gardening.

In horticultural production, there are value chains with different combinations of value-adding stages (e.g. young plants, field vegetable production) (Bokelmann, 2009) characterised by the use of specialised technology. At the end of the value chain of horticultural production is the end consumer. Exceptions are nursery products and ornamental plants intended for public green spaces. Food products such as vegetables and fruits can be distributed without additional processing to the consumer through direct sales or through food retailers. In addition, food products can pass through further value-adding stages outside the horticulture sector and be sold to the end customer after processing (e.g., frozen, conserved, juiced). Non-food products remain in the horticultural value chain. In the fol-

lowing value-added stages, the products are used in service horticulture or marketed. However, direct producer-to-consumer sales also exist in Germany for non-food horticultural products. The essential commonality of the diverse value chains in horticulture is the consumer at the end of the chain, who determines the demand and the price of the products (Bokelmann, 2009).

Consumers have many expectations, especially concerning products and production methods in the food sector of horticulture. In general, the topic of sustainable production or specific topics such as the use of pesticides, food safety and the regionality of products influence the actions of horticultural production companies.

- The use of the pesticide glyphosate, for example, has been the subject of controversial public debate, and conventional agriculture has also been criticised in this context (Villnow et al., 2019). The use of synthetic pesticides in particular is not approved (legitimized) by some parts of society.
- The incidence of food scandals also leads to critical public debate about the actions of the industry, even if a food scandal only has a short-term effect on purchasing behaviour (Bitsch et al., 2014).
- The regionality of horticultural food products, as a feature for consumers of more sustainable, healthier and organic production, has gained importance in the last decade and will continue to be an important characteristic of food in the future (Adams and Salois, 2010). Consumers also look to regional products for criteria such as product identity, the degree of control by local actors or the size of the supply chain (Schmitt et al., 2017).

Ornamental plants, in contrast to fruit and vegetables, represent a luxury good (Havardi-Burger et al., 2020a). But even for this product group, the actions of farmers are shaped by societal expectations of sustainable production conditions. These include issues such as peat reduction (Alexander et al., 2008), biodiversity and bee-friendly production, but also the GHG emissions of greenhouse production (Havardi-Burger et al., 2020a).

In summary, it can be said that the consumer is a key player in the value chain. For horticultural companies, this means that the expectations of the consumer must be taken into account in order to operate with a social consensus. In addition, publicly formulated expectations can have an impact on changes in the legal framework.

Like agriculture, horticulture in Germany is affected by strong structural changes, which have led to a decreasing number of production farms and a simultaneous increase in production area (Bundesministerium für Ernährung und Landwirtschaft, 2021). In addition to the growing expectations of consumers, other challenges (e.g., quality standards, documentation requirements, technical progress and production costs, including energy and the minimum wage) have promoted structural changes in the

past (Klockgether et al., 2016). In the future, regulatory interventions (e.g., the Supply Chain Act), rising costs for CO_2 emissions or more complex approval procedures for plant protection products can be expected to have a significant influence on the development of the entire horticultural sector and the actions of individual companies.

In addition to the increasingly complex framework conditions, production companies have difficulties finding farm successors (Mair and Bitsch, 2018). Furthermore, the skilled labour shortage represents a resource bottleneck for growth-oriented companies (Meyerding, 2016).

Overall, German horticultural farms are confronted with a wide range of challenges. Societal expectations and complex framework conditions require enterprises to act competitively in horticulture.

1.2 Sustainability as a social requirement

The primary definition of sustainability has its origins in forestry and was first described by Hans Carl Carlowitz in 1713 in his work Silvicultura oeconomica (Grober, 2013). The most common definition of sustainability is described in the Brundtland Report of 1987, in which sustainable development is characterised by intergenerational equity ("meets the needs of the present without compromising the ability of future generations to meet their own needs") (World Commission on Environment and Development, 1987).

Based on these publications, there have been two fundamental developments in the concept of sustainability (Kuhlman and Farrington, 2010). First, the concept of the three pillars was developed. This demands a balance of social, economic and environmental sustainability. Second, the concepts of weak and strong sustainability have emerged. The concept of weak sustainability is also found in the three-pillar model, which allows for an exchange of the three dimensions. In contrast, the concept of strong sustainability strives to preserve natural capital and rejects substitutability through physical and human capital.

The main defining characteristics of sustainability in the context of horticulture are:

- “Resources are kept in balance with their use through conservation, recycling and/or renewal,
- practices preserve agricultural resources and prevent environmental damage to the farm and offsite land, water and air,
- production, profits and incentives remain at acceptable levels,
- and the systems work in concert with socioeconomic realities” (Poincelot, 2003).

Poincelot (2003) refers to the first edition of the Journal of Sustainable Agriculture for this definition. Lopez et al. (2008) add social sustainability characteristics with the promotion of economic performance and socio-economic stability by promoting quality of life and society.

The importance of social sustainability features is particularly evident in global value chains (e.g., in ornamental horticulture), which often have their first value-adding stages (e.g., mother plants, cuttings production) in developing countries (Havardi-Burger et al., 2020b).

The consumer's understanding of sustainability is discussed differently in the literature. Grunert et al. (2014) describe the consumer's knowledge of the concept of sustainability as being limited. Hanss and Böhm (2012) have shown that consumers identify the ecological, social and development policy dimensions as essential characteristics of sustainable development.

In addition, various consumer studies have been conducted for horticultural products that examine partial aspects of sustainable production (e.g. ecological footprint, carbon footprint or fair trade) (Adams and Salois, 2010; Peschel et al., 2016). However, there are also some studies on horticultural products that look at the whole concept of sustainability (Yue et al., 2011; Hawkins et al., 2012; von Meyer-Höfer, 2016). From the studies mentioned above for horticulture, it can be concluded that acting sustainably is a fundamental requirement in horticulture. However, there are consumer groups that have more concrete expectations of sustainable horticultural production and also consider these in their purchasing decisions.

1.3 Public perception and reputation of horticulture

The reputation of a company or an industry is closely linked to public perception and thus represents an important strategic resource for companies (Kim, 2019). The public perception of horticultural products is characterised by multi-level distribution systems, seasonal availability and limited shelf life (Bokelmann, 2009). The consumer learns about production methods mainly through regional reports or visits (e.g., open farm days, apple blossom festivals). In particular, the public perception of pesticide use in horticulture has increased in recent years (Dressel et al., 2010). Thus far, there are only a few studies dealing with consumer perceptions of horticulture (Serrano-Arcos et al., 2018). As reputation is an important strategic resource for companies, it is also important for horticultural companies and the entire horticultural sector (Boyd et al., 2010).

When making purchasing decisions for horticultural products, the reputation of the products (e.g., food products) or the companies (e.g., in gardening and landscaping) is particularly important.

Horticultural food products are often experiential and trusted goods due to the difficulty in assessing product quality (e.g., taste) when making a purchase decision. Therefore, the reputation (e.g., of certain origins) can influence the purchase decision (e.g., Dutch tomatoes). The assessment of the quality of the work (end product) of a gardening and landscaping company can only take place after completion, which is why a company is selected on the basis of other characteristics (e.g., reputation of the company, personal recommendation). This shows that the perception of products and companies as

well as trust in the entire industry can influence the purchase decision. To this end, Veh et al. (2019) refer to reputation as a precursor to the formation of trust.

In addition to the difficult assessment of product quality at the point of sale, the differentiation of horticultural food products (e.g., apples from different producers) is a challenge for the consumer. Winfree and McCluskey (2005) showed that for homogeneous product groups (e.g., apples) the individual reputation of a producer within a group (e.g., apple producers in "Altes Land") cannot be differentiated. A lack of knowledge about the production processes and production farms is mentioned as a major reason for the lack of differentiation. For an industry, a lack of differentiation between producers can lead to "black sheep" damaging the reputation of an entire group (Hautzinger, 2009). This context can be found, for example, in cooperative marketing systems (Winfree and McCluskey, 2005). However, it has also been shown that negative events, such as food scandals caused by individual companies, may only lead to short-term consumer uncertainty, but have a negative impact on industry reputation (Bitsch et al., 2014).

1.4 Outline of the thesis

The activities of horticultural companies interact with the social environment. In particular, society as a stakeholder is a simultaneous consumer of many horticultural products and has different expectations towards the companies. It is important for companies to be aware of these expectations as they can have an impact on legal frameworks and thus narrow the scope for corporate decisions. In addition, companies can only act at an early stage if they know the expectations of consumers. Furthermore, active communication with society then becomes possible.

For this reason, society as a stakeholder group in horticulture is the focus of this study. The topics of "sustainability" and "reputation" are addressed as selected research objects. In the context of sustainability, the question of what sustainable horticultural production means for the consumer is answered. The reputation of horticulture can also be influenced by public knowledge and the perception of sustainable practices in horticulture. Since little fundamental knowledge is available on the subject of the reputation of a sector, creating a measurement model was a first important goal of the work in this subject area. Finally, the application of the measurement model for reputation and consumer surveys and the results obtained from these provide a knowledge base that can be used to derive communication topics and recommend actions both for individual horticultural companies and the sector as a whole.

The first paper, "Consumer Preferences for Sustainability in Food and Non-Food Horticulture Production", provides an overview of the sustainability characteristics for flowers and ornamental plants as

well as for fruit and vegetables that are already used in various evaluation systems. These characteristics are subdivided into the sustainability dimensions of ecology, social responsibility, economy and corporate government (responsibility). To analyse these characteristics, an explorative online consumer survey was conducted and the data subsequently evaluated in a confirmatory factor analysis. The results underpin the breakdown into the four dimensions and highlight the particular relevance of the ecological pillar.

The following chapters focus on the reputation of horticulture. The second paper, “Review – Measuring the Reputation of Companies and Industries Using the Example of Horticulture”, provides a comprehensive insight into the definition of reputation and its conception as a latent variable. In addition, the term reputation, which is often used as a synonym of image and in connection with identity, is delimited. The result of this review is a preliminary structural (MIMIC) model that describes the construct reputation using indicators from the literature.

Based on the preliminary structural model derived from the literature, the third paper, “Conception and Evaluation of a Structural Equation Model to Measure the Reputation of German Horticulture”, specifies the model more closely for horticulture. For this purpose, the indicators of the model were evaluated by experts (n = 102) and horticulture-specific indicators were added. In addition, the influence of the horticultural segments on the reputation of the entire horticultural sector as well as in the opposite direction is examined. The evaluation of the indicators includes statistical testing by multiple regression and explorative factor analysis. The interaction between the horticultural segments and the entire sector is examined using a reputation map.

Finally, in the fourth paper, “Reputation of German Gardening and Landscaping: Results of a Consumer Study”, the revised model adapted to horticulture is used for the measurement of reputation using the example of the gardening and landscaping industry. Based on a consumer survey (n = 752), the structural model is analysed together with the characteristics of “knowledge” and “involvement”, which act as moderating variables in the structural model. In this paper, the model for measuring the reputation of a small sector is the focus of the description.

The final chapter concludes with a general discussion of the individual results. The questionnaires of the expert survey on reputation and the two consumer surveys on sustainability and reputation can be found in the appendix. The following chapters of this cumulative dissertation have been published in international journals or are under review. An overview of the publications and authorships of the results presented in the thesis is given in Table 1.

Table 1: Publication of the following chapters.

Chapter	Title	Author	Journal	Status
2	Consumer Preferences for Sustainability in Food and Non-Food Horticulture Production	Marike Isaak, Wolfgang Lentz	Sustainability, DOI: 10.3390/su12177004	Published 27 Aug 2020
3	Review – Measuring the Reputation of Companies and Industries Using the Example of Horticulture	Iris Brenneke, Marike Isaak, Wolfgang Lentz	International Food & Agribusiness Marketing, DOI: 10.1080/08974438.2021.2003922	Published 07 Jan 2022
4	Conception and Evaluation of a Structural Equation Model to Measure the Reputation of German Horticulture	Marike Isaak, Iris Brenneke, Wolfgang Lentz	International Food and Agribusiness Management Review, DOI: 10.22434/IFAMR2020.0009	Published 12 Feb 2020
5	Reputation of German Gardening and Landscaping: Results of a Consumer Study	Marike Isaak, Iris Brenneke, Wolfgang Lentz	International Food and Agribusiness Management Review	under review

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2 Consumer Preferences for Sustainability in Food and Non-Food Horticulture Production

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M.I. and W.L: conceptualization
M.I.: methodology
M.I.: data collection
M.I.: data analysis
M.I.: writing—original draft preparation,
W.L.: writing—review and editing

2.1 Introduction

Horticulture is a branch of agriculture concerned with the production of high value crops like vegetable, fruits, and flowers (Lal, 2008). Horticulture can be defined as an intensive agricultural sector due to the combination of expensive resources, the large number of plants produced and the smaller production units (Lea-Cox et al., 2010).

Sustainability is a fundamental concept defined in the 1987 Brundtland Report, in which sustainable development is described as "[a development that] meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987).

On the basis of this concept, the model was further developed with three pillars representing the ecological, social, and economic dimensions. The three pillars model aims to create a balance between the ecological, social, and economic aspects according to the definition of sustainability in the 1987 Brundtland Report. Despite some studies that are critical of the three pillars model, this basic model forms the background of further development in horticulture in this study (Kuhlman and Farrington, 2010; Spindler, 2013).

Sustainability in crop production was described in the first issue of the Journal of Sustainable Agriculture as follows: "Resource[s] in balance with their use through conservation, recycling, and/or renewal, practices preserve agricultural resources and prevent environmental damage to the farm and off-side acceptable levels and the systems works in concern with socio-economic realities" (Poincelot, 2003).

Poincelot (2003) concludes that the focus of sustainable horticulture is on maintaining productivity, protecting environmental quality, and ecological and socioeconomic soundness. To this definition,

Lopez et al. (2008) added the promotion of economic performance and specified socioeconomic stability by promoting quality of life and society.

Agriculture, horticulture, and the food industry, together with many other sectors, are jointly concerned about ecological, social, and economic sustainability (Pullman et al., 2009). For this reason, sustainability has been investigated in a large number of studies. A distinction should be made between those studies focusing on consumption and those focusing on production (cultures, production systems). Using individual crops, sustainable production was studied for vegetables by Juroszek et al. (2008), for fruit by Reganol et al. (2001), and for the whole horticultural sector by Sumner. A number of studies have also examined the sustainable production of horticultural products and the associated implementation barriers or sales advantages for horticultural producers (Hall et al., 2009; Dennis et al., 2010; Lea-Cox et al., 2010; Kouwenhoven and Nalla, 2016; Silva and Forbes, 2016).

In addition to the added benefits for the horticultural companies, the implementation of these sustainability goals also entails production risks, which, in some cases, are not identifiable (Hall et al., 2010b). One of these barriers is implementing the sustainability features into the existing production system as well as the associated costs and time involved (Silva and Forbes, 2016). Gabriel and Bitsch (2016) describe pressure from the retail chain and pressure from the public and/or media as motivation drivers for companies to focus more on sustainability in the production process. For many consumers, despite their reduced knowledge and experience with the subject, sustainability is an important product characteristic and way of life (Grunert, 2011; Verain et al., 2012). Furthermore, many consumers still have a knowledge gap between the general concept of sustainability and the specific characteristics of a sustainable food industry (Peschel et al., 2016). There is also inconsistency between consumer expectations and the implementation of sustainability in horticultural production. This has already been demonstrated by Selfa et al. (2008) in the differing attitudes of producers and consumers towards ecological characteristics in production. In order to close this gap between producers and consumers, it is necessary to make sustainability actions measurable, because the indirect benefits are insuffcient for creating a clear motivation for producers to implement sustainability practices (Pullman et al., 2009).

Further studies exist on the evaluation of sustainability in production processes in agriculture and the food industry, but not for horticulture (Tilman et al., 2002; Selfa et al., 2008; Pullman et al., 2009; Schader et al., 2014; Schmitt et al., 2017). Consumer studies on ornamental plants and nursery products for the American market have been conducted to better understand consumer expectations (Yue et al., 2011). In addition, consumer studies have also been carried out on individual aspects, such as organic production or social standards in horticulture (Behe et al., 2010; Hall et al., 2010a; Ingrao et al., 2015). Regardless of which characteristics consumers associate with sustainability in horticulture,

studies on their willingness to pay are available (Hawkins et al., 2012; Yue et al., 2016). A study by Rihn et al. (2016) for the American market showed an additional willingness to pay for sustainably produced ornamental plants. Consumer studies have also been conducted on sustainability labels in the food industry (Grunert et al., 2014) and on German tomatoes. Thus, efforts have been made to make sustainability characteristics transparent for the consumer (Meyerding, 2016).

Despite the large number of studies in the field of sustainability, there is still a lack of knowledge on consumer preferences relating to sustainable production in German horticulture. The German market for horticultural products is highly competitive and characterized by a large number of international suppliers. In this case, the knowledge of consumer preferences can be used by individual producers for product differentiation. The targeted implementation of sustainability features together with a labelling of these products might be a way to strengthen German horticulture in comparison to international competitors. This is particularly an advantage if goods from foreign producers are offered at lower prices on the German market. German horticultural products can thus secure added value through sustainable production.

The focus is on consumer preferences regarding sustainability characteristics. Due to the heterogeneity of horticulture, attitudes towards sustainability in food and non-food products are examined separately. Differences in the relevance of sustainability characteristics between the two production sectors (food and non-food horticultural products) can thus be better understood compared. In addition, the characteristics are aggregated into groups of sustainability dimensions that correspond with the pillars of sustainability. Where the characteristics could not be completely assigned to any of the three pillars, an additional dimension was created. Each sustainability dimension is defined by those horticulturally relevant characteristics assigned to it. The purpose was to identify important fields of action in horticultural practice.

2.2 Conceptual background

Sustainability in horticulture can be described using various characteristics. Individual aspects relating to sustainability have been used in the context of consumer studies, e.g. Hall et al. (2010a), Mulholland et al. (2019). However, these studies do not provide a complete view of sustainability in terms of the three pillars of sustainability (ecological, economic, and social aspects). Since this study focuses on a holistic view of sustainability, only publications that describe sustainability using all three dimensions were considered. In addition, the literature analysis only considered publications relating to horticulture (i.e., agriculture, the food industry).

Standards for sustainable production in horticulture have been described since 2003 (Fairweather and Campbell, 2003). Sumner (2008) places sustainable horticulture in the context of sustainability, organic

horticulture, and rural development. Basic knowledge from agriculture can also be transferred to horticulture (Lal, 2008). However, in contrast to horticulture, various dierent sustainability assessment systems exist for the agricultural and food industries (Schader et al., 2014). Ehrmann and Kleinhanß (2008) provide an overview of existing sustainability systems in agriculture. For Germany, these include the Criteria System for Sustainable Agriculture (known in Germany as the KSNL), the Environment and Business Management System "REPRO," and the DLGcertificate "Sustainable Agriculture" (Küstmann et al., 2006; Breitschuh et al., 2008; DLG e.V., 2009). Further international sustainability assessment systems in agriculture include Response-Inducing Sustainability Evaluation (RISE) and the Sustainability Assessment of Food and Agriculture Systems (SAFA) (FAO, 2013; Grenz, 2017). The characteristics used in these systems form the basis of this study to measure consumer preferences in horticulture (Table 1). In addition, there are generally valid systems for sustainability reporting, which also include a holistic view. Examples of these include the German Sustainability Code (GSC, known in Germany as DNK) and the Global Reporting Initiative (GRI). Both systems were considered in the analysis since there is no equivalent reference in horticulture.

On the basis of the literature analysis, 27 characteristics were described and grouped according to the four dimensions. This required another dimension to be added to the classic model of three pillars. This new dimension of "corporate responsibility" is considered necessary because the characteristics of mission statement, innovation, regional added value, certification, transparency, and responsibility are not considered key factors of economic success. The dimension of corporate responsibility incorporates soft facts relating to corporate management, and was therefore described separately from the key economic factors (hard facts). Environmental sustainability is described by the characteristics of plant protection, fertilization, soil-protecting production, biodiversity, water, conservation of resources, greenhouse gas (GHG) emissions, recycling, and the use of peat.

Social sustainability characteristics include occupational safety, gender equality, education and training, remuneration of employees, commitment to the region, stakeholder dialogue, legal violations, and employee satisfaction.

The economic dimension is characterized by the characteristics of liquidity, stability, profitability, and investment. Liquidity includes the capacity to meet principal payments and cash flow. Creditworthiness and the equity ratio are included under stability. Investment also includes investments in real capital.

Table 1: Initial model with four sustainability dimensions and corresponding characteristics from the literature.

Dimension	Characteristic	Literature
Economic		
	Liquidity	(Breitschuh et al., 2008; FAO, 2013; Grenz, 2017)
	Stability	(Breitschuh et al., 2008; DLG e.V., 2009; Winzer and Goldschmidt, 2015)
	Profitability	(Breitschuh et al., 2008; DLG e.V., 2009; FAO, 2013)
	Investment	(Breitschuh and Eckert, 2006; DLG e.V., 2009; Winzer and Goldschmidt, 2015)
Corporate responsibility		
	Mission statement	(DLG e.V., 2009; FAO, 2013; Grenz, 2017)
	Change and innovation	(Meyer-Höfer, 2016)
	Regional added value	(Yue and Tong, 2009; FAO, 2013; Meyer-Höfer, 2016)
	Certification	(FAO, 2013)
	Transparency	(Lopez et al., 2008; FAO, 2013; Winzer and Goldschmidt, 2015)
	Responsibility	(FAO, 2013; Meyer-Höfer, 2016)
Social		
	Occupational safety	(Breitschuh et al., 2008; Lopez et al., 2008; DLG e.V., 2009; FAO, 2013; Winzer and Goldschmidt, 2015; Grenz, 2017)
	Gender equality	(Breitschuh et al., 2008; FAO, 2013)
	Education and training	(DLG e.V., 2009; Grenz, 2017)
	Remuneration of employees	(Küstmann et al., 2006; Breitschuh et al., 2008; DLG e.V., 2009)
	Commitment to the region	(Breitschuh et al., 2008; DLG e.V., 2009)
	Stakeholder dialogue	(FAO, 2013)
	Legal violations	(FAO, 2013)
	Employee satisfaction	(FAO, 2013; Grenz, 2017)
Ecological		

Plant protection	(Breitschuh et al., 2008; Lopez et al., 2008; DLG e.V., 2009; Dennis et al., 2010)
Fertilization	(Breitschuh et al., 2008; DLG e.V., 2009; Dennis et al., 2010; von Meyer-Höfer, 2016; Yue et al., 2016; Grenz, 2017)
Soil-protecting production	(Breitschuh et al., 2008; DLG e.V., 2009; Grenz, 2017)
Biodiversity	(Breitschuh et al., 2008; DLG e.V., 2009; FAO, 2013)
Water	(Lopez et al., 2008; Dennis et al., 2010; FAO, 2013; Grenz, 2017)
Conservation of resources	(Lopez et al., 2008; Dennis et al., 2010; Winzer and Goldschmidt, 2015; Grenz, 2017)
Greenhouse gas emissions	(Breitschuh et al., 2008; Lopez et al., 2008; DLG e.V., 2009; FAO, 2013; Winzer and Goldschmidt, 2015; Meyer-Höfer, 2016; Yue et al., 2016; Grenz, 2017)
Recycling	(Lopez et al., 2008; Dennis et al., 2010; FAO, 2013; Yue et al., 2016; Grenz, 2017)
Peat use	(Lopez et al., 2008)

2.3 Materials and methods

2.3.1 Questionnaire (Assessment of Sustainability Characteristics)

An online survey was conducted to determine consumer preferences for sustainable production in horticulture. The questionnaire was divided into four sections representing the dimensions of ecology, economics, and social and corporate responsibility (Table 1, questionnaires in Appendix). Each section contained one question for each of the characteristics in Table 1. Respondents were asked to indicate how important these characteristics were for them in sustainable production in order to determine the individual relevance of the characteristic (e.g., fewer resources were consumed in production (e.g., through energy savings)).

Each item was evaluated using a four-point Likert scale. A four-point Likert scale was chosen to force the respondent to choose either a negative or positive response. The possibility of a neutral answer, in the sense of “I have no opinion,” was not provided in this scale. Studies have shown that the number of scale points (four or six) has no effect on the quality of the evaluation (Chang, 1994; Leung, 2011), thus a four-point Likert scale was chosen to make the decision easier for the respondents.

Ecological sustainability included nine items, social sustainability included eight items, economic sustainability had four items, and corporate responsibility had six items. In addition, the questionnaire recorded sociodemographic characteristics and characteristics relating to purchasing behavior.

2.3.2 Data collection

Since horticulture consists of a variety of products, the survey was conducted separately for food and non-food horticultural products. The items in the questionnaire were adapted to the specifics of the production methods.

In the first phase, the survey on non-food products (flowers, ornamental plants, and nursery products) was conducted from May to September 2017. By targeting participants via garden blogs, garden shops, and garden plot associations, the intention was for the participants in the survey to have an increased involvement with flowers, ornamental plants, and/or nursery products. The hypothesis behind this selection of respondents in the exploratory study was that consumers who regularly buy ornamental plants or nursery products would be more suitable for evaluating the sustainability characteristics of horticultural production, i.e., only respondents linked to production would be able to evaluate the importance of sustainability in production. The survey was then repeated in the second phase from November 2017 to January 2018 for food horticulture (open field fruit and vegetables). In order to reach participants with an increased involvement with fruit and vegetables, subscribers to a fruit and vegetable box delivery service were addressed.

The questionnaire was available online and was created using LimeSurvey, version 2.6.6 (LimeSurvey GmbH, Hamburg, Germany).

2.3.3 Statistical analysis

A descriptive evaluation of the sociodemographic data (gender, age, family situation, size of residence) and purchasing behavior (place of purchase, frequency of purchase of horticultural products) was conducted. The a priori relationships between the characteristics and the sustainability dimensions (ecological, social, economic, and corporate responsibility) were examined using a factor analysis. The suitability of the items for performing a factor analysis was tested using an anti-image correlation matrix and the Kaiser-Meyer-Olkin (KMO) test with a value limit of 0.8 (Backhaus et al., 2016). Based on a significant Bartlett test, a random correlation between the characteristics was excluded.

Since the structure was already provided from the literature analysis, a confirmatory factor analysis using principal component analysis (PCA) to extract a fixed number of factors (4) was carried out. Varimax rotation was used and factors with an eigenvalue >1 were taken into account. Items with cross loadings were removed from the model. The quality of the factor analysis was checked using the Kaiser criterion. In addition, Cronbach's alpha was used to check internal consistency and the extent to which the questions were related to each other.

Evaluation of the closed questions was performed by IBM SPSS Statistics 25 (IBM, Armonk, New York, NY, USA).

2.4 Results

2.4.1 Sample structure

The average age of the sample for non-food products (sample 1, n = 144) was 34 years, and in the sample for food products (sample 2, n = 386) it was 37 years. The ratio of female and male respondents was also similar in both samples, with 66% female and 34% male respondents in sample 1, and 63% female and 37% male respondents in sample 2. For 65% of the respondents in sample 1 and 57% of the respondents in sample 2, the highest educational level achieved was a degree from a university of applied sciences. Vermeir and Verbeke (2006) note the advantages of a young average age in a sample. This group represents the consumers of the future who will probably continue to pursue their consumption behavior and lifestyle in the future. In addition, a higher level of education can be associated with an increased awareness of sustainability (Vermeir and Verbeke, 2006). A relationship to plants or fruit and vegetables, i.e., a greater involvement of the participants in the topic of this study, was ensured by purposefully contacting interested persons. This greater level of involvement was also reflected in the purchasing behavior of the respondents. In the previous four weeks, 52% of the respondents had bought an ornamental plant and 14% a nursery product. In the previous 12 months, 74% of the respondents had bought an ornamental plant and 33% a nursery product. The most common purchases of the respondents were bedding and balcony plants and green house plants (Table 2).

Table 2: Demographic data of the samples.

Sample: Ornamental Plants and Tree Nursery Products	
n	144
Age (Mean)	34
Female	66%
Male	34%
Purchased ornamental plants	
– Bedding and balcony plant	40%
– Green house plants	19%
– Flowering house plants	10%
– Pot plants	10%
– Cut flowers	10%
– No knowledge about the purchased plant	3%
– Never bought a plant before	9%
Place of purchase of ornamental plants	

– Garden centers	22%
– Specialist flower shop	19%
– DIY markets	17%
– Food retail	11%
– Other places of purchase	31%
Sample: Vegetable and fruit	
N	386
Age (Mean)	37
Female	63%
Male	37%
Place of purchase of vegetables and fruit	
Food retail	47%
Discounter	26%
Weekly market or farm shop	10%
Fruit and vegetable box delivery service	12%
Other places of purchase	5%

Of these respondents, 67% had acquired the bedding and balcony plant in the previous four weeks. Ornamental plants were mainly bought in garden centers, specialist flower shops, and DIY markets (Table 2). The respondents reported that tree nurseries (21%) and garden centers (14%) were their preferred places to buy tree nursery products. The food products of horticulture (open field fruit and vegetables) were purchased by 47% of the respondents in food retail (e.g., supermarkets). A further 22% of the respondents had recently purchased fruit and vegetables at a weekly market or farm shop, or obtained them through a fruit and vegetable box delivery service (Table 2).

2.4.2 Factor analysis for ornamental plants and tree nursery products

The suitability of the characteristics derived from the literature to describe the various sustainability dimensions was examined for non-food horticultural products. The suitability of each characteristic for factor analysis was shown using the KMO test (KMO = 0.854). The significant Bartlett test showed the existence of a correlation between the characteristics. Based on PCA, four factors were identified (Table 3). These factors correspond to the four dimensions of sustainability already described in the model (Table 1). The extracted factors were confirmed by the Kaiser criterion and cumulatively explained

60.843% of the variation. The measure of internal consistency (Cronbach's alpha = 0.874) confirmed that the four factors extracted measure the construct sustainability.

Table 3: Descriptive results and rotated factor loadings of items for ornamental plants and tree nursery products (n = 144).

Sample: Ornamental Plants and Tree Nursery Products	**Mean Value**	**SD**	**Factor Loading**
Factor 1: Ecological sustainability/environment			
– Greenhouse gas emissions in production have been reduced.	3.299	0.758	0.813
– Less fertilizer (e.g., nitrogen, phosphate) was used for production.	3.424	0.735	0.768
– Fewer pesticides were used in production or biological pesticides and beneficial insects were used.	3.229	0.808	0.767
– Recyclable materials were used in production.	3.313	0.762	0.766
– Fewer resources were consumed in production (e.g., through energy savings).	3.368	0.697	0.764
– Water was used sparingly in production.	3.174	0.831	0.725
– The diversity of plants in the production and production environment was promoted.	3.174	0.831	0.674
– The plants grow in a peat-reduced substrate (plant soil).	2.938	0.846	0.668
Factor 2: Economic sustainability			
– Stability: The company has financial stability and is creditworthy.	2.451	0.767	.848
– Investment: The company invests more than is consumed, for example, by the wear and tear and aging of buildings and machinery.	2.563	0.834	0.821
– Liquidity: The operating revenue can cover all operating costs.	2.479	0.755	0.819
– Profitability: The company achieves a high profit.	2.660	0.763	0.711
Factor 3: Social sustainability			
– The company's human resources management pays attention to employee satisfaction.	2.597	0.918	0.774
– The company remunerates its employees appropriately.	2.875	1.030	0.742
– The occupational safety and health of the employees is taken care of by the company.	3.090	1.024	0.700
– The company promotes the training and further education of its employees.	2.639	0.913	0.691
– The company is in dialogue with critics and contributes to the resolution of conflicts.	2.681	0.874	0.444

– Factor 4: Corporate responsibility			
– The company has long-term goals and a mission statement for the orientation of managers and employees.	2.965	0.797	0.876
– Management promotes change and innovation within the company.	2.951	0.796	0.842
– Quality is ensured by certification and is recognizable to the consumer.	3.090	0.801	0.591
Cumulative (%) rotated	60.843		
Cronbach's alpha	0.874		

SD: Standard deviation; factor loading rotated component matrix; scale from 1 "completely unimportant" to 4 "very important."

From the view of the respondents, the sustainable production of ornamental plants and tree nursery products was most strongly influenced by ecological characteristics. Eight of the nine characteristics from the literature search were confirmed in the empirical study. The characteristic of soil-protecting production could not be included in the ecological factor due to double loading. For the respondents, the reduction of fertilizer was the most important characteristic of ecologically sustainable production, while peat reduction was the least important characteristic.

Economic sustainability is defined by the four characteristics of stability, liquidity, profitability, and investment. However, compared to all the other characteristics, the economic characteristics were assigned a lower importance.

Based on the previously conducted literature research, eight characteristics were found to describe social sustainability. In our empirical study, social sustainability was described by only five characteristics, relating primarily to employees and workplace design (remuneration of employees, education and training, employee satisfaction, and occupational safety). Other characteristics, such as commitment to the region, gender equality, and legal violations could not be included under the factor of social sustainability. Only the characteristic of stakeholder dialogue was included beyond those characteristics relating to the employees of the company.

The fourth factor, corporate responsibility, is described by the characteristics of mission statement, change and innovation, and certification. Certification was rated as the most important characteristic of this factor by the respondents.

2.4.3 Factor analysis for vegetables and fruit

To examine the sustainability characteristics in food horticulture, the suitability of the characteristics for describing the four dimensions was evaluated (Table 4). All of these characteristics were considered suitable for carrying out a factor analysis. Both the KMO test (KMO = 0.909) and the significant Bartlett test showed that the characteristics were related and correlated with each other. The PCA selected

four factors which corresponded with the four dimensions described in the theory (see Section 2.2). These four factors were also verified using the Kaiser criterion. The four factors explain 61.871% of the total variance and the suitability of these four factors to describe the construct of sustainability was confirmed by Cronbach's alpha of 0.896.

Table 4: Descriptive results and rotated factor loadings of items for fruit and vegetable growing.

Sample: Vegetable and Fruit	**Mean Value**	**SD**	**Factor Loading**
Factor 1: Ecological sustainability/environment			
– Fewer pesticides were used in production or biological pesticides and beneficial insects were used.	3.332	0.789	0.751
– The plants were produced in a soil-protecting process.	3.282	0.699	0.732
– Less fertilizer (e.g., nitrogen, phosphate) was used for production.	3.526	0.699	0.729
– Recyclable materials were used in production.	3.399	0.725	0.728
– Greenhouse gas emissions in production have been reduced.	3.415	0.706	0.718
– The plants grow in a peat-reduced substrate (plant soil).	2.826	0.908	0.694
– Water was used sparingly in production.	3.228	0.809	0.678
– Fewer resources were consumed in production (e.g., through energy savings).	3.438	0.663	0.673
– The diversity of plants in the production and production environment was promoted.	3.096	0.833	0.670
Factor 2: Economic sustainability			
– Stability: The company has financial stability and is creditworthy.	2.729	0.718	0.859
– Investment: The company invests more than is consumed, for example, by the wear and tear and aging of buildings and machinery.	2.618	0.730	0.811
– Liquidity: The operating revenue can cover all operating costs.	2.793	0.719	0.802
– Profitability: The company achieves a high profit.	2.762	0.684	0.738
Factor 3: Social sustainability/employees			
– The company's human resources management pays attention to employee satisfaction.	2.987	0.807	0.782
– The company remunerates its employees appropriately.	3.231	0.835	0.766
– The occupational safety and health of the employees is taken care of by the company.	3.376	0.823	0.763
– The company promotes the training and further education of its employees.	2.896	0.806	0.677

Factor 4: Corporate responsibility			
– The company has long-term goals and a mission statement for the orientation of managers and employees.	2.995	0.752	0.737
– Quality is ensured by certification and is recognizable for the consumer.	3.236	0.805	0.710
Cumulative (%) rotated	61.872		
Cronbach's alpha	0.896		

SD: Standard deviation; factor loading rotated component matrix; sale from 1 "completely unimportant" to 4 "very important."

Environmental sustainability includes the largest group of characteristics overall, and was more important for the respondents compared to the other sustainability pillars.

All items described in the initial model could be included in the ecological dimension (Table 1). Production with reduced fertilizer use was of utmost importance to the respondents when growing vegetables and fruit, while the reduced use of peat had the lowest importance of the ecological characteristics.

The economic dimension with the characteristics of stability, liquidity, profitability, and investment could also be combined into one factor. Compared with the other characteristics, economic characteristics were assigned the lowest importance. In the economic dimension, the investment characteristic ("The company invests more than is consumed, for example, by the wear and tear and aging of buildings and machinery") was the least important.

The factor of social sustainability includes characteristics that focus on the employees in the company. Occupational safety ("The occupational safety and health of the employees is taken care of by the company") was the most important factor for the respondents. Other characteristics that describe this factor are employee satisfaction, remuneration of employees, and promotion of education and training in the company. The other characteristics of social sustainability found in the literature research could not be included in the factor of social sustainability due to cross loadings. These characteristics (gender equality, commitment to the region, and legal violations) could also not be included in any other factor.

The fourth factor describing the sustainability of fruit and vegetable production includes the characteristics of corporate responsibility, including the characteristics of mission statement and certification. These two characteristics could not be combined into the third factor of social sustainability.

2.4.4 Comparing the sustainability dimensions of food and non-food horticulture

When comparing food and non-food horticulture, the ecological characteristics are more relevant in fruit and vegetable growing than in ornamental plant growing and tree nurseries (Figure 1). In both types of production, the ecological dimension contains the majority of the characteristics. Only in non-food horticulture is the characteristic of soil-protecting production not included in the ecological factor. However, this characteristic is of little relevance in non-food horticulture, and for ornamental horticulture in particular, since a large part of production takes place in pots using a substrate and is thus not grown in the soil (Appendix, Table A2.1). Overall, the high importance of ecological sustainability in horticulture is shown by both the number of items and by the high rating given by the respondents.

Economic characteristics are described for both food and non-food horticultural sectors by the characteristics of stability, investment, profitability, and liquidity. For the respondents, the economic characteristics in food horticulture were slightly more important than in non-food horticulture.

It is noteworthy that in food horticulture the economic characteristics of stability and liquidity are significantly more important to the respondents than in non-food horticulture (Figure 1; Appendix, Table A2.1). However, compared to the other characteristics, the economic characteristics were assigned the least importance in both groups.

In both food and non- food horticulture, the social sustainability factor includes above all characteristics that describe work conditions in horticultural companies. The two horticultural sectors differ in social sustainability only in the characteristic of stakeholder dialogue. This characteristic was only considered for the production of ornamental plants and nursery stock. For both sectors, the characteristics of legal violations, commitment to the region, and gender equality could not be included in the factor of social sustainability. However, occupational safety was the most relevant social characteristic in both sectors.

Another factor that can be regarded as an interface between economic and social sustainability is corporate responsibility. In both sectors, this factor included the characteristics of mission statement and certification. In non-food horticulture, this factor was further characterized by change and innovation. In both sectors, certification was assigned the highest relevance by the respondents, while the characteristics of regional added value, transparency, and responsibility were not significant in corporate responsibility.

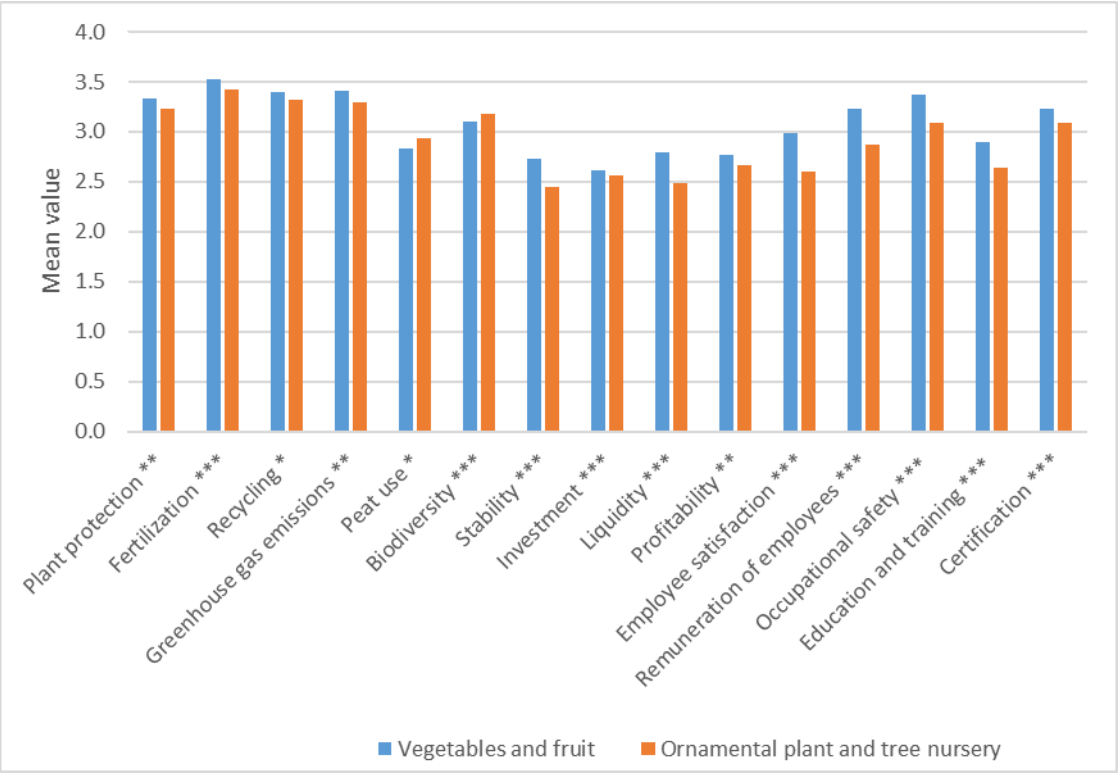

Figure 1: Significant differences in mean values between the non-food and food samples (Mann–Whitney U-test: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$).

2.5 Discussion

The goal of this paper was to compare the attitude of consumers to sustainable production in food and non-food horticulture. A further objective was to combine the characteristics into groups (factors) in order to identify the sustainability fields relevant for action.

For many consumers, sustainability is an important product characteristic and way of life (Verain et al., 2012). With the exception of a few economic characteristics, this study also highlighted the importance of sustainability as already described in the literature.

The ecological characteristics of sustainability are of the highest relevance compared to the other pillars of sustainability. Peschel et al. (2016) point to scientific studies showing that many consumers have become more aware of ecological sustainability. The authors also draw attention to an increased willingness to pay for both ecological and social products. These findings can be associated with a general change in values towards an environmentally and climate friendly lifestyle (Seyfang, 2006).

Furthermore, the high importance of ecological attributes is partly due to negative reports on product safety and animal husbandry and its environmental impacts, such as soil erosion or nutrient leaching over the last 10 years (Pullman et al., 2009). As a result, this sustainability pillar in particular has led to growing pressure on the sector. However, negative externalities that influence climate change or bio-

diversity, among other things, can also be attributed to horticulture (as well as agriculture and forestry). This influence on the climate, nutrient leaching, and biodiversity was also perceived by the respondents of this study and this was reflected in the importance of the characteristics of plant protection and fertilization in the open field production of fruit and vegetables.

From a consumer perspective, the characteristic of peat use was less relevant in food horticulture than in non-food horticulture. The reason for this might be that the respondents assumed a lower use of peat in fruit and vegetable growing. However, 51% of the peat used in German commercial horticulture is used in vegetable growing (Altmann, 2008). For the consumer, peat use is directly visible, especially in potted plants. It is therefore surprising that this characteristic was of rather low significance in regard to ornamental horticulture, especially in light of the ongoing discussions on the restrictions in peat extraction.

The characteristic of soil-protecting production was not taken into account in non-food horticulture. This characteristic is of little relevance in ornamental horticulture in particular, as production is mainly in pots.

For non-food horticulture, the characteristic of water was not included in the factor of ecological sustainability. However, Lea-Cox et al. (2010), among others, emphasize the importance of water management and water quality for tree nurseries and in greenhouse production as important processes for increased sustainability. Water management strategies can be particularly important in practice, especially regarding legal water regulations, which can be very different from region to region (Dennis et al., 2010).

Overall, public interest in and increasing individual awareness of ecological sustainability, as well as media coverage of negative externalities (climate change) resulting from plant production, are explanations for the high relevance of ecological characteristics in horticulture.

Social sustainability characteristics are rated lower than environmental sustainability characteristics, but higher than economic sustainability characteristics. For horticulture in New Zealand, De Silva and Forbes (2016) showed that due to high minimum social standards only a small need for action is seen in the social sustainability pillar. In contrast, despite high minimum standards in occupational safety in Germany, this study regarded work safety in horticultural production to be the most important characteristic.

The economic characteristics of sustainable production were divided into two groups for food horticulture and three groups for non-food horticulture. This grouping was confirmed in the factor analysis based on the empirical data. Economic characteristics were less relevant than corporate responsibility characteristics in both the food and non-food horticultural sectors. This low importance could be linked

to a lack of economic knowledge, which likely made it difficult for respondents to assess these characteristics (Yue et al., 2016).

Characteristics describing corporate responsibility were important attributes of a sustainable horticultural company for the respondents. Characteristics of corporate responsibility, such as transparency and food safety, are drivers for local products (Meyerding et al., 2019) and due to the globalization of supply chains in horticulture and food crises, these topics are becoming increasingly important to consumers. This development can also be seen in this study for the characteristic of certification. De Jonge et al. (2010) also pointed to the confidence of consumers in company management, which compensates for the lack of knowledge about food production. In this study, confidence in the company's management is demonstrated by the mission statement characteristic, and was relevant in both sectors.

This study provides the first indications of the preferences of German consumers in sustainable horticultural production. Social desirability influences the evaluation of the characteristics. Therefore, in this study, which used a survey based on a closed questionnaire, real buying behavior was not addressed. Rather, attitudes towards items that characterize sustainable production were described. The low average age of the participants must also be taken into account. A study from Belgium shows that young consumers with a high level of involvement have a positive attitude and a higher willingness to pay for sustainably produced products (especially milk) (Vermeir and Verbeke, 2006). For ornamental plants, vegetables, and herbs, Hawkins et al. (2012) also showed that young consumers in the state of Maine (USA) had a greater interest in sustainably produced plants than older consumers, however, an increased willingness to pay could not be demonstrated for this group.

In addition, demographic characteristics influence the different preferences between the two samples. The preferences within a sample can also be based on demographic characteristics. However, initial statistical calculations indicated that the present sample is too small for a more comprehensive analysis of the influence of demographic characteristics on sustainability preferences. A correlation between the age and purchasing behavior of ornamental plants has already been demonstrated by Kaim et al. (2012). In the ornamental plant market, however, it should be noted that the sale of flowers and plants is concentrated in the generation over 50 years and that this consumer group had already been buying ornamental plants in their younger years (Kaim et al., 2012). This long-term attitude towards flowers and ornamental plants is included in the age pyramid (cohort effect). If this effect can be transferred to sustainable horticultural products, the positive attitude of young consumers with a high level of involvement identified in this study may offer a market opportunity for sustainable horticultural products in the future.

2.6 Conclusion

For both samples (ornamental plants and tree nursery products and vegetable and fruit), the results of the factor analysis correspond to the dimensions of the sustainability model described above. From a consumer's perspective, sustainable production in horticulture focuses on ecology, regardless of the production type. The importance of the characteristics that describe ecologically sustainable production only has slight differences between food and non-food horticulture. Differences between food and non-food horticulture can be found in the characteristics of social sustainability. Social sustainability was less important in non-food horticulture than in food horticulture. Economic characteristics were only of minor importance in horticulture in this study.

The results of the study make it clear that ecology offers the highest practical relevance for action. The implementation of environmental characteristics can help to reduce the gap between consumer expectations and actual production. Sustainability features that have already been implemented should be communicated to consumers by the horticultural companies. In addition, this information could help to reduce any potential barriers to implementation in order to employ further sustainability characteristics (Silva and Forbes, 2016). Implementation barriers include combining sustainability characteristics into the existing production system, the associated costs and time involved, as well as invisible added value for producers (Hall et al., 2010b; Silva and Forbes, 2016). The consumer preferences identified show that the implementation of sustainability characteristics can add value. Within these sustainability dimensions, the characteristics can be used to implement sustainable production in horticultural companies concretely on the basis of the analysed characteristics. In this way, the costs and time involved can be calculated in advance for specific sustainability characteristics and individual sustainability strategies for each horticultural company can be developed.

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3 Review – Measuring the Reputation of Companies and Industries Using the Example of Horticulture

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Author Contributions:

I.B., M.I. and W.L: conceptualization – research design
I.B.: literature study – reputation and synonymous terms
M.I: literature study – reputation measurement systems and indicators
I.B.: conceptualization – structural model and moderators
I.B. and M.I.: adaptation of the model to horticulture
I.B. and M.I.: writing – original draft preparation
W.L.: writing – review and editing

3.1 Introduction

The concept of reputation is often used, interpreted and described in the context of the analysis of market activities, interrelationships and processes (Herger, 2006; Fombrun, 2007; Liebert, 2009; Liehr et al., 2009; Walker, 2010; Esenyel, 2020). In summary, the reputation of a company can be understood as a directly resulting variable from perceptions and ideas of a company, and the attitude towards a company by its stakeholders (Kim, 2019). The influence of an economic entity on its stakeholders, whether directly or indirectly via media and multipliers, thus inevitably contributes to the development of an image and attitude among the stakeholders (McDonnell and King, 2013). In addition to the possibility of making purely comparative statements on the basis of reputation, reputation can also be used to derive explanations for past business developments and forecast future business developments (Bromley, 1993; as cited in Hautzinger, 2009). Boyd et al. (2010) consider corporate reputation to be possibly the most important strategic resource of an organization. According to Wæraas and Byrkjeflot (2012), reputation helps companies differentiate themselves from competitors and reduces consumer uncertainty (Weigelt and Camerer, 1988; as cited in Boyd et al., 2010). While it initially seems easier to deal with reputation at the individual company level, it is also possible to transfer this to the industry level (Csiszar and Heidrich, 2006). To this end, the perspective must be broadened. The focus, which was initially on the level of a single actor, from whose actions a reputation is directly derived, must be transferred to the association of several actors.

Among its stakeholders, the reputation of the horticultural sector as an industry has, until now, only been a matter of speculation. However, there are many indications that the industry's reputation is at least damaged. At the beginning of the 1990s, Becker and Oppermann (1993) spoke for the first time

of a crisis in the acceptance of German agriculture and observed a gradually emerging demand in society for intervention and control by society. With regard to German horticulture, a change in the environmental awareness of the population manifested itself at about the same time, leading to the first tightening of the legal framework conditions for production (Schenk, 1992). More recent studies conclude that considerable effort will be required to improve the reputation of the horticultural profession in particular, so that the current shortage of skilled and managerial staff does not become an existential threat to companies in commercial horticulture (Meyerding, 2016). Similarly, frequently observed scepticism in the population towards horticultural production systems has been reported (Ludwig-Ohm and Dirksmeyer, 2013). Environmental impacts are perceived by consumers today more than ever before (Meyerding, 2016). For a long time, a change in societal values, especially with regard to increased environmental awareness, was not at all or only slightly reflected in the entrepreneurial activities of farmers and horticulturists. Today we can therefore speak of a partial lack of acceptance and loss of confidence in the entire value chain of the German food industry (Böcker, 2003; Kayser et al., 2011). As a result, the demand for certain production methods or consumption trends (regionality, naturalness, organic production, etc.) is increasing (Spiller and Nitzko, 2017). These developments are often driven by food scandals, especially as seen in the last two decades. The opportunistic behaviour of individual companies as well as thoughtlessness or carelessness can lead to a drop in demand and loss of reputation for all players in the supply chain. Irrespective of responsibility, the actors are also always affected, who are fundamentally not at fault (Theuvsen and Peupert, 2003; Bokelmann, 2009; Bitsch et al., 2014).

More and more often, individuals and groups of these individuals can also experience negative effects on their personal quality of life through these entrepreneurial activities (Meier, 1995; Specht et al., 2016). The inter-company perspective of entrepreneurs is of particular importance in this context due to the increasing integration of production processes on both a horizontal and vertical level (Bokelmann, 2009). The same applies to horticulture. The legitimation of entrepreneurial actions and the formulation of communication strategies to ensure the long-term social acceptance of the sector (Sageder et al., 2018) are just two examples of the need to further develop socio-economic research approaches in this area.

The measurement of reputation is difficult due to its abstractness, which does not allow for a direct recording (Helm, 2011). The complexity of the construct is reflected in the literature in a lack of consensus on what the aspects of reputation actually encompass and in the large number of different approaches to measuring reputation (Davies et al., 2001; Hautzinger, 2009). While a number of approaches and indicators already exist at the company level (see Chapter 3), the reputation of larger units, such as specific industries or value chains, has so far been only marginally addressed (Mahon,

2002). There are hardly any scientific studies that consider the formation and measurement of reputation for industries (Albersmeier and Spiller, 2008; Tshivase and Kleyn, 2016; Cintamür and Yüksel, 2018). This would provide valuable strategic knowledge to the horticultural sector, not least when formulating sustainable development goals (e.g. direct sales, online trading) and sustainable and long-term establishment in the market.

This paper focuses on measuring reputation at the industry level. The goal is to first develop a basis of knowledge on reputation measurement approaches and establish what the corresponding indicators are. Based on a literature analysis, different terms will be defined, existing approaches at the company and industry level will be presented and any related problems identified. Any limits to the application in the different sectors will be defined and the future significance of a sector reputation for horticulture will be discussed. Finally, the conclusion of the present work intends to clarify the question of how the reputation of horticulture can be measured. Based on these results, the planned follow-on research will evaluate the indicators through an expert survey, question their respective relevance to horticulture, supplement the indicators where necessary and validate the construct accordingly. The validated model will form the basis for a final survey in a follow-up study in which the reputation of horticulture will be measured.

3.2 The importance of reputation

To present a comprehensive concept of reputation, additional terms were considered in this context. First, search results from Web of Science and Google Scholar were analysed. Search criteria keywords included the following: standing, reputation, image and general attitude constructs of stakeholders. Studies on consumer confidence and acceptance were also included. In addition, agricultural and horticultural literature on the subjects of image, identity and reputation were analysed. In this context, scientific studies on the acceptance of production systems and changes in social values were also sought. Different approaches and focuses of different authors have led to a controversial and inconsistent discussion of the terms “identity“, “image“ and “reputation“. The term reputation, as used in this work, is defined at the end of Chapter 2.

Various terms are used to describe the relations between the perception of an actor by third parties, their effect on the corresponding environment or simply their reputation. Based on a thorough review of the literature, this work is an attempt to place the most important terms in a structured and logical relationship (interactive structure). In accordance with their special significance, the main concern is to establish a well-founded differentiation of the terms most frequently discussed in publications on the topic of reputation or perception: “reputation“, “image“ and “identity“. All reputation constructs described should henceforth be considered in the context of companies or industries.

According to Dutton and Dukerich (1991), the identity of a company is the image an employee develops of the company (Figure 1). They state that this image includes the attributes that an employee thinks outsiders associate with the company. This can sometimes lead to significant differences in the way employees and entrepreneurs/managers view the company. Reputation, in turn, describes the attributes that outsiders assign to an organization. It is therefore an external image of the company (Dutton and Dukerich, 1991).

As Wartick (2002) points out, the relative reputation of companies, in the context of different levels of observation, can be understood with different terms. In sociology the preferred term is “prestige“, in economics it is “reputation“, in marketing it is “image“ and in accounting and law it is “goodwill“. As a generic term to replace the others, he refers to the term “standing“, coined by Shenkar and Yuchtman-Yaar (1997).

Lewellyn (2002), on the other hand, considers the company itself to be much more influential in shaping the terminology. In his view, identity captures what an organization actually represents and makes. The image contains a message about “who it is“ and “what it does“. Reputation, on the other hand, represents what others think the organization is and what it does.

This view of reputation is also adopted in the approach of Schwalbach (2003), who defines reputation as the perceived standing or entrepreneurial capacity perceived by others (Figure 1). At the same time, reputation indicates the extent to which the desired image has been achieved and can be understood as a kind of feedback relating to the image the company strives for. He assigns the reflection of corporate identity, by which he means the self-image and characteristics of the company, to the image. The ideal case would then involve the image leading to the reputation of the company (Stuart, 1999; as cited in Hautzinger, 2009).

Whetten (1997) makes a very similar connection. For him, identity answers the question “who or what do we think we are?“, while image provides the answer to the question “what should others think we are?“ In his view, reputation answers the question “what do we know about what others think of who or what we are?“ Figure 1 outlines this above relationship between the three terms.

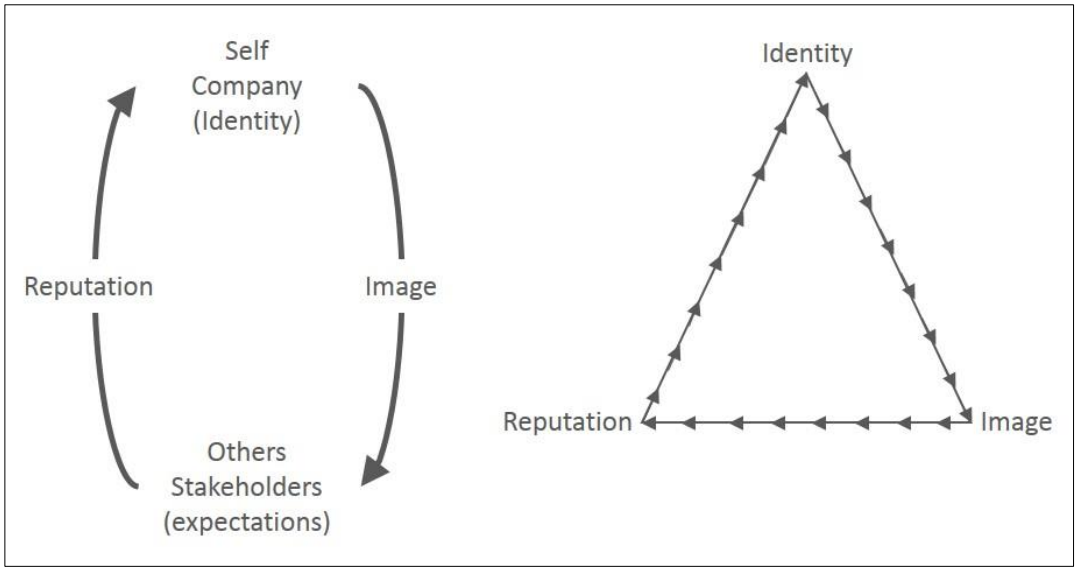


Figure 1: Interdependence of identity, image and reputation; left, Whetten (1997), right, Schwalbach (2003).

Davies et al. (2001) describe identity as the internal view of the company by the employees, while image reflects the view of external stakeholders, especially customers. Reputation is therefore a collective term that is formed from the sum of the impressions of all stakeholders and includes identity and image.

3.2.1 Interactions of the most important terminology

In the various scientific studies, each dimension (identity, image, reputation) is assigned a multitude of attributes. An overview is made difficult by this multitude of different perspectives, e.g. from the viewpoint of employees, suppliers, end customers, etc. On the basis of these considerations, together with the characteristics and limitations described in the literature, the structure of the effects of these three terms was developed according to Figure 2.

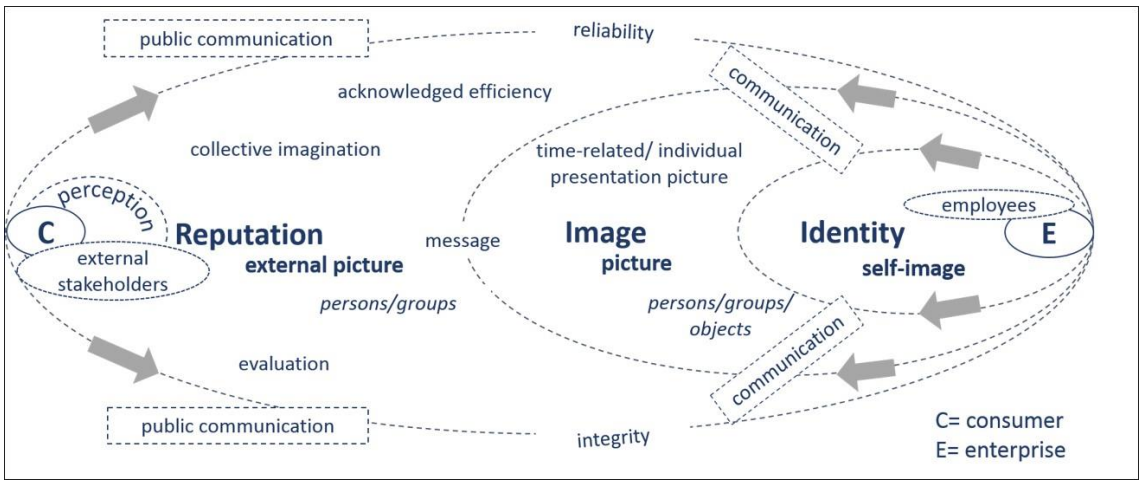


Figure 1: Interactive structure of the terms reputation, image and identity with selected attributes. Derived from Eisenegger (2005), Schwalbach (2003) and Whetten (1997).

A more detailed representation can be found in Figure A3.1 in the Appendix. The list of attributes in Figure 2 and Figure A3.1 is not exhaustive. Rather, an attempt was made to capture the range of terms

used in the literature and their respective contexts. Frequently occurring attributes from different studies were taken into account and appropriately placed. For the sake of clarity, terms that are very close in content and meaning have been combined into a single term. Figure 2 shows identity, image and reputation and their effects in spheres that are not strictly separated from each other. “E“ represents the respective enterprise and “C“ the customer. The arrows indicate the direction of action and the point of origin of the respective dimension. The individual spheres are only intended to represent the flow and general direction of the transitions from one dimension to the other. The enterprise/company, which in the literature is often characterized by its employees, actively forms an identity or self-image (Figure 2). This is a self-assessment through the construction of an actual picture and can thus be self-determined (Stahl, 2000; Helm, 2007; Balmer, 2008). Through communication, this identity ultimately becomes publicly perceivable in the form of an image. Balmer (2008) describes identity as the central platform on which communication strategies are developed, images are formed and the company’s reputation is built (Figure 2).

Image is also a representation of identity, which can be understood as a time-related and individual picture of imagination (Eisenegger, 2005; Herger, 2006). As a message, the image must ultimately reach the consumer or external stakeholder (e.g. suppliers) (Lewellyn, 2002). Through reflection and subsequent evaluation by consumers or external stakeholders (i.e. the recipients), the company (i.e. sender) is assigned a reputation or external picture (Dutton and Dukerich, 1991; Eisenegger, 2005). The decisive factor here is the emergence of a collective picture of ideas, which requires public communication in order to integrate even initially uninvolved third parties into the evaluation process (Eisenegger, 2005; Herger, 2006; Helm, 2007; Luoma-aho, 2008). Luoma-aho (2008) describes corporate reputation as the sum of the stories that stakeholders tell each other about the organization. Reputation theorists conceptualize reputation as the totality of all stakeholders’ perceptions of a particular business or organization (MacMillan et al., 2005). The recognition of performance by the recipients ultimately contributes to reputation building (Helm, 2007). While the attributes of reliability and competence determine reputation, integrity is considered a criterion for reputation building (Eisenegger, 2005; Helm, 2007). According to Fombrun (1996), the attributes of credibility, reliability, responsibility and trustworthiness are the most important characteristics of reputation (Luoma-aho, 2008). Since the image is influenced solely by the company and creates an individual picture of the company’s ideas at a certain point in time, a collectively and continuously maintained picture of the company leads to the reputation (Figure 2). In addition to individual persons or groups of persons, objects can also have an image. In contrast, only persons or groups of persons can have a reputation (Eisenegger, 2005; Helm, 2007). According to this view, a product may have an image communicated by the producer (company), but only the producer (company) itself can have a reputation – not the product itself. Wartick (2002) considers Fombrun’s definition (1996) to be the most commonly used

definition of corporate reputation since the mid-1990s. He defines reputation as “a perceptual representation of a company’s past actions and future prospects that describes the firm’s overall appeal to all of its key constituents when compared with other leading rivals“ (Fombrun, 1996).

3.2.2 Definition of reputation

Often used to refer to external experiences, reputation is made up of a series of statements that do not arise from personal experiences. Instead, they are somehow adopted by others. The reputation construct shifts between the object of the reputation to which the reputation refers (company) and the subject making statements about the reputation (e.g. the consumer), as a kind of social entity (Helm, 2007). Breyer (1962) further describes reputation as the performance of the company from the perspective of the needs and interests of third parties. In addition, Sandig (1962) describes the bilateral nature of the phenomenon of “reputation“ with the conceptual pair of reputation and echo, as well as with the interrelationship between performance and recognition of performance. For a reputation bearer (person, organization, industry, etc.) to develop a certain reputation, it is first necessary to have an idea of significance or esteem, on the one hand, and credibility and trustworthiness vis-à-vis the reference object, on the other hand (Liebert, 2009; Kim, 2019). A prerequisite for the development of an idea of a specific fact is the perception or awareness of it. This means that a minimum amount of attention must first be generated by a primary contact or medially mediated, from which at least some attention by the subject (e.g. the consumer) results (Deephouse, 2000; Lewellyn, 2002). In addition to the definition of Fombrun (1996) (cf. Chapter 3.2.1), the present study is primarily based on the definition of reputation by Helm (2007) following the view of Sandig (1962). Reputation refers to the performance capability and willingness to perform recognized by stakeholders, which other authors call “organizational performance“ (Fombrun and Shanley, 1990; Roberts and Dowling, 2002; Helm, 2007; Boyd et al., 2010). Here, service extends to all activities of the company and thus includes both economic and societal factors.

3.3 Reputation measurement

Reputation measurement is possible at various levels. As the smallest unit, the reputation of an individual person can be described (Schwalbach, 2015). The next largest relevant unit that can be measured is reputation at the company or organization level (Csiszar and Heidrich, 2006). Reputation measurements should take into account perceptions of the most important aspects of the relationship, i.e. what is important for the specific stakeholder group (MacMillan et al., 2005). For vertically integrated companies, reputation can be measured based on value chains (Albersmeier and Spiller, 2010). The predominant measurement methods of reputation in current research projects include regression analysis followed by structural equation modeling (SEM) (Veh et al., 2019). Charles Fombrun, who is

considered to be a pioneering author in the field of corporate reputation (Pires and Trez, 2018), primarily focuses on SEM-related approaches to corporate reputation in his work (Fombrun et al., 2015). Veh et al. (2019) out that reputation is predominantly measured in surveys using a wide range of items and analyzed using SEM. Ponzi et al. (2011) also see several advantages in the SEM approach over more traditional techniques, especially when the model being evaluated is not directly observable.

Since reputation is a construct, it must first be transformed into a measurable variable (Joreskog and Goldberg, 1975). Only through its relationships with observable, manifest variables (indicators/items) that include the measured values of a real situation, does reputation become measurable (Joreskog and Goldberg, 1975; Fornell and Bookstein, 1982; MacMillan et al., 2005; Helm, 2007; Kirstein, 2009; Backhaus et al., 2015). In addition to the measurement model derived in this way, the relationships between the latent and manifest variables lead to the formation of a structural model.

Domains that include both observed and latent variables can be modelled using a SEM with latent variables that can be divided into two main components: the measurement model and the structural model. The relationships between the latent variables and their corresponding observed variables, often called indicators, are captured by the measurement model (Rahmadi et al., 2019).

When measuring reputation, measurement approaches are differentiated according to their one-dimensional or multidimensional concepts. In a one-dimensional measurement approach, the reputation-describing indicators are only recorded using one item. In contrast, the reputation-describing indicators of multidimensional approaches are described by several items. In addition to the observation level, i.e. company or industry, there are various perspectives that influence the orientation of the measurement approach.

A company is understood here as an entity that designs, manufactures, distributes and delivers products or services. Industries, on the other hand, comprise a specific group of companies. The main criteria for defining a group or division according to the European Commission is the type of goods and services produced, the intended use of the goods and services, the production factor input, the process and the production technology. The type of goods and services produced takes into account the physical composition, the stage of production and the intended use of the goods (European-Commission, 2008). According to this definition, the horticultural sector is characterized, among other things, by the production of plants for consumption, for decoration, as an ecosystem service provider for urban areas or as part of a value chain (e.g. tree nursery plants). Furthermore, the production factors of water, light and substrate unite the horticultural industry. In the case of homogeneous product groups and commodities that are sold through central marketing facilities, it can be assumed that the reputation of an individual company corresponds to that of its industry (marketing group) (Winfree and McCluskey, 2005). In the case of horticultural products, this is often the case in fruit growing. However, in this case,

reputation is strongly determined by the quality of the marketed products. It is obvious that the reputation of an individual company cannot be considered independently from the reputation of the group (sector) since the reputation of the group (sector) is only as good as that of its individual members (Tirole, 1996).

In terms of reputation at the industry level, the free-rider effect is considered to be a difficulty. Since industry reputation should ultimately be considered as belonging to the public, companies can use it without consideration. For this reason, a company can benefit from a positive industry reputation despite a poor corporate reputation. However, it is unclear whether, and to what extent, a positive corporate reputation can be influenced by a negative industry reputation (Mahon, 2002). A poor industry reputation in particular could lead to a barrier to market entry for companies (e.g. the crop protection market) (Tegtmeyer, 2005).

Due to methodological differences in treatment, various measurement methods and approaches have been developed to survey reputation, an overview of which is given below.

3.3.1 Methodological approaches

3.3.1.1 Examples of measurement approaches

Fombrun (2007) published an overview of four reputation measurement approaches for Germany. These include the Reputation Quotient (RQ) for Germany, which is based on a total of six indicators (Chapter 3.3.2) and has been used by the Reputation Institute since 1999 (Wiedmann et al., 2007). The RQ has served as a basis for the development of further concepts. For example, the “RepTrak“ model is extended by the indicator of “innovation“ and distinguishes between reputation drivers and reputation reflectors (Fombrun et al., 2015).

To capture the reputation reflectors (perceptual perspective, see Chapter 3.3.1.2), the RepTrak model must be expanded to the “RepTrak Pulse“ concept, which includes four additional reflective indicators (trust, admiration, positive feelings and esteem) (Ponzi et al., 2011). To measure reputation-driving indicators – i.e. the assessment of the object of reputation (e.g. the company) carried out in the RepTrak model – the general population is surveyed using seven indicators in a multidimensional approach (see Chapter 3.3) in the companies’ respective countries of origin. An important prerequisite for this is knowledge of the company to be valued (see Chapter 3.3.1.1). Fleischer (2015) criticizes the uniform weighting of the seven indicators in the RepTrak model. For the development of an industry-specific measurement method in particular, a precise analysis of the significance of the respective indicators appears to be useful.

The American business magazine Fortune provides another concept. The list of “America’s Most Admired Companies“ (MAC) is published annually. According to Wartick (2002), the Fortune MAC survey

is the most frequently and longest used, and most discussed data set of all approaches to corporate reputation developed until now. The first ranking was published as early as 1983 and is repeated annually, whereby a development of reputation over time is available using the example of some companies. The ranking is determined by a telephonic or written survey of experts (senior managers, supervisory board members, financial analysts, etc.) based on a one-dimensional evaluation (one item per indicator, see Chapter 3.3) of eight indicators (Fryxell and Wang, 1994). Three of the eight indicators focus on financial stability and the selection of companies is based on their turnover (Davies et al., 2001). The strong focus on economic criteria, the selection of the surveyed experts ("business leaders") and the aggregation into a summative index have been criticized (Mahon, 2002; Schwalbach, 2015).

Another measurement approach is the "Imageprofile" that is published every two years by the German magazine "manager magazine". With regard to methodological features, the concept of Imageprofile follows the Fortune approach. Experts (senior managers) evaluate the 100 largest companies on a basis of 12 indicators (Manager Magazin, 2006). The critical aspects already mentioned also apply to the Imageprofile due to its methodological similarity to the Fortune concept. Tegtmeyer (2005) criticizes the long-term comparison of the approach, arguing that such a comparison of enterprises is not possible since the composition of the participating enterprises changes.

Helm's measurement approach (Helm, 2007), which is used for a scientific analysis of the relationship between loyalty and reputation, is composed of 10 indicators. These were used by different stakeholder groups (end customers, private shareholders, employees, etc.) to evaluate a specific company. An equally scientific approach for research purposes on measuring corporate and CEO reputation is presented by Schwalbach (2015). Seven indicators were developed in each case. As with the previous concepts, with the exception of RepTrak, the approach in this work also involves interviewing experts at the first or second management level. These experts, either CEOs or experts from 10 different industries, were asked to evaluate the leading large companies in Germany with regard to the respective indicators.

Thus far, measuring the reputation of an entire industry has had little practical application. Nevertheless, there are measurement methods that have been used on a scientific level to address specific research questions. Indicators for determining industry reputation were developed from a literature search with a subsequent quality check of the structural equation model for the automotive and petroleum industries (Hautzinger, 2009). These "10 plus 1 indicators" are similar to Helm's (2007) approach. To assess the sector reputation of the automotive and petroleum industries, potential applicants were asked to provide a one-dimensional assessment of the indicators on a seven-point Likert scale. Another approach was provided by the Swiss "Reputation Gap" study that examined the reputation of five Swiss industries (banking, telecommunications, health insurance, insurance and retail

trade) (Geiser, 2015). The method was developed by a consulting firm with the aim of showing corporate managers the need for action to enable them to make reputation-effective changes to meet customer expectations. A study on the reputation of the meat industry focuses on four stages of the value chain (agricultural livestock farming, slaughter companies, manufacturers of sausage products, sausage and meat products in the food retail trade) (Albersmeier and Spiller, 2010). The method of measurement is based on the Fortune indicators with certain specific adjustments for the meat industry. Compared to the approaches explained above, these indicators were identified for the meat industry, meaning a transfer to other sectors is hardly possible. However, the possibility for the necessary adaptation of indicators to the object of investigation becomes obvious.

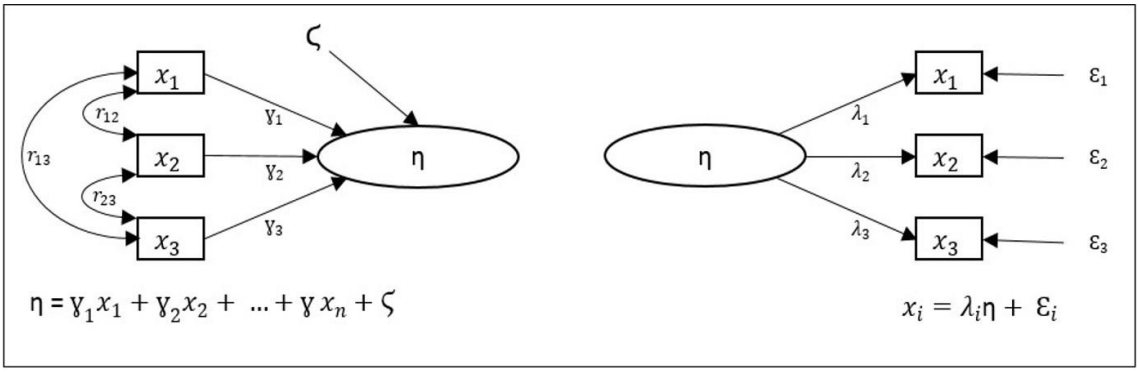
Once an overview of the measurement approaches has been established, the relationships between the latent construct, its observable indicators and the moderating effects need to be analysed more precisely.

3.3.1.2 Structural model

The operationalization of the construct “reputation“ requires the development of a concrete measurement instrument (Figure 3). In the literature, multi-level schemes are often proposed for this purpose. These are suitable for the development and validation of a measurement model (Helm, 2007). Helm (2007) explicitly refers to three aspects to consider when measuring reputation. First, it must be determined whose viewpoint of the reputation is relevant. According to Wiedmann et al. (2007), the RQ (see Chapter 3.3.1.1) can be understood as an overall measure of reputation across all relevant stakeholder groups. However, in specific individual cases, it is not always possible to carry out corresponding, equal surveys of all stakeholder groups. Experience to date, especially based on the results of empirical studies, leads Wiedmann et al. (2007) to recommend that, in future, more country- and sector-specific features should be taken into account when developing measurement concepts. Wartick (2002) considers the aggregation of the partial reputations of individual stakeholder groups into an overall reputation to be a problem in Fombrun’s requirement (1996) that states that reputation is “the firm’s overall appeal to all of its key constituents“ (see chapter 3.2.1) (Fombrun, 1996). With a limited number of stakeholders in a respondent group, this goal can never be achieved. He considers the solution to be the disaggregation of the overall reputation, which corresponds to a differentiated consideration of partial reputations (Wartick, 2002). In particular, stakeholder-specific measurement concepts, for example with regard to customers, investors or even employees, should receive more attention (Wiedmann et al., 2007). MacMillan et al. (2005) expresses similar concerns and refers to Bromley (2002). He is also critical of overall ratings (RQ, Fortune’s measures, etc.) for reputation. These result from applying exactly the same reputation model across different stakeholder groups. Since the various groups are likely to differ in their values and convictions, they will also assess the reputation

of a company in relation to different issues that are individually important to them. Helm (2007) also refers to the process of differentiating reputation according to different stakeholders as the "divergence approach".

Helm (2007) cites the choice of the epistemic relationship of the latent variable "reputation" to its measurable variables (indicators) as the second relevant aspect of reputation measurement. Latent constructs can be described and surveyed using reflective or formative measurements (Diamantopoulos and Winklhofer, 2001). In terms of formative indicators, the weighted sum of the factors forms the latent formative variable of "reputation" (Rossiter, 2002; Eberl, 2004). In the case of reflective indicators, the non-measurable construct "reputation" evokes observations in reality and is thus modelled as a function of its observable indicators (Diamantopoulos and Winklhofer, 2001; Christophersen and Grape, 2009). The cause-and-effect link here therefore extends from the construct in the direction of its indicators. The formative link thus describes the opposite correlation, namely with a cause-and-effect direction from the observations (indicators) to the latent construct (reputation). Using these connections, Figure 3 shows the latent variable on the left from a formative perspective and on the right in a reflective operationalized way.



η: latent Variable; γ: weight; x_i (left): formative indicator; ζ: measurement error at latent variable level; r: correlation between indicators; λ: factor charge; x_i (right): reflective indicator; ε: measurement error at indicator level

Figure 3: Latent construct with (left) formative indicators and (right) reflective indicators. Based on Diamantopoulos et al. (2008).

The indicators of a formative construct do not need to have the same content or a common theme, which clearly distinguishes them from reflective formalization (MacKenzie et al., 2005). "Omitting an indicator is omitting a part of the construct" (Bollen and Lennox, 1991). While the formative construct requires a survey of indicators, reflective indicators, according to the domain sampling model, require a set of items "chosen randomly from the universe of items relating to the construct of interest" (DeVellis, 1991). In reflective measurement models the indicators are highly correlated and are therefore interchangeable since all indicators are reflected by one and the same construct (see Figure 3) (Helm, 2005). Thus, the elimination of individual indicators does not pose a problem (Diamantopoulos and Winklhofer, 2001; Christophersen and Grape, 2009). But each reflective indicator must capture a

different consequence of the latent construct (Helm, 2005). According to Rossiter (2002), formative indicators are not interchangeable, i.e. they can neither be added nor removed.

In formative measurement models, the indicators are often weighted differently (Helm, 2005). The measurement error in formative constructs is not present at the indicator level (Eberl, 2004). Instead, the latent variable itself is assigned a disturbance term (Diamantopoulos et al., 2008). High priority is given to content validity in formative constructs (Rossiter, 2002; Helm, 2005; Hautzinger, 2009). Consulting experts in developing a set of formative indicators (expert validity) is recommended (Rossiter, 2002; Schwaiger, 2004; Straub and Gefen, 2004; Zinnbauer and Eberl, 2004; Hautzinger, 2009). Regarding external validity, Diamantopoulos and Winklhofer (2001) refer to Bagozzi (1994): "the best we can do … is to examine how well the index relates to measures of other variables". Thus, a further approach for validation consists of linking the index (here, a collection of formative indicators) with other constructs (i.e. causes and/or consequences). Subsequently, only those indicators that are significantly correlated with the variable of interest (reputation) would be retained. Such validation is particularly relevant if indicators have been removed from the original index. In this case, it is essential to determine whether the new version works in a predictable way (Diamantopoulos and Winklhofer, 2001). Formative measurement models are calculated using multiple regressions (Diamantopoulos et al., 2008).

Finally, the third and final aspect to be examined in the modelling of reputation measurement is the formalization of the construct in a reflective or formative sense. Helm (2007) treats reputation as a formative construct and justifies this by stating that it is not, for example, reputation that leads to the perception of a certain product quality, but the opposite. While Helm's approach aims at investigating a single company, Hautzinger (2009) extends this approach to an investigation of an industry. Ponzi et al. (2011) refer to the different models of the reputation construct: "some model corporate reputation as a reflective construct, a formative construct or a combination of the two".

There must be sound theoretical reasons for why indicators should refer to the variable being studied (i.e. reputation). One possibility is to use a global element (global measure) as an external criterion that summarizes the essence of the construct that the index provides (Diamantopoulos and Winklhofer, 2001; Helm, 2005). This global measure can be understood as a global query of the industry's reputation (e.g. "how do you rate the industry's reputation?") to ensure content validity (Hautzinger, 2009). Wartick (2002) also requires the comparison with a standard (global measure) for the definition of corporate reputation.

In this paper, reputation will be treated as a formatively operationalized construct. However, among the measurement approaches discussed in Chapter 3.3.1.1, indicators with a reflective impact are also identified (see Chapter 3.3.2). For example, indicators of the affective components of, for example,

"trust" or "admiration" can be assigned to the reflective direction of action (see Chapter 3.3.1.1). They can therefore be understood as the result of a previous reputation-building process. Jarvis et al. (2003) comments: "It is also possible for a model to contain a mixture of formative and reflective indicators." In this context, Diamantopoulos and Winklhofer (2001) refer to Bollen and Lennox (1991), who describe the formative measurement model as statistically under-identified. The model can only be estimated if it is embedded in a larger model that includes consequences, such as the effects of latent variables (Bollen, 1989). Due to the difficulty of construct validation, Diamantopoulos and Winklhofer (2001) discuss several validation approaches. They consider the multiple indicators and multiple causes (MIMIC) model to be particularly suitable. This model allows an evaluation of the proposed indicators as a set (i.e. taking into account their interrelations) by including reflective indicators (Hauser and Goldberger, 1971; Joreskog and Goldberg, 1975; Diamantopoulos and Winklhofer, 2001). The index indicators x_i act as a direct cause for the latent variable η, which is indicated by one or more reflective measures, y_j (j = 1,2…m) (see Chapter 3.4.2) (Diamantopoulos and Winklhofer, 2001). This is the model used in this work.

3.3.2 Indicators

The measurement approaches explained in Chapter 3.3.1.2 are based on constructs that are composed of a large number of indicators. These indicators can be grouped together based of their proximity in terms of content (see Table 1). Table 1 shows that reputation indicators are not always indicators in the true sense of the word. Rather, they are also latent variables that must be broken down into observable indicators. Using the term "factor", which is also defined as a latent variable in statistics (Field, 2015), similar reputation indicators are first grouped into superordinate factors (Table 1). The factors are arranged in descending order of their indicators and measurement approaches, representing the results of the literature analysis.

Factors with nine indicators each are "employee satisfaction" and "economy" (see Table 1). Both include indicators that are used several times in the presented measurement approaches (see Chapter 3.3.1.1). In this way, their particular relevance to measuring reputation becomes apparent.

Table 1: Summary of the most commonly used factors and indicators for measuring reputation.

Factor	Indicators	Measurement concepts/authors
Employee satisfaction	Human resource management	Fryxell and Wang, 1994
(nine indicators in seven measurement approaches)	Attractiveness to managers	Manager Magazin, 2006
	Employee orientation	Manager Magazin, 2006; Schwalbach, 2015
	Behaviour towards employees	Helm, 2007
	Dealing with employees	Albersmeier and Spiller, 2010

	Exemplary function	Schwalbach, 2015
	Team spirit	Schwalbach, 2015
	Workstation (field)	Fombrun et al., 2015
	Perception of employee needs	Geiser, 2015
Economy **(nine indicators in six measurement approaches)**	Long-term investment	Fryxell and Wang, 1994
	Financial stability	Fryxell and Wang, 1994
	Company assets	Fryxell and Wang, 1994
	Earnings and financial strength	Manager Magazin, 2006
	Entrepreneurial success	Helm, 2007
	Financial situation of the company	Helm, 2007
	Financial solidity	Schwalbach, 2015
	Financial capacity	Fombrun et al., 2015
	Consistent business success	Geiser, 2015
Social affairs **(seven indicators in seven measurement approaches)**	Social responsibility	Fryxell and Wang, 1994
	Engagement for charity	Helm, 2007
	Social commitment and awareness	Hautzinger, 2009
	Corporate social responsibility	Albersmeier and Spiller, 2010
	Social commitment	Schwalbach, 2015
	Awareness of social responsibility	Geiser, 2015
	Responsibility	Fombrun et al., 2015
Management **(seven indicators in six measurement approaches)**	Quality of management	Fryxell and Wang, 1994; Manager Magazin, 2006; Schwalbach, 2015
	Qualifications of management	Helm, 2007
	Strategic competence	Schwalbach, 2015
	Assertiveness	Schwalbach, 2015
	Accurate action	Geiser, 2015
	Management	Fombrun et al., 2015
	Control system	Fombrun et al., 2015
Credibility	Keeping advertising promises	Helm, 2007
	Imposition of high commitments	Hautzinger, 2009

(seven indicators in five measurement approaches)	Seriousness	Hautzinger, 2009
	Free from scandal	Hautzinger, 2009
	Transparency	Albersmeier and Spiller, 2010
	Credibility	Hautzinger, 2009; Albersmeier and Spiller, 2010; Schwalbach, 2015
	Credible communication	Geiser, 2015

The factors “social affairs“, “management“ and “credibility“ further summarize the important indicators that are taken into account in several measurement approaches (at least five). Other indicators relevant to reputation measurement are summarized in Table A3.1 (Appendix). However, these are factors or indicators that have so far only been considered in a few measurement approaches. This suggests a lower degree of generality and thus a closer connection to the respective object of investigation. The largest group, “emotions“ (11 factors, see Appendix Table A3.1), is very heterogeneous compared to the other factors. In addition, it is characterized by indicators from the study on the reputation of the meat industry (Albersmeier and Spiller, 2010), which makes a corresponding adjustment necessary when transferring it to a new object of investigation.

3.3.3 Moderating variables

Corporate reputation is an aggregated parameter that does not allow direct statements to be made about what exactly stakeholders perceive or evaluate. For this reason, measuring corporate reputation in the form of a construct can only be used to estimate the extent of the support potential of stakeholders or individual stakeholder groups (Liehr et al., 2009). “Moreover, sector reputation is formed in the minds of the stakeholders, whose knowledge of these attributes may be limited, lacking or even skewed“ (Luoma-aho, 2008). Knowledge is understood to be all information stored and retrievable by an individual (Bauer et al., 2003). Information processing and the selective examination of information in a decision-making process depend on the degree of knowledge a person has (Cowley and Mitchell, 2003; Kroeber-Riel and Weinberg, 2003). This information asymmetry among respondents also leads to different assessments of the reputation bearer (Weigelt and Camerer, 1988). Thus, knowledge about the reputation bearer can vary, extend over different areas and therefore, as a moderating variable, influence the strength of the relationship (Helm, 2007; Hautzinger, 2009). Moderating variables influence the direction and/or strength of the relationship between an independent or predictor variable (e.g. “products & services“, see Appendix Table A3.1) and a dependent or criterion variable (reputation) (Sharma et al., 1981; Baron and Kenny, 1986; Shields and Shields, 1998). They have no direct influence, either on the independent variable or the dependent variable. However, the interaction between the independent variable and reputation is determined by them.

In the horticultural sector, for example, consumers may be very familiar with the characteristics of the products (e.g. health value, preparation) on the one hand, but have a rather low level of knowledge about the production systems on the other hand. The measurement of reputation is weakened by differences in experience, knowledge and accuracy of the participants in answering the questions (Ponzi et al., 2011). What Cable and Turban (2003) describe as product or company knowledge, Hautzinger (2009) adapts accordingly to industry knowledge. In order to measure "knowledge", appropriate questions (indicators) are formulated ("I know quite a bit about this firm") in which the respondents can give corresponding scores on a Likert scale from "strongly disagree" to "strongly agree" (Cable and Turban, 2003). For horticulture, the question arises of the extent to which consumers have knowledge of the production processes within the sector, the heterogeneity of the product and the structure of the sector.

In addition to knowledge, involvement is considered to be another determinant that influences people's decision making. The processing of information depends on the degree of the person's individual involvement in a situation (Hautzinger, 2009). Also referred to as "activation" by Trommsdorff (2004), it describes the perceived personal relevance of the reference object or the degree of involvement with an object, action or situation based on inherent needs, values and interests (Zaichkowsky, 1985; Celsi and Olson, 1988). Involvement can also be described as individual attitudes towards the importance attached to the valuation process or the object itself (Krugman, 1965; Petty et al., 1983; Mantel and Kardes, 1999). With increasing involvement, people are said to process available information more thoroughly and be more interested in obtaining it (Zaichkowsky, 1985; Celsi and Olson, 1988; Haugtvedt and Wegener, 1994; Mantel and Kardes, 1999). The extent to which involvement as a moderating variable influences reputation formation or the assessment of reputation must remain unanswered at this point. However, it is conceivable that the factors in reputation building are of varying importance, depending on the involvement of the respondent. With decreasing involvement, peripheral aspects gain in importance, while increasing involvement leads to more rational and increasingly fact-based information processing (Petty et al., 1983; Petty, 1986; Fombrun and van Riel, 1997). Peripheral aspects in this context could be unconsciously perceived stimuli in advertising measures, headline-oriented media reporting or third-party hearsay (Petty et al., 1983). These could replace specifically gathered experience or fact-based information about the product, the company or the industry. With regard to horticulture, for example, an environmentally conscious lifestyle could lead to a high level of involvement in the topic of "soil-bound production", whereas a person leading a more urban lifestyle and is less environmentally conscious but more nutritionally aware could orientate more towards the product qualities of vegetable growing when assessing the reputation of the industry.

3.4 Development of an adapted model for the horticultural sector

The horticultural sector and its peculiarities and characteristics are presented in Chapter 3.4.1. This is followed by the development of a structural model for measuring the reputation of the horticultural sector. For this purpose, the necessary steps developed in Chapter 3.3 and the interrelationships to be taken into account when measuring reputation are considered and implemented in the structural model (Chapter 3.3.1.2). The structural model will be adapted to the specifics of the horticultural sector in accordance with all preliminary considerations for creating a measuring instrument suitable for the sector.

3.4.1 Characteristics of the horticultural sector

The horticultural sector has a number of distinct characteristics, such as a high degree of heterogeneity in its range of segments, products and services, ranging from fresh products, such as fruit and vegetables, to ornamental and nursery plants and a wide variety of services (Bokelmann, 2001; Lal, 2008). Horticultural plant production includes the four segments of fruit, vegetable, flower and ornamental plant production as well as tree nurseries (Dirksmeyer and Kerstjens, 2009; Schöps, 2013). Additionally, there are other more specific segments, such as spice, medicinal herb and mushroom cultivation (Deutsche Gartenbau Gesellschaft, 2008; Friedrich et al., 2013).

Horticultural plant production is spatially concentrated in Germany, located in only a few regions, i.e. it refers to a highly intensive and concentrated cultivation of fruit (Bokelmann, 2009). In addition to soil-bound production and a dependence on climatic conditions in outdoor cultivation, the production of food is a sensitive field of activity (Lea-Cox et al., 2010). Thus, the consumption of fresh fruit and vegetables certainly poses health risks, among other things, due to possible residues or contamination (Klonsky, 2006; Calvin, 2007; Bitsch et al., 2014). In addition to outdoor production, horticultural plant production is characterized by intensive cultivation under protected areas. Here, both soil-bound (ornamental plants) and soilless (e.g. tomatoes, cucumbers) production methods are established. Service horticulture is characterized, among other things, by direct contact with consumers. By designing public facilities, parks and private gardens, it serves an important comfort function in German society (Schöps, 2013).

A characteristic feature of the sector, especially in the case of fruit or vegetable cultivation (e.g. apples, potatoes), is the form of direct marketing. However, the majority of German horticultural production is marketed via multi-level marketing systems and does not reach its customers directly from the production companies (Bokelmann, 2009). Limited shelf life and seasonal availability of products influence sales activities. Consequently, the perception of horticultural products by consumers is also subject to seasonal influences. An increased perception of flowers on special occasions, such as Valentine’s Day,

or an increased perception of strawberries during the growing season (end of May to mid-August) are two examples of this.

The continued migration of the population from rural to urban centres also leads to a lack of familiarity with the realities of food production systems (Hewett and Warrington, 2014).

3.4.2 Structural model for measuring reputation in horticulture

In order to develop a structural model for the horticultural sector, it is first necessary to differentiate between the formative and reflective approaches. The choice of a formative versus a reflective specification depends on the causal priority (sequence) between the respective indicator and the latent variable (see Chapter 3.3.1.2) (Bollen, 1989). With regard to the selected indicators, it is notable that attributes of both causal relationships are represented (see Table 1). All indicators that are directly related to entrepreneurial activities and that in their sum represent the sector activities contribute to the reputation of the sector and can thus be operationalized formatively. These are then modified accordingly in the structural model for the horticultural sector. The indicator “management“ has been extended to “management & organization“ in order to take into account the other attributes assigned to the content (see Figure 4). In addition, the indicator “economy“ was assessed as rather meaningless in the context of measurements and was thus replaced by “economic performance“. The broad term “social affairs“ is replaced by “social responsibility“ in view of its subordinate attributes and its suitability to the horticultural sector. The indicators “customers“ and “environment“ were placed in their respective relevant contexts and accordingly replaced by “customer orientation“ and “impact on the environment“. For “monetary attributes“, the “price-performance ratio“ was used, the indicator “communication“ was extended to “communication & presentation in the media“ and “company development“ was renamed “industry development“. Thus, the reputation formed in this way reflects the emotionally coloured view of the stakeholders in the industry. In accordance with their emotional anchorage, these indicators were combined to form the factor “emotions“ (see Table 2). They thus represent the reflective side of the reputation construct.

The inclusion of the indicators identified as reflective in the model for reputation measurement in horticulture is thus further supported and legitimized. Figure 4 shows the MIMIC model (see Chapter 3.3.1.2) with the selected indicators and their direction of action.

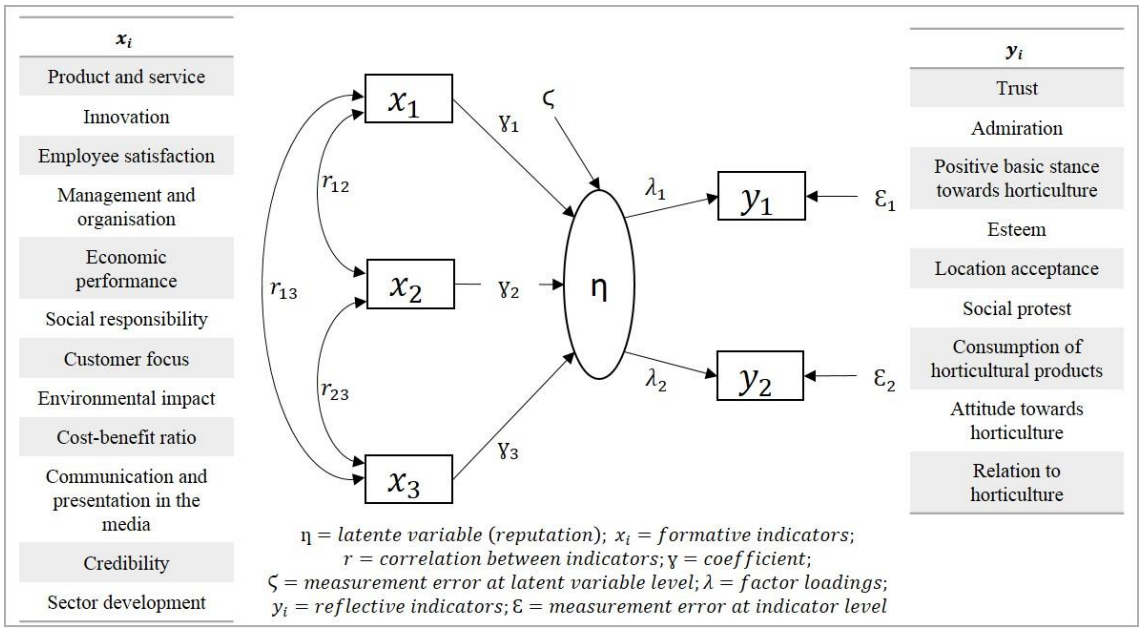


Figure 4: Structural model for measuring the reputation of horticulture.

Due to a strong heterogeneity among the indicators summarized in the factor “emotions“ (see Table 2) and their not-to-be-disregarded importance in the horticultural sector, they are almost completely included in the structural model (Figure 4). The indicators developed specifically for the meat industry were adapted to the horticultural sector or removed altogether (e.g. “confidence in meat“) if they had already been taken into account by a broader indicator (e.g. “confidence“).

The indicator “political control pressure“ is not taken into account in this case. Although reputation could generate political control pressure (reflective), it is reasonable to assume that this indicator is associated primarily with agriculture in general and less with horticulture in particular. Furthermore, the indicator only appears once in the measurement of the reputation of the meat industry (Albersmeier and Spiller, 2010), where it provides a reason to assume that it plays a special role in the topic of animal husbandry and animal ethics. The common agricultural policy also does not take a differentiated view at this point and the controversial topic of animal husbandry has a currently overriding effect regarding the desire for political regulation (European-Commission, 2008).

The indicator “attractiveness as an employer“ is also derived solely from measuring reputation related to the meat industry (Albersmeier and Spiller, 2010). As an industry, horticulture is a smaller sector in comparison to others – as well as compared to the value chain of the meat industry. Furthermore, the horticultural sector is characterized by a high number of foreign seasonal workers and the highly heterogeneous nature of the sector’s occupational field does not lead to a uniform image as an employer. An evaluation of the indicator would not provide a clear result, as the respondents could think of completely different fields of activities, regardless of their level of knowledge. For this reason, the inclusion of the indicator does not appear to be meaningful, since it would first be necessary to define a specific field of activities, which in turn would not sufficiently cover the whole industry.

The indicator “consumption of horticultural products“ represents an example of how difficult it can be to identify the direction of impact. While this indicator is included based on a reflective construct in the model, a formative influence cannot be completely excluded. The reputation of horticulture can both reflect the consumption of horticultural products and contribute to reputation building. With the consumption of consumer goods or the use of horticultural services (e.g. visiting parks), a formative influence is also conceivable. Since this indicator (“consumption of horticultural products“) can only be influenced indirectly by the industry and the consumption decision is made by the customers, the reflective relationship assumed in Figure 4 (Albersmeier and Spiller, 2010) seems more plausible. However, this assumption can be corrected in a final quality check and validation of the model in the case of an incorrect specification (Bollen, 1984).

3.5 Discussion

Prior research focused primarily on the importance of reputation and the appropriate measurement methods at the company level and only partially at the industry level (see Chapter 3.3). The focus of previous research is also on industries and companies that can only be compared with horticulture to a limited extent. Against the background of past experience and the results of empirical studies, Wiedmann et al. (2007) recommend taking into account more country- and industry-specific characteristics in future and also the development of stakeholder group-specific measurement concepts (e.g. with regard to customers, investors and employees). This paper, which deals extensively with reputation research from other industries and companies, provides a basis for further research relating to horticulture. The selected indicators (see Chapter 3.3.2), adapted to the characteristics and peculiarities of horticulture (see Chapter 3.4.1), should be checked in further investigations regarding their quality. The structural model developed in Chapter 3.4.2 for the measurement of reputation in horticulture based on an in-depth literature search provides a framework for further development specifically for the horticultural sector. Corporate reputation research has its methodological origins in the marketing literature on structural equation modelling and is considered to be the predominant method in this field (Veh et al., 2019). According to Helm (2005), the key to meaningful modeling is to have an understanding of the epistemic nature of reputation in a formative or reflexive sense.

To ensure that the construct is complete in terms of its content, the structural model must first be validated by experts in the sector (expert validity) in order to correct any possible incompleteness or overlaps where necessary (Straub, 1989; Rossiter, 2002; Schwaiger, 2004; Zinnbauer and Eberl, 2004). In the process, the uptake or withdrawal of indicators should be checked. Finally, in a follow-up study, the validated model will be applied in a stakeholder survey (horticultural consumers) allowing the

measurement of reputation. The demand for the development of a stakeholder group-specific measurement concept is thus met as far as possible, since the model has been adapted accordingly to horticultural consumers.

Beyond this, the implementation of moderating variables must be considered (see Chapter 3.3.2). The extent to which the parties involved have knowledge (expertise) relating to the heterogeneity of the industry, the composition of the business fields or the production processes is initially unclear. In the context of reputation measurement, it is accordingly necessary to determine the respondents" knowledge in order to uncover possible correlations between the level of knowledge and reputation assessment. Involvement plays a similar role in this context (see Chapter 3.3.2). The relationship can also have a lasting effect on the reputation results, as respondents who are directly involved in the sector also have a different view of the sector in their role as consumers. At this point, the function of the moderating variables must be examined in detail.

Another important factor that can be decisive for the reputation of horticulture is the timing of the survey. This is closely related to seasonal availability (e.g. regionally grown vegetables or fruit) or a seasonally limited supply (e.g. flowering parks, services in private gardens). In addition, holidays, special occasions and celebrations (e.g. Valentine's Day) increase the selective perception of customers regarding horticultural production or services. In addition, food retailers play a key role in the marketing of horticultural products. With its very broad range of horticultural products, the retail food trade is increasingly coming to the fore as a marketer and its marketing strategies also have a decisive influence on the image of the products and thus the reputation of the sector. The producers themselves and their significance to the consumer thus recede into the background. In order to be able to better classify study results against this background, additional consumer knowledge of the respective producers and production processes could be collected.

3.6 Conclusion and outlook

The chosen research design, beginning with the development of a literature-based initial model, which will be validated by a survey of experts and a final reputation measurement, seems particularly appropriate for this research topic, above all because it is a field of research that has only been partially investigated and breaks new ground in horticulture. The specific adjustments that need to be made after the expert survey and before the final consumer survey remain open at this point. The inclusion of further variables, in particular the moderating variables, should be considered, not least in order to examine the relevance of reputation in strategic decisions, such as the decision to buy a product. As

horticultural products are supplied to consumers in a largely unprocessed form, the industry is particularly interested in knowing how this stakeholder group reacts to the nature and results of its production processes.

In order to be able to derive recommendations for producer action, it is of interest to understand more than just the adjusting screws for reputation. Also of interest are findings relating to the relevance of reputation in the case of customer behaviour that is damaging to the industry. This knowledge could be helpful as a guide when planning the scope and cost of reputation-enhancing measures. For example, behaviour harmful to the industry could mean switching to non-garden substitutes. The inclusion of the indicators and the moderating variables should be decided by means of a subsequent expert survey which entails an empirical analysis of the structural model formalized in this paper. This approach makes it possible to take into account all important reputation consequences (e.g. trust/acceptance) and impacts and thus helps generate results that will be relevant in practice.

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4 Conception and Evaluation of a Structural Equation Model to Measure the Reputation of German Horticulture

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M.I., I.B. and W.L.: interpretation of the results
M.I. and I.B.: writing –original draft preparation
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4.1 Introduction

Horticulture is a branch of agriculture which deals with the principles and practices of growing vegetables, fruits and flowers (Lal, 2008). Horticulture as a sector is characterized by great heterogeneity. It can be divided into the areas of horticultural production, services and trade. Horticultural production is further subdivided into the fruit, vegetable, ornamental plant and nursery segments. A large number of different products are produced in these segments. The service and retail segments include garden and landscaping, cemetery horticulture, retail and floristry. Public green areas, such as parks or garden shows, can also be regarded as horticultural products.

The reputation of horticulture as a sector among stakeholders can only be speculated upon. As early as the 1990s, expert circles already pointed to the early development of image improvement activities for horticulture in order to consolidate the standing and position of horticulture (Storck, 1992). Ludwig-Ohm and Dirksmeyer (2013) report a frequently observed skepticism among the population particularly towards horticultural production systems. Technological progress in production has led to a gap between the consumer's ideas and actual production methods. Today, more than ever, environmental aspects are perceived by consumers and can therefore also influence purchasing decisions for horticultural products (Meyerding, 2016). In addition, many horticultural products have confidence characteristics (e.g. taste) that cannot be tested at the point of sale. Trust in these products can be influenced by the reputation of the sector (Weigelt and Camerer, 1988). Due to the lack of differentiation of the products, the sector's reputation can also be damaged by opportunistic behavior of individual producers (Winfree and McCluskey, 2005). A bad reputation can result in a decline in sales and thus influence the economic success of a company. Bitsch et al. (2014) were able to show that the occurrence of foodborne illnesses leads to economic losses and a reputation damage.

In combination with customer loyalty and identification, reputation can lead to an improvement in the intention to buy and the willingness to pay, thus influencing sales in the sector (Keh and Xie, 2009). Reputation is therefore an important strategic resource for companies. This influences communication with stakeholders and legitimizes entrepreneurial action (Sageder et al., 2018). Nevertheless, no measurement approach is known that captures the reputation of horticulture in all its diversity. Only on the basis of a measurement approach it will be possible to formulate concrete recommendations for the entire sector and the individual segments on how reputation can be influenced. This missing measurement approach will be elaborated in this publication.

An approach for reputation measurement based on a literature research is to be adapted by experts with the aim of carrying out a consumer survey in the following step. The validation of the indicators of a structural model by experts is the declared aim of the present work. These indicators have been used in non-sector-specific measurement systems for companies and sectors, which requires adaptation to the specific characteristics of horticulture. Besides, validation by experts is necessary, because the model should be corrected for possible incompleteness and unsuitable indicators should be eliminated (Straub, 1989; Rossiter, 2002; Schwaiger, 2004; Zinnbauer and Eberl, 2004). The main research question that should be answered in this paper is, what indicators describe the reputation of horticulture.

With the help of the experts, the interaction between the reputation of horticulture and the reputation of the individual segments can also be investigated. The second research question is whether the reputation of horticulture is mainly influenced by segments and what is the relative contribution of the segments to the sector's reputation from an expert perspective. With the help of experts, it will be examined whether certain sectors have a higher presence in the minds of consumers (society). It is assumed, for example, that visiting public parks or creating private gardens by the horticultural and landscaping contractors, this segment makes a higher contribution to the reputation of the entire sector.

4.2 Theoretical framework

Reputation is defined by Fombrun as 'a perceptual representation of a company's past actions and future prospects that describes the firm's overall appeal to all of its key constituents when compared with other leading rivals' (Fombrun, 1996). This has been the most commonly used definition since the mid-1990s. (Wartick, 2002). As also stated in this paper, reputation in scientific research is mostly understood and treated as a synonym for the terms reputation and standing (Schwalbach, 2003; Helm, 2007b; Hautzinger, 2009; Liebert, 2009). The frequently used German term 'Ruf' is described by Breyer (1962) as a short, clear, characteristic and (relatively) constant statement about an object of opinion

(Breyer, 1962; Helm, 2007b). Reputation at sector level is understood in the sense of Helm (2007b) as an opinion that dominates in the public eye. Simply put, reputation was defined here as the recognized performance and willingness of the company to perform, which other authors also call 'organizational performance' (Fombrun and Shanley, 1990; Roberts and Dowling, 2002; Helm, 2007b; Boyd et al., 2010). Following Hautzinger (2009), this view of corporate reputation is transferred to the sector. The sector's reputation is thus understood as the public recognition perceived by stakeholders of the sector's performance and willingness to perform (Luoma-aho, 2008). Performance includes all the activities of a sector, in terms of both economic and social factors (Lins et al., 2017).

Reputation is a latent construct that is not directly observable in this form (Joreskog and Goldberg, 1975). Only through its relationships to observable (to be interrogated) variables, which are also called indicators or items, does it become measurable (Joreskog and Goldberg, 1975; Fornell and Bookstein, 1982; MacMillan et al., 2005; Helm, 2007b). The construct reputation thus forms the latent variable, which in turn, is described by the variables assigned to it – the indicators or items. The complexity of the construct is shown in the literature through the lack of consensus on which aspects the reputation actually covers and in the multitude of approaches to reputation measurement (Davies et al., 2001).

The multiple indicators and multiple causes (MIMIC) model were selected as the approach to reputation measurement (Figure 1). This model makes it possible to evaluate the indicators used as a whole (i.e. taking into account their interrelations) and requires the inclusion of reflective indicators in addition to the formative ones (Hauser and Goldberger, 1971; Joreskog and Goldberg, 1975; Diamantopoulos and Winklhofer, 2001). The formative indicators represent the direct causes of the latent variable, while the variable is indicated by one or more reflective indicators (Diamantopoulos and Winklhofer, 2001).

4.3 Research method

In the first research stage, the literature analysis, fundamental findings on reputation as a latent variable and on the measurement of reputation were first collected and incorporated into a theoretical model for measuring reputation.

Systems for measuring corporate reputation, such as the reputation quotient or the fortune system, are already being used in business. A reputation measurement at sector level, using the example of the automotive sector, on the other hand, was only carried out within the framework of a scientific study. Based on these existing measurement approaches for companies as well as for sectors, indicators from eight systems were analyzed, compared, tabulated and subsumed. The indicators were brought together in the form of a MIMIC model (Figure 1).

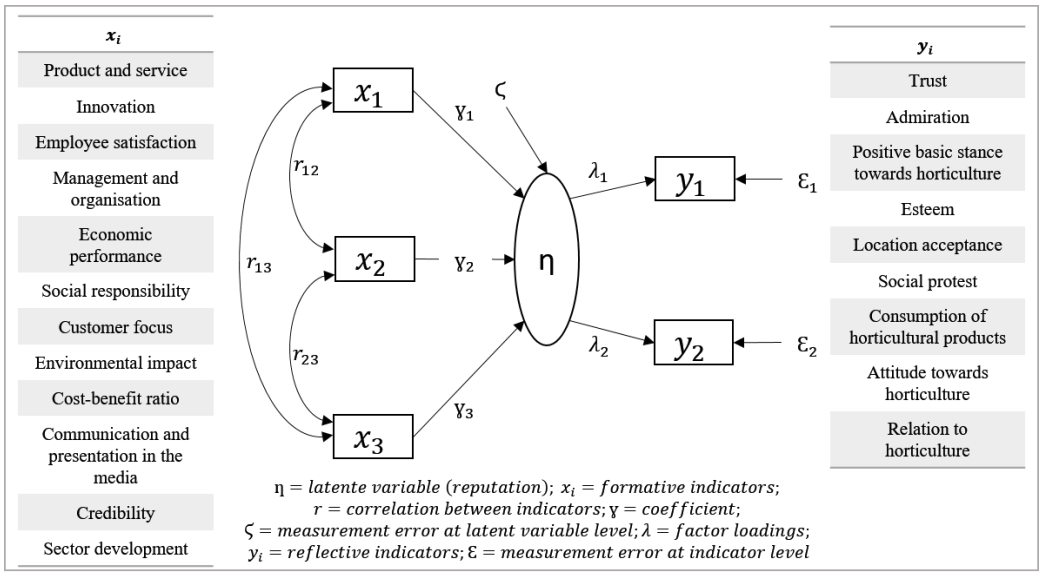

Figure 1: Proposed structural model for measuring the reputation of the horticultural sector (adapted from Diamantopoulos and Winklhofer, 2001)

In the second stage of the study described here, the model is validated, as the results of empirical studies have shown that many country- and sector-specific peculiarities have to be taken into account (Wiedmann et al., 2007). To validate and supplement the set of indicators, qualitative and quantitative methods were combined in a questionnaire in the form of a mixed method approach. The indicators summarized in the model were quantitatively tested on a 7-point Likert scale with regard to their suitability for horticulture. The structure of the questionnaire follows the study by Hautzinger (2009). The global measure required for the statistical quality check – the assessment of the reputation by the experts – was also determined on the basis of a 7-point Likert scale.

The interaction between the reputation of the segments and the reputation of the sector was also quantitatively analyzed in this part. By asking two questions with changing perspectives regarding the influence on the reputation, the importance of the different segments was also examined on a 7-point Likert scale. The explorative character of the study could be fulfilled by open questions. The use of qualitative methods in the form of open questions served to complete the set of indicators as well as to identify further areas that have a major influence on the reputation of horticulture.

The questionnaire was available online and was created using LimeSurvey (version 2.6.6). The evaluation of the closed questions was done by IBM SPSS Statistics 25 (IBM, Armonk, New York, NY, USA) and the evaluation of the open questions by MAXQDA Analytics Pro 2018 (VERBI GmbH, Berlin, Germany). In the third stage, the structural model is then used to survey the reputation among consumers.

4.3.1 Quality criteria of formative indicators

The reputation of a sector is defined as publicly recognized performance and willingness to perform. Based on this definition, the formative indicators represent the performance of a sector and thus justify the reputation of a sector (Helm, 2005). The formative indicators can be regarded as building blocks of the reputation construct and their change leads to a change in reputation.

The evaluation of the formative indicators in the construct is based on multiple regression (Diamantopoulos et al., 2008). The regression coefficient gives information about the validity of the indicators regarding the construct.

The set of indicators represents the construct (Steinmann, 2013). Strong multicollinearity – a linear interdependence of indicators – should be excluded, since each individual indicator should contribute independently to reputation. The variance inflation factor (VIF) can be used to describe the strength of the dependence of a single indicator on the other construct indicators. A VIF value of one illustrates the complete linear independence of the indicators (Gujarati, 2004), while a VIF value >10 is considered critical (Diamantopoulos et al., 2008). In order to avoid distortion in a small sample, the VIF value >3.3 is defined as the limit value, as has already been the case in other studies (Diamantopoulos and Siguaw, 2006; Hautzinger, 2009).

A *t*-test can be used to determine the significance of the indicators for the construct. However, a value of non-significance does not automatically result in the elimination of an indicator. Different views are expressed in the literature on dealing with non-significant indicators (Helm, 2005; cf. Diamantopoulos and Siguaw, 2006). For this work, the correlation with the global measure is used as the elimination criterion (Helm, 2007b). Correlation with the global measure ensures that there is a connection between the indicator and the latent variable (Diamantopoulos and Winklhofer, 2001).

4.3.2 Quality criteria of reflective indicators

The reflective indicators represent the sector's reputation. Reputation can thus be described as a function of reflective indicators and a change in reputation results in a change of the assigned reflective indicators.

The indicator reliability provides information on the suitability of the indicator for the description of the latent variable. The unidimensionality can be proven by explorative factor analysis and the reliability of the indicator for the construct is described by the height of the indicator loadings. An indicator loading of 0.7 is considered acceptable (Huber et al., 2007; Schöps, 2012). This limit can be used to ensure that the variance of an indicator caused by the construct is higher than the variance caused by the measurement error. Indicators that do not reach this loading are eliminated from the construct. The loadings are tested for significance by a one-sided t-test at 5% level (>1.645) (Huber et al., 2007).

The construct reliability (CR) can also be called factor reliability or internal consistency and is the degree of explanation for the relationship between the indicators and the construct. To ensure that the indicators reflect the construct as well as possible, a strong correlation between the indicators is desired. A value of >0.7 is targeted for a strong link or high homogeneity of the indicators (Huber et al., 2007; Hautzinger, 2009).

Another measure of the internal consistence is Cronbach´s alpha with a limit of 0.7 (Peterson, 1994). However, Nitzl (2010) points out that Cronbach´s alpha tends to underestimate internal consistence, which is why both CR and Cronbach's alpha are used as quality criteria in the following.

A further validity check can be carried out with the use of the average variance extracted (AVE). This describes the ratio of the measurement portion explained by the latent variable to the measurement error. For this purpose, at least half of the variance of the indicators of a construct should be explained by the latent variable (Hautzinger, 2009; Schöps, 2012).

In addition, discriminant validity can be used to examine the differences between the indicators of this construct and those of another construct. According to the Fornell-Larcker criterion, the AVE should be higher than any correlation of this latent variable with another latent variable (Fornell and Bookstein, 1982; Nitzl, 2010).

4.3.3 Reputation characteristics specific to horticulture

The evaluation of the free texts is based on a qualitative content analysis according to Mayring and is based on the methodology for inductive category formation. The statements of the experts on the formation of upper categories are used. If further differentiation appears to make sense, the upper categories are segmented into further subcategories (Mayring, 2014). At this point, the experts were asked to name other characteristics that had not been adequately addressed or completely disregarded so far, and which have a decisive influence on the reputation of horticulture in society. The aim of this approach is to identify horticultural-specific characteristics to supplement the construct and to further specify the indicators collected from the literature.

First, the category system was defined (selection criterion) and the level of abstraction fixed (depth), which is used as a guideline in the further course of category formation. In an iterative process, statements, sentences or individual words (keyword-like enumerations) were subsumed under already existing categories or new categories were created from the material, taking into account category definitions and abstraction level.

A formative reliability test was carried out by revising the categories according to 50% of the material. The summative reliability test was finally fulfilled by a final passage through the material.

4.3.4 Sample structure

The target group of the survey are experts who work as consultants in the horticultural sector. Consultants are closely linked to the sector and represent an interface between the internal and external viewpoints. The internal view of the sector includes extensive knowledge of the special features of the sector that they have collected through their professional experience. On the other hand, their employment or self-employment as consultants enables them to take an external perspective of the sector. Besides they are not economically directly dependent on the success of the horticultural business and can independently assess sector-specific characteristics. Additionally, the consultants can also evaluate characteristics of horticulture from a consumer perspective.

The contact data of associations, institutes, chambers of agriculture and consulting firms were determined by online research. The approach was differentiated according to federal states. The experts (132) were contacted via email with a link to the survey and a request to forward the study. With this procedure a distribution could be achieved by a snowball effect. After 14 days, a second email was sent as a reminder. The survey took place from the beginning of May to the middle of July 2018.

A total of 102 questionnaires, fully completed by experts, were collected in this way. 77% of the experts carry out their work in associations, research institutes, teaching and research institutes or public authorities. 41% of the respondents are active in cross-divisional consulting services regardless of the segments. Some respondents are only active in one segment of the sector (agriculture 8%; retail and floristry 3%). 15% of the respondents are active in vegetable growing, 11% in fruit growing, 10% in gardening and landscape construction and 9% in ornamental horticulture.

4.4 Results

The quality assessment of the formative and reflective indicators was carried out with the help of the global measure. The global measure, which raises the reputation of the sector from the perspective of the experts irrespective of the indicators, indicates a slightly positive trend (μ=4.4) (n = 102). However, the distribution also shows that only eight surveyed experts rated the reputation as very bad (1) or bad (2). On the other hand, according to the assessment of 6 experts, the sector's reputation is even very good (7).

As reputation is a collective image created through interaction with third parties, the experts were not given a definition of the indicators (Petty and Cacioppo, 1986). Thus, the following evaluation of the indicators only reflects the respondents' understanding of the indicators, which is shaped by the public.

4.4.1 Quality testing of formative indicators

All indicators which are directly related to corporate activities and in their sum reflect the sector activities, form the reputation of the sector and can thus be operationalized in a formatively effective direction. The formative link thus describes a cause-effect relationship between the observations (indicators) and the latent construct (reputation).

Overall, the formative indicators make only a negligible weak contribution to the regression equation (Table 1). The indicator 'Environmental impact' has the highest effect on reputation and is the only one which has a statistically significant influence on the construct. The negative regression coefficient clearly shows that, in this construct, an increase in environmental pollution leads to a deterioration in the reputation of horticulture.

Table 1: Quality testing: regression of formative indicators.

Indicators	Mean value	Estimated coefficient	t-value	VIF	Correlation with the global measure
Innovation	3.775	-0.098	-0.95	1.340	0.471
Customer focus	5.169	0.177	1.33	1.419	0.177
Employee satisfaction	3.674	-0.152	-1.51	1.400	0.165
Economic performance	3.596	-0.006	-0.04	2.184	0.336
Sector development	3.584	0.144	1.05	2.423	0.146
Social responsibility	4.685	0.057	0.54	1.592	0.392
Environmental impact	5.674	-0.235	-1.9**	1.645	0.157
Communication and presentation in the media	5.157	0.124	1.24	1.421	0.129
Critical values		> 0.1		VIF < 3.3	> 10 % probability of error

n = 102; VIF: Variance Inflation Factor

1 = 'not very influential' and 7 = 'very influential'

The indicators 'Innovation', 'Employee satisfaction' and 'Economic performance' also have a negative coefficient. An increase in the respective indicator results in a deterioration of reputation by the level of the coefficient. Since the contribution of the indicators 'Innovation' and 'Economic performance' to the regression equation is very small (<0.1), the interpretation of the negative coefficient can be neglected. However, the negative coefficient of the indicator 'Employee satisfaction' indicates a deterioration of the reputation with increasing employee satisfaction. This surprising connection can probably be attributed to the rather secondary importance of the indicator 'employee satisfaction' for the experts.

The external validity – the correlation of the indicators with the global measure – ensures that the indicators are of relevance to the construct. The indicators 'Product and service', 'Cost-benefit ratio',

'management and organization' and 'credibility' were excluded from the formative construct due to a missing correlation with the global measure (reputation of horticulture).

4.4.2 Quality testing of reflective indicators

The reflective indicators evoked the observations in reality from the non-measurable construct (Helm, 2007b). The reflective indicators present the consequences of reputation, which in turn is made up of the sum of the effects of the formative indicators (Diamantopoulos and Winklhofer, 2001). The cause-effect relationship here thus runs from the construct in the direction of its indicators.

The indicator reliability can be tested on the basis of the factor loadings. The construct reputation explains a large share of the indicator's variance: 'Positive basic stance towards horticulture', 'Esteem', 'Location acceptance', 'Attitude towards horticulture', and 'Relationship to horticulture' (Table 2).

Table 2: Quality testing: factor analysis of reflective indicators.

Indicators	**Mean Value**	**Factor loadings**	**t-value**	**AVE**	**CR**	**Cronbachs alpha**	**Fornell - Larcker**
Positive basic stance towards Horticulture	4.677	0.793	27.448	0.66	0.9	0.849	0.0974 < AVE (r^2=0.3122 ^{2}=0.0974)
Esteem	4.248	0.821	25.383				
Location acceptance	4.022	0.806	25.894				
Consumption of horticultural products	5.188	0.694	37.490				
Attitude towards horticulture	4.632	0.805	28.364				
Relation to horticulture	4.907	0.764	28.291				
Critical values		> 0.7	> 1.645 (one-tailed test)	>0.5	>0.7	>0.7	R^2<AVE

n = 102; AVE: Average variance extracted; CR: composite reliability.

1 = 'not very influential and ' 7 = 'very influential'

For the indicator 'Consumption of horticultural products', the share of declared variance by construct is just below the required limit of 0.7. Since the common variance between indicator and construct (with over 0.5) is still higher than the variance of the measurement error, this indicator should continue to be taken into account due to its high content relevance. All indicator loadings fulfil the quality criterion of one-sided significance. The indicators 'Trust', 'Admiration' and 'Social protest' were eliminated from the construct because the factor loadings were too low. The reliability of the still considered indicators in the construct can be described as good with an alpha value of 0.849. However, CR, which is used as a further instrument to ensure internal consistency, also exhibits a strong link (homogeneity) between the indicators and the latent variable. In contrast to the formative indicators, as already men-

tioned the reflective indicators must correlate strongly enough with each other. The convergence validity described by the AVE shows that a 66% share of variance is explained by the reflective measurement model. Thus, the declared share of variance due to reputation is higher than the measurement error. Using the Fornell-Larcker criterion it can be shown that the average variance of the construct reputation is higher than the squared correlation with another construct. In this way, the validity of the indicators for the construct 'reputation' can be assumed.

4.4.3 Identification of reputation characteristics specific to horticulture

The reputation indicators tested for their quality (see sections 4.4.1 and 4.4.2) do not take into account any specific characteristic of horticulture due to their originating from existing reputation measurement systems (see section 4.3). This is partly due to the universal orientation of the measurement systems, which are oriented towards sectors or companies that have little in common with the horticultural sector. Since sector-specific characteristics must be taken into account when measuring reputation (Wiedmann et al., 2007), an open question is asked about specific reputation characteristics of the horticultural sector. As a consequence of the results, the construct should be extended accordingly by newly acquired features or through further specification of the already included indicators.

The procedure described in section 4.3.3 resulted in a total of eight main categories (characteristics). Table 3 shows seven of these categories. The category 'Events & holidays/special occasions' has been omitted due to the unique naming. For each subcategory with n≥4 mentions, two statements are presented, which are rated as particularly significant for the respective characteristic or represent the diversity of the statements well. Subcategories with fewer mentions are characterized by one statement.

A total of 57 respondents provided information on this question. The answers to these free text questions were very detailed and well-founded. From the category 'Job description & profession' (n = 17) two subcategories could be formed. Here it proved to be useful to differentiate between negative (n = 5) and positive (n = 6) associations with the occupational profile. In this way, the many facets of the statements could be precisely contrasted. The heterogeneity of the perceptions is reflected in the almost equal number of positive and negative statements. The importance of the category for reputation formation is also highlighted by the largest number of responses. However, it must also be considered that the frequency of mentions does not provide a reliable indication of the relevance of the indicators. It is possible that a less frequently mentioned category is also important to respondents, but the respondents did not think of this issue when answering the free text question.

Four further categories could be identified with similar frequencies: ‘Products & services’ (n = 15), ‘Characteristics of consumers’ (n = 14), ‘Media presence & public relations work’ (n = 14), and ‘Management methods & production systems’ (n = 12). Except for the category ‘Media presence & public relations work’, it was possible to create further subcategories for each of the categories mentioned.

At least two (‘Products & services’ > ‘Quality characteristics of services’ (n = 2)) and a maximum of 10 text passages (‘Characteristics of consumers’ > ‘Knowledge & perception’ (n = 10)) could be assigned to these subcategories. With a total of four subcategories (‘Product attributes’ (n = 7), ‘Prices’ (n = 4), ‘Product-related quality characteristics’ (n = 3), ‘Quality characteristics of Services’ (n = 2), the ‘Products & services’ subcategory has the largest number of subcategories. In this way, the extensive subdivision underlines the relevance of the category in terms of content for the reputation of the sector. The text passages of the characteristic ‘Media presence & public relations work’, on the other hand, proved to be so heterogeneous and so diverse that the formation of further subcategories did not appear to be effective. The relevance of the category to reputation is nevertheless underlined. When using this indicator to measure reputation, the questions for the survey should be formulated with particular care. Here it is important to prevent different images and to create a uniform understanding of the indicator. The attributes ‘Social responsibility/dealing with nature/environment’ (n = 9) and ‘Social impacts’ (n = 4) represent effects that go beyond horticultural production. Compared to other sectors (except agriculture), they play a special role in horticulture through the use of natural resources, above particular in the form of outdoor production and the design of public facilities (e.g. urban greening).

The characteristics surveyed correspond in part to the indicators already examined in sections 5.4.1 and 5.4.2. Most surveys referred to the characteristic – ‘Job description & profession’ (n = 17) – which has not yet been taken into account in this form in the measurement model. The category cannot be clearly differentiated with regard to its direction of action. In addition to text passages that refer to the description of the various horticultural occupations, activities or work processes, it also contains ideas on the part of the stakeholders regarding the company culture, and the behavior/traditions of the sector (e.g. family businesses). It is not always clear whether respondents represent their personal opinions or whether they represent prejudices within society, the job description or the profession. For example, text passages that refer to the attractiveness of working conditions and the level of wage payments must, by definition, be operationalized formatively in the construct. In contrast, text passages that represent prejudices from the consumer’s point of view should be assigned to the construct in a reflective direction. In this case an assignment to the category ‘Characteristics of consumers’ > ‘Knowledge & perception’ would be conceivable. The characteristic ‘Products & services’ also has an important impact on the reputation of the experts (n = 15). The product characteristics (n = 7) and the prices (n = 4) are of particular relevance here. The indicator was eliminated in section 5.4.1 due to a

lack of correlation with the global measure. The renewed inclusion of the indicator here by the experts on the open question points to a possible misinterpretation by them in the evaluation in the form of a closed question (cf. section 4.6). In particular, the resumption of the indicator should be based on the subcategories, whereby the product characteristics in particular have proven to be particularly relevant (n = 7). The interfaces to other categories, such as the linking of pesticide-polluted products with the category 'Management methods & production systems' > 'Plant protection & fertilization', must not be neglected when measuring reputation. The subcategories of the characteristic 'Characteristics of consumers' are largely covered by the indicators of the reflective direction of action in Section 4.2. However, the experts emphasize the importance of the characteristic 'Knowledge & perception' (n = 10). The cause-and-effect relationship between consumer 'knowledge' and 'relationship' (see Table 3) and the reputation construct cannot be conclusively clarified here. However, an inclusion in the measurement model should take place in any case (Hümmer, 2015). The additions to the reputation construct for horticulture shown in Table 3 should be taken into account for further work. This should be done regardless of whether they are operationalized as an additional indicator or as a specification of an existing indicator in the construct.

Table 3: Summary of reputation characteristics specific to horticulture (n = 57).

Top categories (n)	**Subcategories (n)**	**Coded text passages/ codings**
1st: Job description & profession (17)	Negative (5)	1st: "Necessity (grows everywhere by itself), greed for profit (inject everything dead so that they earn as much money as possible)." 2nd: "Poor working conditions, unhealthy, pesticidally contaminated work […]".
	Positive (6)	1st: "Professional expertise, conviction, lifeblood […]." 2nd: "[…] complexity of the profession, study is required, indicates high wages for the workforce."
2nd: Products & services (15)	Product attributes (7)	1st: "[…] Products that are generally perceived as pretty and appealing." 2nd: "[…] unhealthy […] products contaminated with pesticides, both, in gardens and gardening and landscape construction."
	Prices (4)	1st: "Reasonable prices […]." 2nd: "[…] overpriced prices in season […]."
	Product-related quality characteristics (3)	1st: "Freshness […]."
	Quality characteristics of services (2)	1st: "Customer service/ Quality of cemetery gardeners and florists […]."
3rd: Characteristics of consumers (14)	Knowledge & perception (10)	1st: "Knowledge and familiarity with horticultural and agricultural production outside the sector tends towards zero. This lack of knowledge increasingly creates fears and incomprehension, especially with regard to food production. For this reason, the reputation of horticulture is primarily shaped by social opinion leaders outside the sector."

		2nd: "[…] Innovations are hardly noticed in society. Barriers that prevent gardeners from innovating are also not perceived (prices, esteem). "
	Interest & relationship (5)	1st: "Garden experience at home […]." 2nd: "Contact to individual growers. Relationship to horticulture or your own garden."
	Consciousness & responsibility (2)	1st: "Broad range of consumption in everyday life; effect, use of horticultural products in life (e.g. health effect, fitness, by buying ecological products; the purchase of ecological products makes it possible to assume responsibility in society)."
4th: Media presence & public relations work (14)		1st: "Call for help to society in crisis situations (e.g. Russia embargo; lack of harvest workers; weather-related failures): intensively marked." 2nd: "Professional competence of the representatives, social commitment (local market garden actively communicates with the public, can be visited, invites school classes and kindergarten groups to visit and leads to the plant ...)."
5th: Management methods & production systems (12)	Plant protection & fertilization (7)	1st: "How it is farmed; As organically farmed fruit and vegetable cultivation shapes the landscape for the customer and negatively affected spray agents are not associated with it." 2nd: "Use of fertilizers and pesticides."
	Principles of action & production factors (5)	1st: "[…] sustainability, conservation of resources." 2nd: "[…] foils; monocultures […]."
	Production methods (3)	1st: "Organic or conventional."
6th: Social responsibility / Dealing with nature/ environment (9)		1st: "Nutrition of the population is a high commodity!" 2nd: "Ecological awareness / responsibility."
7th: Social impacts (4)		1st: "Effects of horticulture on the lives of citizens." 2nd: "Membership/ honorary office in organizations/ associations."

4.4.4 Reputation map-interaction of the reputation of the segments and the sector

Horticulture as a sector is characterized by a high degree of heterogeneity. Due to this heterogeneous composition of the sector, the reputation of horticulture from the consumer's point of view can only be determined on the basis of individual segments or product groups. To get a first understanding of the impact of horticultural segments in the public, the experts were asked to characterize the interaction. This way the reputation map can help to better understand and illustrate the interactions between horticulture as a whole and the various segments from the expert's points of view (Figure 2).

The horticultural segments can be shown to have an influence on the reputation of horticulture (X-axis of the reputation map). But the reputation of the segments themselves is also influenced by the reputation of the sector (Y-axis). If an influence can be seen in equal parts, there is an equilibrium (a). Ornamental horticulture is the only segment that is influenced more by the reputation of the sector (0.57) rather than its own reputation impacting upon the sector (0.11). The influence of ornamental horticulture on the reputation of horticulture is therefore negligible. All other segments have a stronger influence on the sector's reputation than their own individual reputations. The influence of

horticultural production (fruit growing, vegetable growing, ornamental horticulture and tree nurseries) on the reputation of horticulture is smaller than the influence of service horticulture (retail and floristry, gardening and landscape construction, garden art, cemeteries, parks cemeteries, parks and garden exhibitions (2) have a much more positive influence on the sector's reputation than the retail and floristry segments (1.18).

In horticultural production, the influence of fruit growing on the sector's reputation (0.99) is most strongly perceived. Vegetable growing, which is the second segment in the food industry of horticulture, has a smaller influence on the reputation of horticulture than fruit growing (0.69). A comparison between the segments, on the basis of the linear balancing lines (b), shows that service horticulture benefits.

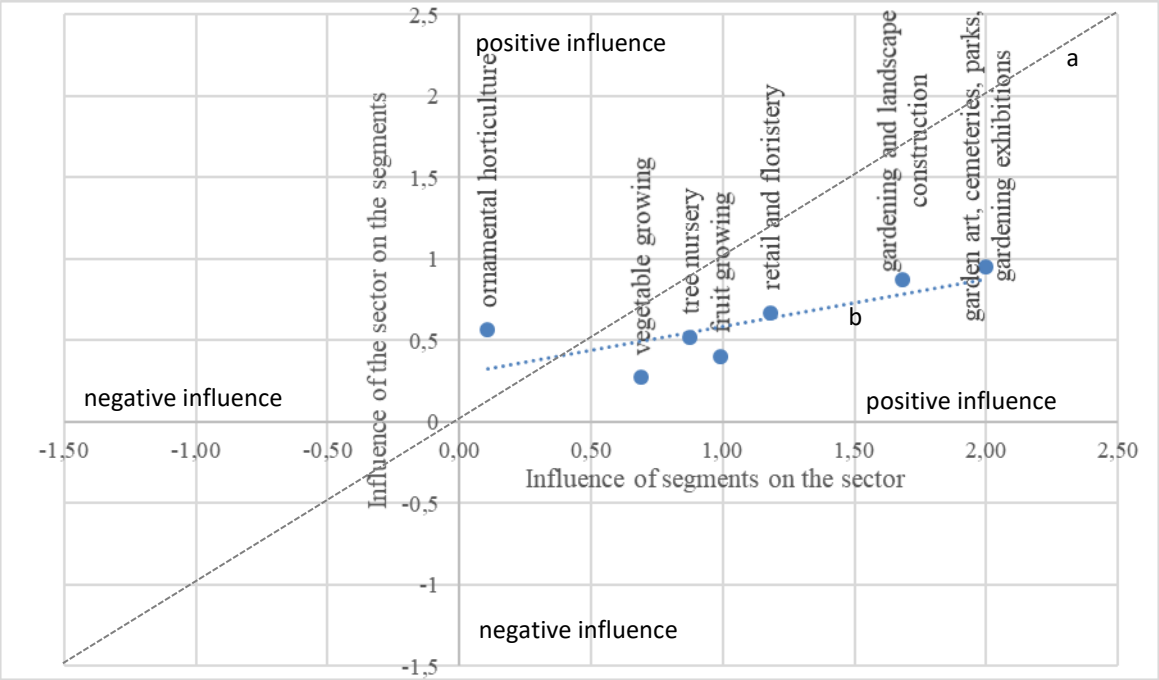

Figure 2: Reputation map (n = 102).

4.5 Discussion

The experts interviewed here are consultants in horticulture, so they have an internal and external view of the industry. However, the answers are mainly influenced by the experience they have gained in their daily work with gardeners. This means that the reputation, which was considered slightly positive by the experts, cannot be interpreted as a reputation among consumers.

A large number of indicators described in the literature for reputation measurement have been tested by experts for horticulture. There is disagreement in the literature about whether not significant indicators should be removed from the model (Diamantopoulos and Siguaw, 2006). Within a formative construct, the elimination of an indicator could lead to a falsification of the theoretically derived construct (Seltin and Keeves, 1994 cited after; Steinmann, 2013). Since the examined indicators show only

a very low multicollinearity (VIF), low coefficients (<0.1) as well as the missing significance can be neglected. Due to the almost independent indicators, the effects (coefficients) can be interpreted as a direct result of the respective indicator on the reputation and an elimination does not appear to be necessary.

The limit value of the regression coefficient is also not reached in other empirical studies (Helm, 2007a; Hautzinger, 2009). Especially at Helm (2007a), economic indicators (corporate success, financial performance) have only a weak weight. Steinmann (2013) also points out that the often low regression coefficients for formative indicators may not be misinterpreted.

The indicator 'Product & service' was eliminated due to the missing correlation with the global measure. In contrast, Raithel and Schwaiger (2015) describe a combination of good reputation, product and service quality and positive customer behavior. For horticulture, the indicator is of particular importance, as contact between consumers and the sector takes place solely via the product and the service (Ludwig-Ohm and Dirksmeyer, 2013). The peculiarity – in comparison to other sectors – is reflected in the lack of perception of producers of food products in the food retail trade. With a share of 92.4% of fresh fruit and 91.4% of fresh vegetables, supermarket chains are the dominant sales channel for fruit and vegetables in Germany (Agrarmarkt Informations Gesellschaft mbH, 2019b, 2019a). There the products are not differentiated by brands or companies, but above all by their quality and country of origin. Furthermore, the overall quality of horticultural products cannot be tested at the point of sale by the consumer at the product. In this case, the reputation represents an expectation of the quality of the products (Shapiro, 1982). Thus, the quality of the products and the reputation of the sector influence each other. In contrast, consumer groups who buy horticultural products through direct sales are much more aware of the producer. This means that the distribution channel also has a major influence on the perception of the product and the sector as a whole.

It should also be noted that a lack of knowledge on the part of the consumer regarding the affiliation of products to horticulture can be a substantive reason for eliminating the indicator from the construct. This applies to products that can be grown on both agricultural and horticultural farms, as is the case with field vegetables If products are not linked to the sector, the reputation cannot be influenced by the product or the service. In order to be able to take into account the relevance of the indicator in terms of content in the construct, the written additions and explanations of the indicators by the experts are used (cf. section 4.4.3).

The literature also describes indicators influenced by reputation. These were also tested for their suitability to be used for measuring reputation in horticulture. There are hints in the literature that a lack of consumer confidence and transparency within the sector is a problem for cooperation in horticul-

ture (Ludwig-Ohm and Dirksmeyer, 2013) However, the indicator 'Trust' was removed from the construct during quality testing because the factor loading was too low. It is possible that experts are currently perceiving higher level of confidence in security of supply than was the case in the past (2012) (Kantar Emind, 2017). In contrast, Giampietri et al. (2018) show for short food supply chain that 'trust might drive solid relationships between producers and consumers and overcome consumer confusion, building new loyalty […]'. But trust is formed on the basis of the farmer's reliability and by his/her reputation (Offer, 1997). This underlines the fact that trust and reputation are closely interrelated.

The indicator 'Admiration' was also no longer included in the construct. Fombrun et al., 2015 refer to qualitative studies which show that admiration by stakeholders is generated by good deeds on the part of companies. To this end, Wiedmann (2012) hypothesizes that production output, innovative strength and performance can lead to admiration and appreciation. In this way, the indicator 'Admiration' continues to be captured by formative indicators (e.g. innovation or product and service) in the construct. In addition, the time within the year at which the reputation measurement is executed is also important. The perception or, in particular, admiration of products or services is closely linked to seasonal availability (e.g. regionally grown vegetables or fruit). Asparagus, for example, is very present for many German consumers in spring. Horticultural services can also be used only seasonally (e.g. flowering parks, services in private gardens). Holidays and special occasions (e.g. birthdays, mothers' day) increase the consumer's perception of horticulture (e.g. buying bouquets of flowers) (Schimmenti et al., 2013). On holidays and special occasions, cut flowers are mainly sold through direct sales (Batt and Pool, 2004).

Perhaps trust and admiration are a matter of course for the experts due to their daily work with gardeners. In the literature, it is clear, that these indicators have a close relationship to reputation (Berens and van Riel, 2004).

The indicator 'Social protest', which also had to be eliminated from the construct, was classified as a reflective indicator according to Albersmeier and Spiller (2010). Accordingly, reputation must be understood as the cause of social protests. In turn, the performance (formative indicators) of a company or a sector are regarded as the cause of reputation. Wiedmann and Buxel (2005) describe the reputation as a reservoir of goodwill that offers potential support in times of crisis and can protect against social protests. Social movements such as protests and boycotts can pose a threat to a company and lead to a deterioration of its reputation, despite simultaneous efforts to create a positive image (Basdeo et al., 2006; McDonnell and King, 2013).

In addition to the indicators determined for reputation measurement in horticulture, the importance of the segments for the reputation of horticulture was determined. In the field of horticultural production, fruit growing has the greatest influence on the reputation of the entire horticultural sector. The

service horticulture segments have an even stronger influence on reputation of the entire horticulture sector.

As shown, the contribution of individual segments to the reputation of the sector is very heterogeneous. There are various reasons for this. On the one hand, the achievements of service horticulture are directly visible to society; on the other hand, the products of horticultural production are sold through intermediaries – such as the food retail trade for fruit and vegetables – which means that there is no direct contact with the producer. The concentration in food retailing has led to the development of wholesale food retail chains with enormous purchasing power. They procure fruit and vegetables directly from large farms or buy the products from cooperatives, which have an estimated market share of 40% (Bijman et al., 2012). As a result of this development, the consumer has no contact with producers along the value chain, which is why the influence of fruit and vegetable cultivation on the reputation of the sector is only slight. In addition, negative media reports, such as those that occur in food scandals, can have a negative impact on the trust and reputation of the horticultural food industries (Bitsch et al., 2014). In contrast, service horticulture as a whole has positive attributes and is less affected by negative reporting. Priego et al. (2008) show that there is a positive attitude towards public greening in Germany. This study also shows that public green spaces are used significantly more frequently for leisure activities in Germany than in Spain and Chile (Priego et al., 2008). These positive links between horticulture and society's leisure activities can have a positive influence on the reputation of the entire sector.

4.6 Summary and outlook

Reputation is a latent construct quantified by formative and reflective indicators. The indicators 'Innovation', 'Customer focus', 'Economic performance', 'Sector development', 'Social responsibility', 'Environmental impact' and 'Communication and presentation in the media' could be identified as the causative factors for the reputation of horticulture (formative side). A correlation with the global measure could be demonstrated for these indicators, which legitimizes their inclusion in the measurement model. They are complemented by the indicators 'Positive attitude to horticulture', 'esteem', 'Location acceptance', 'Consumption of horticultural products', 'Attitude towards horticulture' and 'Relationship to horticulture', the reflective side of the construct. The reflective characteristics show the consequences of the reputation in reality, which are directly reflected in the behavior of consumers towards the sector (Figure 3). These indicators, which originate from other sectors and companies, are supplemented by horticultural-specific reputation characteristics. Developed on the basis of an open question to the experts, eight characteristics emerged within the framework of inductive category formation, of which a total of seven are taken into account. 'Job description & profession', 'Products & services', 'Characteristics of consumers', 'Media presence & public relations work', 'Management

methods & production systems', 'Social responsibility/dealing with nature/environment' and 'Social impacts' must be included to complete the construct. The formed categories could to a large extent be subdivided into further subcategories. These provide indications of the main focuses that should be set for a reputation measurement and that should help to interpret the characteristics logically. The subcategory 'Characteristics of consumers' > 'Knowledge & perception' represents the most frequently mentioned of all subcategories (n = 10) and should be adequately mapped according to its possible characteristics. The Reputation Map shows the interactions between the reputation of the segments and the reputation of their sector. The service and retail segment proved to be particularly relevant to the reputation of horticulture. On the other hand, the horticultural production segments had only a minor influence on the sector's reputation.

With the results of the present study, a statistically validated model for reputation measurement could be developed and adapted to horticulture. In contrast to what could be expected from the literature research, the experts estimate the reputation of horticulture in society as slightly positive.

The extent to which the horticultural-specific reputation characteristics should be combined with the indicators from the quality test must be examined in detail before a final reputation measurement among consumers is carried out. Some of the indicators can be adapted, others can be specified more precisely and others newly created. In a step preceding the reputation measurement, the determination of the direction of effect, of the characteristics generated specifically for the sector, represents an important task. A misinterpretation of these leads to incorrect and inaccurate assumptions in the model, which in turn can lead to a distortion of the results. Other empirical studies have also pointed to the importance of processes of adaptation and specification of the indicators (Helm, 2007b; Hautzinger, 2009). Both studies use multi-stage pre-tests to ensure that the indicators are assigned to the construct in terms of content. During this adjustment process, care should be taken to ensure that, by and large, the indicators completely reflect the content of the reputation construct (Diamantopoulos and Siguaw, 2006). Once this procedure is complete, the resulting construct can be used to measure the reputation of the horticultural sector. For latent constructs, a measurement using multi-item scales is recommended in the literature (Schwaiger, 2004; Diamantopoulos and Siguaw, 2006). The indicators are operationalized by several items or statements and serve as a basis for the development of a consumer survey. A survey of consumers requires their knowledge of the horticultural sector and its products. In this way, 'knowledge' and the availability of information influence the assessment of the respondent of the company or sector to be evaluated (Newburry, 2010). A survey of consumers should therefore be based on the results of the reputation map. Finally, the results of a consumer study can serve as a basis for deriving recommendations for action for the sector. The indicators identified here

represent the key parameters of reputation. The impact of these indicators on the reputation of horticulture can only be determined after the consumer survey. Knowledge of the influence of the individual indicators enables producers to influence the reputation of the sector.

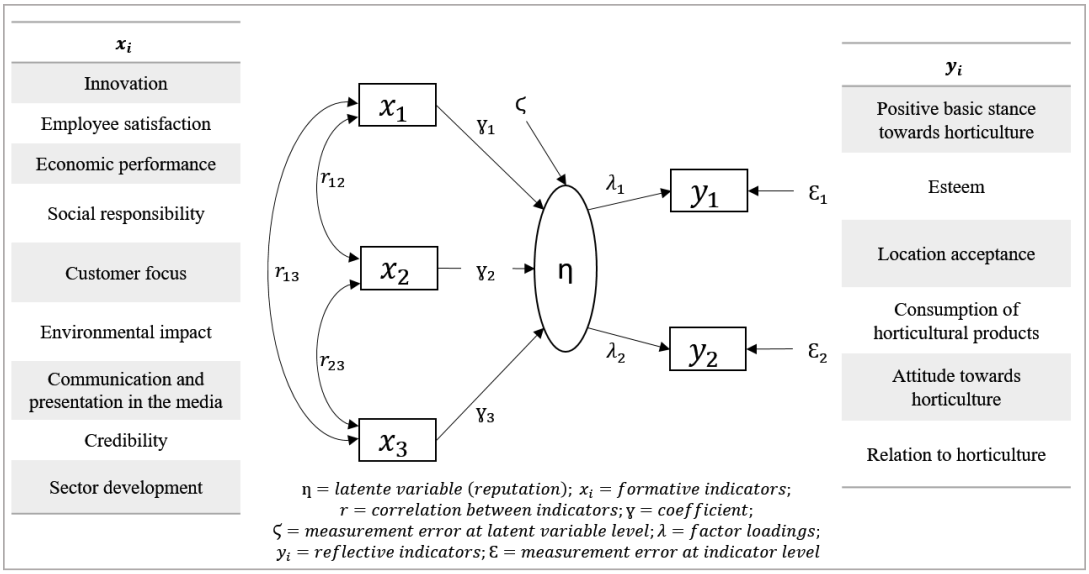

Figure 3: Validated structural model based on quantitative answer on the expert survey (adapted from Diamantopoulos and Winklhofer (2001)).

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5 Reputation of German Gardening and Landscaping: Results of a Consumer Study

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5.1 Introduction

Gardening and landscaping is a segment of horticulture and, together with cemetery horticulture, constitutes service horticulture.

The main tasks of gardening and landscaping are the building of gardens and green areas as well as the maintenance of these areas. These services are in demand by consumers, companies and public institutions (e.g. municipalities). Gardening and landscaping is thus also a sales channel for production horticulture, e.g. tree nursery products. However, the performance profiles and framework conditions of gardening and landscaping also correspond to those of the construction industry, so that there are some overlaps between the construction industry and horticulture (Ziegler, 2002) **.**

In Germany, the gardening and landscaping segment has a high economic importance with a share of 45% of the production value of the horticulture industry as a whole (Bundesministerium für Ernährung und Landwirtschaft, 2019) and also includes the largest share of employees in the horticulture industry (Dirksmeyer and Fluck, 2013).

It is noteworthy that gardening and landscaping shapes the reputation of horticulture as a whole (Isaak et al., 2021) because consumers regularly come into contact with service and products, such as public green areas, parks and garden exhibitions, and associate these activities with the horticultural industry as a whole. Great importance is attached to public green areas, particularly in urban areas (Priego et al., 2008). However, for horticulture as a whole, limited public interest is one of the biggest challenges (Meyer et al., 2016). For the gardening and landscaping segment itself, reputation in the eyes of the public represents an important strategic (Flanagan and O'Shaughnessy, 2005). For example, reputation

can lead to an increased purchase intention and an improved willingness to pay (Keh and Xie, 2009). For this reason, knowledge on the perception and reputation of the segment is particularly important.

This paper aims to describe the reputation of gardening and landscaping as it relates to the German public. For this, the influence of different indicators that affect the reputation of the segment was determined. These indicators can be significantly influenced by the individual knowledge and involvement in gardening and landscaping. Finally, recommendations for action for shaping the reputation of the German gardening and landscaping industry are derived based on the empirical results.

5.1.1 Research model

In this study the measurement of reputation is based on a research design that includes three working steps, where the measurement of reputation presented here represents the third working step. The first step involved an extensive literature review (Brenneke et al., 2022) with the aim of developing the characteristics of reputation and distinguishing the term reputation from synonymously used terms. Based on this first step, reputation was defined in this study as follows: Reputation is the recognised organisational performance and the willingness of the company to perform as recognised by stakeholders ('organizational performance') (Fombrun and Shanley, 1990; Roberts and Dowling, 2002; Boyd et al., 2010). In this context, performance extends to all activities of the company and includes both economic and social factors (Helm, 2007; Esenyel, 2020).

Since reputation is a latent variable and therefore not directly measurable, observable characteristics in the form of indicators are necessary for quantification. These indicators form a structural model that represents reputation. The structural model chosen here is the 'multiple indicators and multiple causes' model (MIMIC model), which is composed of indicators that have already been described in the literature for reputation measurement (see Figure 1).

These findings provided the basis for the second working step (Isaak et al., 2021) in which the structural model was evaluated by experts (n = 102). The aim of this step was to check the suitability of the chosen indicators for horticulture and to add further possible horticulture-specific characteristics. Finally, the inclusion of these additional horticulture-specific characteristics and the proposed changes to the structural model were discussed among a group of experts.

Also in the second step, a reputation map was developed that identified gardening and landscaping as a segment with a very high influence on the reputation of the entire horticultural industry (n = 102). The influence of the segments within service horticulture were identified as being stronger than the influence of the segments within production horticulture, of which the influence of fruit growing on horticulture as a whole was the strongest.

The results presented in the following are derived from a survey of consumers in the gardening and landscaping segment that was carried out in the third research step (cf. chapter 5.2.1). In addition, a survey of consumers in the fruit-growing segment was also conducted in this third step, and the results are described in a separate publication. The basis for both surveys is the structural model developed in the previous steps (cf. chapter 5.1.3 and Figure 1).

5.1.2 Theoretical background

The structural model (Figure 1) consists of three groups of indicators, for which a differentiated procedure was necessary to analyse the influence on reputation. The formative indicators affect reputation, meaning a change in formative indicators leads to a change in reputation (Fornell and Bookstein, 1982; Helm, 2005). The reflective indicators represent the impact of reputation and accordingly, a change in reputation leads to a change in the reflective indicators (Friedler, 2011).

The third group to be considered are the moderating variables. A moderator affects the direct causal relationship in complex cause-effect relationships, as is the case in the structural model (Chin et al., 2003). A moderation effect describes the influence of a variable (Z) on the relationship between a formative indicator (X) and reputation (Baron and Kenny, 1986; Henseler and Fassott, 2010) and can strengthen or weaken the relationship of a formative indicator with reputation (Baron and Kenny, 1986). For this reason, the moderator is not a direct component of the influencing relationships in a structural model.

A global measure is also used to analyse the structural model. The global measure summarises the essence of the construct that is to be mapped by the formative indicators (Diamantopoulos and Winklhofer, 2001). In our case, it represents the overall reputation of the gardening and landscaping industry.

5.1.3 Development of a structural model for measuring reputation in gardening and landscaping

The first step in the research process resulted in a theoretical model with twelve formative and nine reflective indicators (Brenneke et al., 2022). An evaluation by experts confirmed nine formative indicators (innovation, employee satisfaction, economic performance, social responsibility, customer focus, environmental impact, communication and presentation in media, credibility, industry development). The additionally horticulture-specific characteristics identified were combined with the existing indicators after a discussion among the experts, and as a result one additional indicator (production method) was included in the model (Isaak et al., 2021). Thus, the adapted structural model is composed of ten formative indicators (Figure 1). Six of the reflective indicators remained in the model after the evaluation (positive basic stance towards horticulture, esteem, location acceptance, consumption of

horticultural products, attitude towards horticulture, relation to horticulture). As a result of the discussion between the experts, the reflective indicators of 'positive basic stance towards horticulture' and 'attitude towards horticulture' were combined as 'attitude towards horticulture'. The indicators of 'relations to horticulture' and 'consumption of horticultural products' were characterised as moderator variables and thus combined into one moderator variable defined as 'involvement'. In addition, the moderator variable 'knowledge' was added to the model.

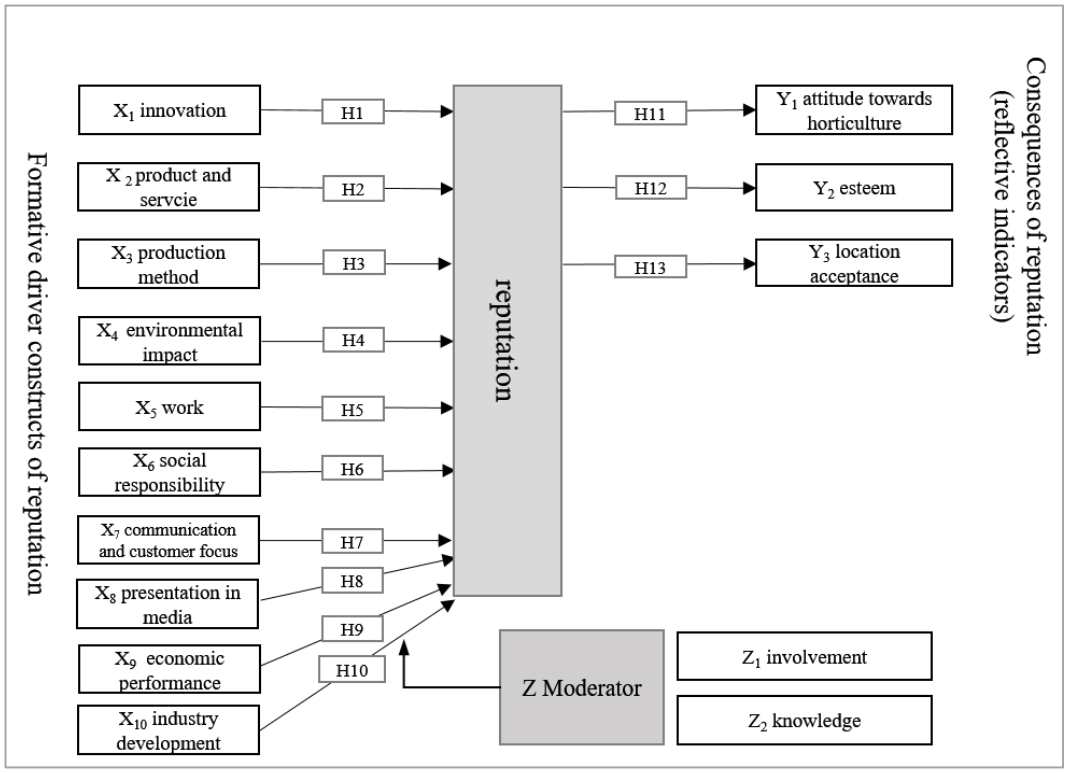

Figure 1: Structural model for measuring reputation in gardening and landscaping

The relationships between the indicators and reputation are based on hypotheses derived from the qualitative results of the expert survey in the second working step. The hypotheses of the formative indicators describe a positive contribution by each indicator to reputation:

- The more innovatively gardens and green spaces are designed, the better the reputation (H1).
- The more attractive and aesthetic the green spaces and gardens, the better the reputation (H2).
- The more technically skilled and professionally maintained and created the gardens and green spaces, the better the reputation (H3).
- The more carefully the environment has been managed and the greater the contribution to a varied landscape, the better the reputation (H4).
- The better the working conditions for the employees, the better the reputation of the segment (H5).

- The greater the commitment to green recreational spaces and sustainable, healthy living spaces in the city, the better the reputation (H6).
- The more communicative, customer-oriented and active the gardening and landscaping industry is in society, the better its reputation (H7).
- The greater the media presence, the better the reputation (H8).
- The more economically successful the entrepreneurs within the segment as well as the segment as a whole are, the better the reputation (H9).
- The stronger the turnover and size of the businesses grow, the better the reputation (H10).

Furthermore, an indirect influence of the moderators of 'involvement' and 'knowledge' is assumed, as the moderators are not directly causally related to reputation. The hypotheses of the reflective indicators assume that a positive reputation also has a positive effect on these individual indicators.

- The better the reputation, the more positive the attitude towards gardening and landscaping (H11).
- The better the reputation, the higher the appreciation of entrepreneurs and the entire segment (H12).
- The better the reputation, the higher the acceptance of the location for entrepreneurs and the entire segment in the neighbourhood (H13).

5.2 Research method

5.2.1 Data collection and survey

The data for this study was collected through an online consumer survey on gardening and landscaping in November 2019. The online questionnaire was accessible to respondents recruited by a panel provider. For the analysis of the structural model, questions and items were formulated for the following thematic blocks:

(1) Demography

(2) Knowledge and involvement

(3) Reputation evaluation of different industries

(4) Formative and reflective indicators

(5) Knowledge of gardening and landscaping

(6) Formative and reflective indicators (repeat questioning)

(7) Reputation evaluation

For surveying reputation (3), respondents were first asked to rate the reputation of various industries on a 7-point scale (global measure). This evaluation has always a subjective character and was asked independently of the reputation-forming characteristics. The evaluation of the formative and reflective indicators were determined using items (4) that were rated on a 7-point scale. In order to depict the formative indicators as correctly as possible, two items were formulated for each indicator.

In terms of questions relating to the respondents' prior knowledge, illustrated information on gardening and landscaping was shown. The knowledge of this information (through the pictures) was determined by asking dichotomous questions (yes/no) (5). In order to test whether the presented pictures on gardening and landscaping changed the evaluation of the indicators as well as the reputation evaluation, an additional, renewed query on the indicators (6) and reputation evaluation (7) was subsequently conducted.

The questionnaire was pretested in advance in the form of six personal interviews.

5.2.2 Multiple regression

An evaluation of the formative indicators in the construct was conducted using multiple regression (Diamantopoulos et al., 2008). The regression coefficient enables a statement about the validity of the indicators with regard to the construct. The procedure is based on the procedure in the second study section (cf. Isaak et al., 2021).

Strong multicollinearity – a linear dependence between the indicators – must be ruled out, as each individual indicator should make an independent contribution to reputation. The variance inflation factor (VIF) was used to describe the strength of the dependence of an individual indicator on the other formative indicators. A VIF value of one illustrates a perfect linear independence of the indicators (Gujarati, 2004). A VIF value > 10 is considered critical (Diamantopoulos et al., 2008). To ensure content validity, a correlation with the global measure was tested. This global measure can be used to check whether the indicators are equivalent in terms of content (Diamantopoulos and Winklhofer, 2001) and this quality criterion is fulfilled if there is a significant positive correlation. The influence of a formative indicator can be interpreted based on the level of the regression coefficients. For this purpose, the test for significance of the indicators was one-sided in the sense of a directional hypothesis.

For an additional content validation of the structural model and the aim of increasing the explanatory contribution, a backwards elimination was carried out. In a backwards elimination, the combination of indicators is evaluated in individual steps and one indicator is removed at a time. This leads to the greatest improvement in the explanatory contribution. This procedure was continued until no improvement of the model could be determined. Finally, the combination of indicators that did not lead

to a significant improvement in the determination coefficient was assumed to be an improved model. Backwards elimination was used to test a pool of indicators consisting of formative and reflective indicators, demographic characteristics and the moderator variables. A substantive justification for the content validation of all the indicators and characteristics in the formative direction of impact can be found in chapter 5.3.5.

5.2.3 Exploratory factor analysis

For the analysis of the reflective indicators, an exploratory factor analysis was carried out. This procedure is analogous to the second working step (Isaak et al., 2021).

Exploratory factor analysis tests for indicator reliability. The indicators can be used to describe the latent variable if the factor analysis proves unidimensionality. An indicator loading of 0.7 shows that the indicator is reliable for describing reputation (Sarkar et al., 2001; Chin, 2010). With a factor loading of 0.7, it can be assumed that the variance of the indicator caused by the construct is greater than the variance caused by the measurement error. In addition, the indicator loadings were tested for one-sided significance using a t-test.

The construct reliability (CR) was used as a further quality criterion. This indicates the degree of explanation for the relationship of the indicators with reputation. A strong link between the indicators and thus a high degree of explanation was present with a construct reliability > 0.7 (Bagozzi et al., 1991; Götz et al., 2010). Cronbach's alpha was used as an additional measure of internal consistency, where a value > 0.7 is also desired (Peterson, 1994). Validity was tested based on the average variance extracted (AVE). Sufficient validity exists if half of the variance of the indicators is explained by the latent variable (reputation) (Henseler et al., 2009). The Fornell-Lacker criterion was used to further test validity. This criterion is considered fulfilled if the average variance recorded is greater than any correlation of this latent variable (reputation) with another latent variable (Fornell and Larcker, 1981; Götz et al., 2010).

5.2.4 Moderating effect

The moderating variables in this study were collected through categorically scaled variables, so that calculating the influence of the moderators was done using a multiple group analysis (Memery et al., 2015). In addition to the possibility of using categorically scaled variables, the advantage of a multiple group analysis is that all the individual formative indicators are considered. The influence of moderation can thus be interpreted for each formative indicator.

In order to conduct a multiple group analysis, the sample is grouped according to the expression of the categorical variables. In this study, moderation is described by the variables of 'knowledge' and 'involvement'. For the 'knowledge' variable, the sample was divided into respondents with a higher level

of expertise (respondents agreed with 4 or more of a total of 6 statements) and lesser expertise (respondents agreed with 3 or fewer statements) on gardening and landscaping. The 'involvement' variable was divided into respondents with a high level of involvement (respondents agreed with 2 or more of a total of 3 statements) and a low level of involvement (respondents agreed with 1 or no statements). Subsequently, the procedure described in chapter 5.2.2 for carrying out a multiple regression was repeated for the respective subgroups. The influence of the moderators of 'knowledge' or 'involvement' on each formative indicator was calculated from the difference in the regression coefficients for the respective subsample (Henseler and Fassott, 2010).

$$d = b^1 - b^2 \text{ (b: regression coefficients, } ^1 \text{ subsample)} \quad (1)$$

A t-test was used to examine the significance of the moderating effect d. Due to the different sizes of the subsamples (n^1 and n^2), a prior testing for the homogeneity of variances was necessary. This requirement for measurement model invariance ensures that the assessments between constructs in two samples draw on the same construct content (Henseler and Fassott, 2010). The subsequent calculation of significance using the t-test follows the procedure of Henseler (Henseler, 2007).

$$t = \frac{b^{(1)} - b^{(2)}}{\sqrt{\frac{(n^{(1)}-1)^2}{n^{(1)}+n^{(2)}-2} s.e.^{(1)^2} + \frac{(n^{(2)}-1)^2}{n^{(1)}+n^{(2)}-2} s.e.^{(2)^2}} \sqrt{\frac{1}{n^{(1)}} + \frac{1}{n^{(2)}}}} \quad (2)$$

$$df = n^{(1)} + n^{(2)} - 2 \quad (3)$$

(Henseler, 2007, p. 104)

For performing the t-test, the sample sizes of the subsamples n^1 and n^2 were required as well as the coefficients of the subgroups b^1 and b^2. In addition, the standard error (s.e.) of the respective subgroups was included in the calculation. The calculation of the degree of freedom (df) includes the size of the subsamples n^1 und n^2.

5.3 Results

5.3.1 Sample description

The surveyed sample includes 752 persons over 18 years of age living in Germany. With regard to the demographic data of age and gender, the sample corresponds approximately to the German national average and is representative according to these characteristics (Table 1). The allocation of the population to the place of residence shows that almost half of the respondents live in a city with more than 50,000 inhabitants, which approximately corresponds to the German national total of 41% (Statistisches Bundesamt, 2019c). The highest vocational qualification, at 47% of the respondents, is an apprenticeship. This also corresponds approximately to the educational qualifications of the German na-

tional total (Statistisches Bundesamt, 2019b). Net household income was described in the questionnaire as the sum of the income of all household members. Income source includes, e.g., wages, property income, transfer payments and social benefits minus income taxes and payments to social insurances. The net disposable household income was below € 2,000 for 21% of the respondents. Another 18% had a monthly net income between € 3,001 and € 4,000. In total, 82.3% of the respondents had an income of less than € 4,000 at their disposal.

Table 1: Demographic data of the sample.

	Sample	**German population**
	%	
Gender		
Female	50.3	50.4
Male	49.7	49.6
Age		
18–29	18.4	18.8
30–39	15.4	16.1
40–49	18.2	18.2
50–59	20.6	20.7
60–74	27.4	26.3
Population of the place of residence		
Less than 2,000	9.7	5.6
2,001–5,000	9.7	8.6
5,001–20,000	20.5	26.4
20,001–50,000	12.9	18.4
50,001–100,000	8.4	9.1
100,001–500,000	18.6	15.1
More than 500,000	20.2	16.8
n	752	

(Statistisches Bundesamt, 2019c, 2019a, 2020)

5.3.2 Reputation evaluation

The reputation evaluation, which acts as a global measure in the model, shows that the reputation of gardening and landscaping is rated as good (5.23, scale: 1 = 'very bad reputation' and 7 = 'very good reputation'). The reputation of the horticultural industry as a whole and of the fruit-growing segment, as an example of a segment of production horticulture, are rated marginally better, with a mean of 5.25 and 5.26, respectively. The reputation of agriculture is rated slightly worse, however, with a mean of 4.66, it still falls within the range of a positive rating. All other segments outside the agricultural sector (automotive industry (3.77), banking (3.42), confectionery industry (4.12) and chemical industry (3.42)) are rated worse. With a mean of 4.12, the confectionery industry has a neutral to slightly positive rating, the automotive industry is rated with a mean of 3.77 and banking and the chemical industry each have a mean rating of 3.42. Accordingly, the reputation of these industries is assessed as being rather poor.

5.3.3 Parameter estimation

As already explained, the structural model for describing reputation is divided into formative and reflective indicators as well as moderator variables (cf. chapter 5.1.3, Figure 1).

The results of the analyses (Table 2) show that all indicators tested in the structural model influence reputation on the basis of the mean value (> 4). This means that the statements of the items describing the indicators in gardening and landscaping can be confirmed. Among the formative indicators, the indicators of 'production method' (5.70) and 'product and service' (5.64) are rated highest (Table 2). In contrast, the items for the indicator 'presentation in the media' (4.10) received the lowest rating.

In the structural model, the formative indicators of 'innovation', 'production method', 'economic performance' and 'industry development' have a highly significant influence on reputation. In particular, the indicators of 'innovation' and 'production method' strongly influence reputation due to the high regression coefficients (> 0.2). The indicators of 'environmental impact', 'work' and 'social responsibility' have a weaker influence on the reputation of gardening and landscaping. The indicator 'communication and customer focus' also has a weakly significant influence and, surprisingly, a negative effect. This would imply that increased communication and customer focus could lead to a deterioration in reputation because the items of the indicator describe open communication, receptiveness to customers' wishes and being actively present in society. However, it must be taken into account that the indicator has only a minimal influence on reputation due to a low regression coefficient (< 0.1), and methodological reasons may also have had an impact on this result (cf. Table 2). No statistically significant influence on reputation could be found for the indicators of 'product and service' and 'representation in the media'.

The quality test based on the determination coefficient of the formative indicators in the structural model shows that 43.65% of the variance of the dependent variable (reputation) can be explained using the model. Despite this rather low explanatory contribution, the analysis of variance (ANOVA) of the regression shows that the model provides a significant explanatory contribution. To test the linear independence of the individual formative indicators, the VIF values were calculated. The requirement for independence of the indicators is fulfilled with a critical VIF < 10. The required content validity was also confirmed (Table 2).

Table 2: Quality testing: regression of formative indicators.

	Mean	**Coefficient**	**t-value**		**VIF**	**Correlation with the global measure**
Innovation	5.32	0.25	**4.27**	***	4.45	0.61
Product and service	5.64	-0.01	-0.14		6.15	0.58
Production method	5.70	0.21	**2.99**	***	5.71	0.59
Environmental impact	5.54	0.10	1.57	*	4.87	0.60
Work	5.59	0.07	1.35	*	2.56	0.51
Social responsibility	5.31	0.08	1.47	*	3.20	0.54
Communication and customer focus	5.11	-0.07	-1.51	*	3.02	0.49
Presentation in media	4.10	-0.04	-0.95		2.29	0.29
Economic performance	4.74	0.13	**2.61**	***	3.40	0.48
Industry development	4.41	0.11	**2.21**	**	3.07	0.41
Critical values		> 0.1			< 10	> 10% probability of error

Note: ***, **, * denote significance at the 1%, 5% and 10% levels, respectively

VIF: variance inflation factor

Mean: 1 = ‘not very influential’ and 7 = ‘very influential’

The three reflective indicators of ‘attitude towards horticulture’, ‘esteem’ and ‘location acceptance’ represent the consequences of reputation that can be observed in reality. The reflective indicators received a slightly higher level of agreement (mean value) than the formative indicators (Table 2, Table 3), with the reflective indicator ‘esteem’ achieving the highest level of agreement with a mean value of 5.71.

For all three reflective indicators, indicator reliability is confirmed by a factor loading of > 0.7 (Table 3), which shows that all indicators contribute to the establishment of reputation. The CR (construct reliability) also shows that the indicators considered are subject to a strong correlation and thus have a high degree of contribution to reputation. Furthermore, 75.3% of the AVE (average variance extracted) of the indicators can be explained using the construct.

The validity test using the Fornell-Larcker criterion is also fulfilled.

Table 3: Quality testing: factor analysis of reflective indicators.

	Mean	**Factor loadings**	**t-value**	**AVE**	**CR**	**Cronbach's alpha**	**Fornell-Larcker**
Attitutde towards horticulture	5.65	0.87	127.87				$r^2 = 0.52^2 = 0.27$
Esteem	5.71	0.90	130.65	0.753	0.901	0.834	< AVE = 0.75
Location acceptance	5.56	0.84	118.97				
Critical values		> 0.7	> 1.645 (one-tailed test)	> 0.5	> 0.7	> 0.7	R^2 < AVE

AVE: Average variance extracted; CR: construct reliability

Mean: 1 = 'not very influential' and 7 = 'very influential'

The structural model shows that, with the exception of the indicators of 'product and service' and 'presentation in the media', all formative indicators have a significant influence. Accordingly, the *a priori* formulated hypotheses for the indicators of 'product and service' and 'representation in the media' could not be confirmed (Figure 2, Appendix Table A5.1). These are:

- The more attractive and aesthetic the green spaces and gardens, the better the reputation (H2).
- The greater the media presence, the better the reputation (H8).

Both the absence of significance and the negative regression coefficients contradict the formulated hypotheses. A negative coefficient indicates that an increase in the indicator leads to a deterioration in reputation. Correspondingly, frequent presence in the media can lead to a deterioration in reputation.

The hypothesis relationship of the indicator 'communication and customer focus' must also be rejected as the negative regression coefficient also contradicts the positive hypothesis relationship for this indicator:

- The more communicative, customer-oriented and active the gardening and landscaping segment is in society, the better its reputation (H7).

The hypotheses of the indicators of 'environmental impact', 'work' and 'social responsibility' could only be confirmed to a limited extent. The positive regression coefficients support the formulated hypothesis, but the coefficient is low and the influence on reputation is only slightly significant. These are:

- The more carefully the environment has been managed and the greater the contribution to a varied landscape, the better the reputation (H4).
- The better the working conditions for the employees, the better the reputation of the segment (H5).
- The greater the commitment to green recreational spaces and sustainable, healthy living spaces in the city, the better the reputation (H6).

The reflective indicators, as a representation of reputation, describe the factor reputation with a high factor loading. Thus, the hypotheses of these three indicators could be confirmed (Appendix Table A5.1).

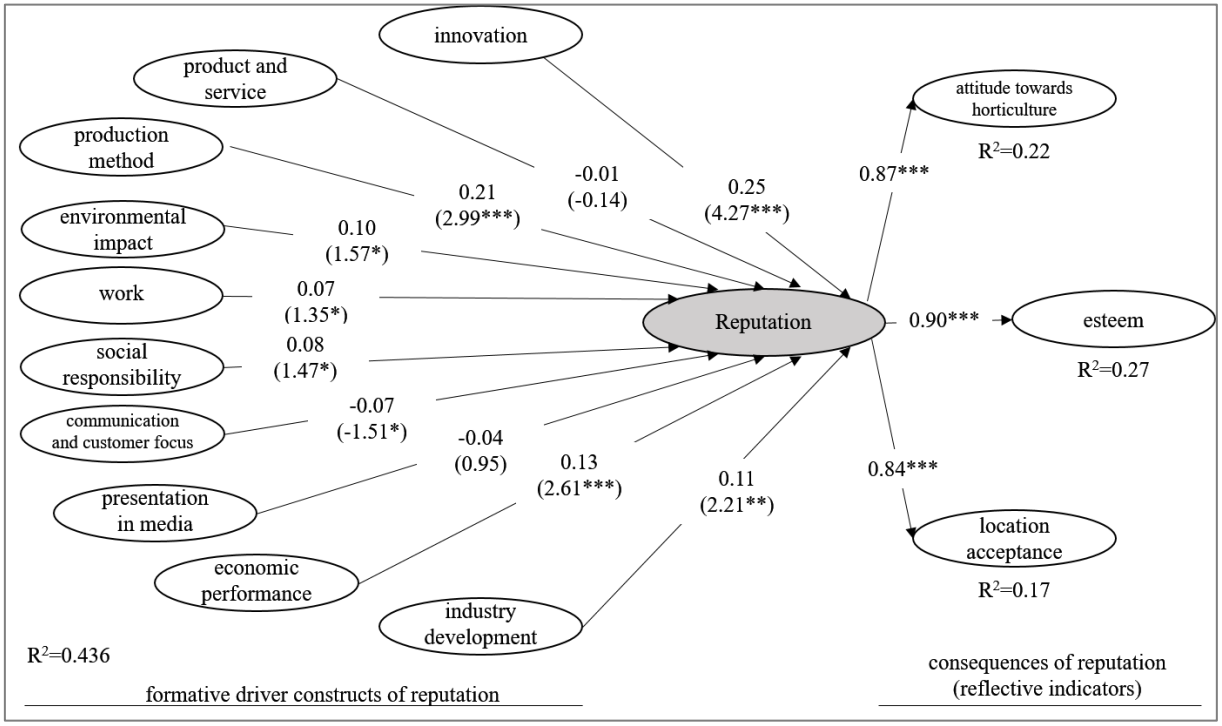

Figure 2: Results of the overall data model (***, **, * denote significance at the 1%, 5% and 10% levels, respectively).

5.3.4 Moderator variable knowledge and involvement as a categorical variable

The characteristics of knowledge and involvement were defined as the moderator variables. Based on the moderator 'knowledge', the sample was divided into two subsamples: respondents with a high level of prior knowledge (n = 477) and little prior knowledge (n = 275) (cf. chapter 5.2.4). Since prior knowledge was surveyed via a simple self-assessment, it can be assumed that the respondents rated their own knowledge higher (social desirability). Prior knowledge was only surveyed for gardening and landscaping and for this purpose, agreement or disagreement with illustrated statements on gardening

and landscaping was requested (cf. chapter 5.2.1 and chapter 5.2.4). An examination of reputation (global measure) as a function of the respondents' prior knowledge revealed that the reputations of the segments or industries are rated better when there is a higher level of prior knowledge (Table 4). For the segments of gardening and landscaping, fruit growing and the industries of horticulture and agriculture, a highly significant difference between the mean values exists. Respondents with a high level of prior knowledge on gardening and landscaping rated the reputation of the entire horticulture industry (5.47) higher compared to the other segments and industries. The segments of gardening and landscaping (5.45) as well as fruit growing (5.44) were given a marginally lower reputation rating by those respondents with a high level of prior knowledge. Agriculture received the lowest reputation rating when respondents had little prior knowledge.

Table 4: Mean values of reputation depending on prior knowledge.

	n	**Mean**	**SD**
Gardening and landscaping* **			
High level of prior knowledge	477	5.45	1.10
Little prior knowledge	275	4.86	1.09
Fruit growing* **			
High level of prior knowledge	477	5.44	1.10
Little prior knowledge	275	4.95	1.13
Horticulture* **			
High level of prior knowledge	477	5.47	1.06
Little prior knowledge	275	4.86	1.10
Agriculture* **			
High level of prior knowledge	477	4.77	1.36
Little prior knowledge	275	4.47	1.22

Note: ***, **, * denote significance at the 1%, 5% and 10% levels, respectively

Mean: 1 = 'very bad reputation' and 7 = 'very good reputation'

The moderator variables can also increase or decrease the influence of the formative indicators on reputation, as shown in the following results. Respondents with a high level of prior knowledge rated the indicators more positively than respondents with little prior knowledge. In the subsample 'high level of prior knowledge', the indicators of 'innovation', 'production method' and 'economic performance' have a significant influence on reputation and an explanatory contribution of 40.9% (Table 5).

In the 'little prior knowledge' subsample, the indicators of 'environmental impact', 'social responsibility', 'communication and customer focus', 'economic performance' and 'industry development' have a significant impact on reputation. The model has an explanatory contribution of 42.19%. With the exception of the indicator 'communication and customer focus', the coefficients describe a positive relationship. On the other hand, increased 'communication and customer focus' has a significant negative impact on reputation. Overall, it can be seen that the regressions of the subsamples differ significantly with regard to the significant coefficients. Only the indicator 'economic performance' has a significant positive influence on reputation in both subsamples. A statement about the strength of the influence of knowledge on the respective indicators in the complete structural model is possible on the basis of the parameter differences between the subsamples. The influence of moderator knowledge is strongest for the indicators of 'production method' and 'industry development'. For the indicator 'production method', existing knowledge strengthens the influence of the indicator on reputation. For the indicator 'industry development', existing knowledge weakens the influence of industry development on reputation. The effect of moderator knowledge is significant for the indicators of 'production method' and 'industry development'.

Table 5: Multiple group analysis of the moderator knowledge

	High level of prior knowledge				**Little prior knowledge**				**Moderator influence**	**Multiple group analysis**	
	n = 477				**n = 275**						
	Mean	**Coeff.**	**t-value**		**Mean**	**Coeff.**	**t-value**		**d**	**t-value[a]**	
Innovation	5.57	0.30	**4.25**	***	4.88	0.12	1.14		0.18	0.08	
Product and service	5.90	-0.06	-0.71		5.17	0.07	0.52		-0.13	-0.85	
Production method	5.97	0.35	**3.75**	***	5.22	0.06	0.55		0.29	**1.95**	**
Environmental impact	5.78	0.06	0.73		5.13	0.15	**1.39**	*	-0.10	-0.04	
Work	5.85	0.08	1.28		5.16	0.05	0.58		0.03	0.32	
Social responsibility	5.52	0.03	0.44		4.95	0.16	**1.87**	**	-0.13	-1.15	
Communication and customer focus	5.37	-0.07	-1.22		4.67	-0.14	**-1.69**	**	0.07	0.04	
Presentation in media	4.92	-0.02	-0.54		4.41	-0.07	-0.99		0.04	0.05	
Economic performance	4.23	0.15	**2.38**	***	3.88	0.14	**1.62**	**	0.01	0.54	
Industry development	4.54	0.03	0.43		4.18	0.30	**3.39**	***	-0.28	**-2.68**	***

Note: ***, **, * denote significance at the 1%, 5% and 10% levels, respectively
[a] t-value calculated according to formula 1
Mean: 1 = 'very bad reputation' and 7 = 'very good reputation'

The second moderator is the characteristic of 'involvement'. A large proportion of the respondents (n = 577) had a low level of involvement in gardening and landscaping and only 175 respondents had a high level of involvement. In the subsample 'high level of involvement', the indicators of 'innovation', 'product and service', 'production method' and 'economic performance' have a significant influence on reputation (Table 6). The explanatory contribution of 37.43% is lower when compared with the model of the complete sample. This shows that for respondents with a high level of involvement and a high level of prior knowledge, 'production method' and 'economic performance' have a significant influence on reputation.

Table 6: Multiple group analysis of the moderator involvement.

	High level of involvement n = 175				**Low level of involvement n = 577**				**Moderator influence**	**Multiple group analysis**	
	Mean	**Coeff.**	**t-value**		**Mean**	**Coeff.**	**t-value**		**d**	**t-value[a]**	
Innovation	5.63	0.19	**1.51**	*	5.22	0.27	**3.90**	***	-0.08	-0.57	
Product and service	5.93	-0.19	**-1.36**	*	5.55	0.05	0.53		-0.23	**-1.35**	*
Production method	6.01	0.39	**2.84**	***	5.60	0.13	**1.55**	*	0.26	**1.54**	*
Environmental impact	5.77	0.11	0.92		5.47	0.11	**1.51**	*	0.00	0.02	
Work	5.83	0.10	1.19		5.52	0.05	0.96		0.05	0.44	
Social responsibility	5.52	-0.02	-0.16		5.25	0.11	**1.73**	**	-0.13	-0.98	
Communication and customer focus	5.46	-0.01	-0.14		5.01	-0.09	**-1.69**	**	0.08	0.69	
Presentation in media	4.43	0.06	0.85		4.00	-0.07	**-1.50**	*	0.12	**1.41**	*
Economic performance	5.12	0.18	**1.61**	*	4.62	0.11	**1.92**	**	0.06	0.53	
Industry development	4.75	-0.01	-0.06		4.30	0.14	**2.46**	***	-0.15	-1.27	

Note: ***, **, * denote significance at the 1%, 5% and 10% levels, respectively
[a] t-value calculated according to formula 1
Mean: 1 = 'very bad reputation' and 7 = 'very good reputation'

In the subsample 'low level of involvement', all indicators have a significant influence on reputation, with the exception of the indicators of 'product and service' and 'work'. The model of this subsample has an explanatory contribution of 44%. As for respondents with low prior knowledge, the indicator 'communication and customer focus' again has a significant negative influence on reputation. Overall, it can be stated that in the case of low involvement many indicators influence reputation. In contrast, respondents with a high level of involvement take only a few indicators into account when evaluating

reputation. This means that respondents who have a strong connection to the industry do not need much information to form an opinion relating to reputation. On the other hand, respondents with a low level of involvement in the industry take a lot of information into account when forming an opinion on reputation.

The strength of the interaction of involvement with the formative indicators can also only be assessed for this subsample using the calculated moderator influence. The influence of the moderator is significant for the indicators of 'production method' and 'presentation in the media'. A higher level of involvement increases the influence of the indicators of 'production method' and 'presentation in the media' on reputation.

In addition, the influence of other characteristics as moderator variables was tested. The demographic characteristics of 'gender', 'age', 'population of the place of residence', 'professional education', 'children living in the household' and 'income' were considered. No direct influence as a moderator variable could be identified for these demographic characteristics.

5.3.5 Extended parameter estimation

Although the research process described in section 5.1.3 attempted to develop a plausible structural model prior to the empirical survey, the formative indicators tested achieved only an explanatory contribution to reputation of 43.65%. It may be possible that further indicators not yet considered in the model could lead to a higher explanatory contribution and therefore additional indicators available from the empirical survey were tested for their influence on reputation.

In addition, the specification of indicators in the reflective impact direction in particular is critically discussed in the literature (MacKenzie et al., 2005; Hautzinger, 2009). For this reason, the reflective indicators were also considered in the formative direction of impact, since it seems plausible that the reflective indicators of 'attitude towards horticulture', 'esteem' and 'location acceptance' establish reputation and thus have a formative effect. The same applies to the moderators of 'knowledge' and 'involvement', which could also be reasons for the establishment of reputation and could thus have a formative effect. In addition, the influence of demographic characteristics has, thus far, not been taken into account in the model. Demographic characteristics could also be reasons for the latent variable 'reputation' and thus could have a formative effect in the model.

In order to examine this, additional indicators collected in the empirical survey, such as demographic characteristics, were included in the model as formative indicators. In addition, the moderator variables and the reflective variables were included in the group of formative indicators. The aim of this procedure was to increase the validity of the model by improving the composition of the indicators.

With the help of backwards elimination procedure, the indicators whose elimination led to the greatest increase in the explanatory contribution were gradually removed from the indicator pool. Eight elimination steps were carried out in establishing the adjusted model (Figure 3). The following indicators were removed in the order listed: age, income, knowledge, location acceptance, population of place of residence, product and service, gender and attitude towards horticulture.

The adapted structural model has a marginally higher explanatory contribution (44.93%) compared to the initial structural model (cf. chapter 5.3.3). The moderator variable 'involvement' should be emphasised – as a formative indicator in the model, it has a significant effect on reputation with a high regression coefficient (0.29).

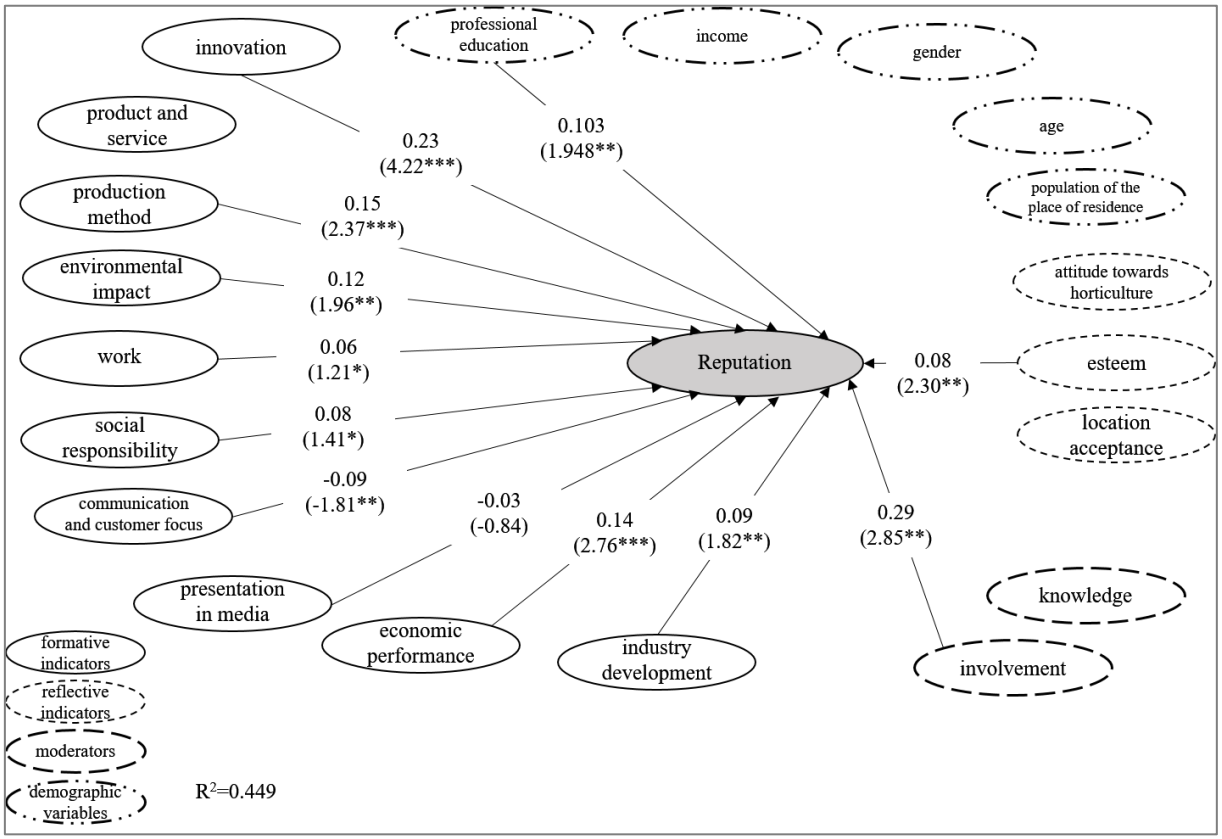

Figure 3: Results of the adapted data model (***, **, * denote significance at the 1%, 5% and 10% levels, respectively).

5.4 Discussion

An evaluation of the consumer survey shows that the reputation of gardening and landscaping and the horticultural industry as a whole is considered positive. In contrast to the neutral to slightly positive reputation described by experts, which can be termed an internal view, the external view of consumers presented here is clearly more positive (Isaak et al., 2021). This shows the differing perceptions of the industry between the internal perspective (experts) and the external perspective (consumers). The positive reputation of the gardening and landscaping segment by consumers in this study contradicts

some authors in the literature who cite evidence for a more negative reputation (Storck, 1992; Bitsch, 2004; Ludwig-Ohm and Dirksmeyer, 2013).

Since the explanatory contribution, measured by the determination coefficient, is only of moderate quality, the underlying methodology of the entire model must therefore be critically discussed. Other studies on the reputation of industries have also only achieved a determination coefficient of moderate quality (Storck, 1992; Hautzinger, 2009; Albersmeier and Spiller, 2010). In this study, the structural model includes formative and reflective indicators, whereas the adjusted structural model, which was determined with the help of backwards elimination, only includes formative indicators. The literature has already noted the danger of specifying indicators incorrectly in the reflective direction of impact (Storck, 1992; MacKenzie et al., 2005; Hautzinger, 2009). This study shows that the reflective indicator 'esteem' can also be considered in the formative direction.

Multicollinearity must also be regarded critically since it can lead to a bias in the model and can be seen as a cause for a lower determination coefficient (Diamantopoulos and Siguaw, 2006). The critical VIF value (< 10), as a quality criterion for multicollinearity, was not exceeded. Nevertheless, because Diamantopoulus and Siguaw (2006) recommend a significantly smaller VIF value (< 3.3), there is evidence of correlation between the formative indicators. This threshold is exceeded by five of the indicators. To avoid multicollinearity, Baltes-Götz (2019) propose summarising the formative indicators by means of an explorative factor analysis. For our model, it was not possible to summarise the formative indicators due to double loadings in the factor analysis.

A connection can be assumed between the methodological weaknesses of the model and the rather unexpected results of the low significance of the indicators of 'media presence' and 'communication and customer focus'. In this context, it must be critically questioned whether the content-related formulation of the items led to this low significance. The items of the indicator 'presence in the media' focused on the frequency of gardening and landscaping in the media. However, a wide dispersion of the indicators, which can be seen in the corresponding scatter diagrams, also points to the uncertainty of the interpretation of the items. Since gardening and landscaping is rarely present in the media, this indicator was also rated as insignificant by the respondents. In addition, it should also be taken into account that the mass media tends to report on negative developments in industries or companies rather than on the positive aspects, which could also be a reason for the negative regression coefficients (Dean, 2004; Serrano-Arcos et al., 2018).

From a methodological perspective, this shows that further adjustments to the model are necessary to improve the representation of the reputation of gardening and landscaping. The chosen three-stage approach, consisting of a literature research, expert interviews and consumer surveys, can only partially explain the reputation of the segment. It can be assumed that the selection of indicators by the

experts could be a reason for the low explanatory contribution of the model. One attempt to increase the explanatory contribution was the consideration of further indicators, which were tested using backwards elimination procedure. In particular, the elimination of the 'product and service' indicator suggests that the perception of the segment differs between experts and consumers. In addition, the inclusion of the demographic variable 'professional education' suggests that not only segment-specific characteristics are responsible for the reputation of an industry. Both the selection of indicators and the use of the MIMIC model should be critically analysed for future reputation measurement. The transfer of the model to other segments of horticulture also requires further segment-specific adaptations.

Thus far, the indicator 'production method', described by experts in horticulture as particularly relevant, has not been used in any established reputation measurement system (Fombrun, 2007; Isaak et al., 2021). This study proves that production method has a particularly strong influence on the reputation of gardening and landscaping. This implies that it is not the final product that influences the reputation, but rather the production process, i.e., the creation or maintenance of the landscape. For gardening and landscaping as a service provider, the quality of the product is closely related to the production method. Since the work of a company is judged by the consumer in terms of its quality, poor product quality can represent a reputational risk (Eckert, 2017).

The importance of the indicator 'innovation' is also closely related to the indicator 'production method'. A study in fruit growing shows that innovative characteristics in an industry or company, together with nutritional content, are the most important factors in consumer perception and willingness to pay (Zanetti et al., 2020).

Saeidi et al. (2015) confirmed that the economic success of a company or segment improves the reputation and competitive advantage of an industry. Also in this study, the economic indicators ('economic performance' and 'industry development') have a significant influence on reputation, which is surprising for gardening and landscaping due to its rather small share in the total gross value added in Germany. Within the horticultural industry, gardening and landscaping, in contrast to the segments of production horticulture, has seen a positive development in terms of turnover, number of companies and employees, and is characterised by steady growth (Bundesverband Garten- und Landschaftsbau, 2019).

The indicator 'work', which is discussed against a background of skilled labour shortages, together with the image or reputation of the industry, has no influence on the reputation of gardening and landscaping in this study. Bitsch (2004) described that entrepreneurs perceive the image of jobs in horticulture in general as more negative. This poorer reputation of work in the horticultural sector could make it difficult to attract qualified workers (Knoop and Theuvsen, 2018). This suggests that reputation has a

reflective impact on labour availability. Nolan et al. (2013) have shown that, when using employer image to recruit workers, at least nine pieces of information (including innovation, safety and customer orientation) must be provided to the interested party. Thus, for employer image, as well as for reputation, a bundle of information is needed for the assessment. Employer image allows job seekers to differentiate between individual employers (Lievens and Highhouse, 2003). However, the working conditions characterised by the formative indicator 'work' in this study do not affect the reputation of gardening and landscaping itself.

Knowledge of gardening and landscaping, described here as the moderator variable 'knowledge', affects the relationship of the indicators of 'production method' and 'industry development'. This moderator variable assumes that reputation is based on the perception of the production of high-value goods (here 'production method') and awareness of the organisation. Similar to other studies, other factors, such as demographic characteristics of the respondents, do not have a moderating effect in this study (Onwezen and Bartels, 2011). On the other hand, the professional education of the respondents as a formative indicator has a significant influence on reputation.

Some recommendations for strategic management in gardening and landscaping companies can be derived from this study. As shown in the study, the reputation of the industry is significantly shaped by the indicators of 'innovation' and 'production method'. These indicators are closely interrelated, as an innovative company can be characterised by both an innovative production method and an innovative end product. However, the research shows that the end product itself is less important than its creation. Prior knowledge of gardening and landscaping only has an indirect effect on reputation via the indicators of 'production methods' and 'industry development'. Involvement in the segment also positively supports the indicator 'production method'; in addition, involvement also has a strong direct influence on reputation. Accordingly, the gardening and landscaping segment can significantly influence its reputation through the involvement of society.

Particularly relevant to the strategic work of stakeholders in the entire industry (e.g., in associations) is that reputation can be positively influenced by a relationship to gardening and landscaping and a positive perception of the creation and maintenance of green areas (production method). In order to establish a relationship with society, many entrepreneurs are already engaged in their local community, e.g., in the fire brigade or in associations. Both professional associations and individual entrepreneurs try to bring the work of gardening and landscaping closer to society via social media. Reports in local media about professional competitions should also help inform the public about the work of the segment. This makes it clear that gardening and landscaping is trying to communicate with the general public. The particular focus of communication is on work in the private sector. In the future, communication on public work could also be strengthened and environmental aspects such as climate change

and biodiversity could be more in focus due to their current relevance. Economic success, which is also reflected in a positive development, could contribute to this.

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6 General Discussion

Society is a driver for various developments in companies and industries as a whole. In addition, Luoma-aho (2008) assigns a control function to society, since in today's global context no organisation can operate without the consent of the people around it.

The examples of sustainability and reputation presented here interact closely with the expectations of society. The reputation of a sector, which reflects the perception of the sector's activities, is also influenced by society's expectations of sustainable production. A sustainable production method can be seen as a reputation-influencing indicator. Reputation itself can have a positive impact on customer loyalty and is therefore an important strategic factor in corporate management (Leaniz and Del Bosque Rodríguez, 2016). Reputation and corporate responsibility are closely related (Saeidi et al., 2015; Kim, 2019), and corporate responsibility can also be a sub-aspect of corporate sustainability strategies. Baldarelli und Gigli (2014) were able to show that a reputation measurement system (reputation quotient) can also be used meaningfully with regard to corporate responsibility. In addition to overlaps in content, there are also conceptual similarities between the topics of sustainability and reputation.

6.1 Social expectations of sustainable horticultural production

The results presented in this thesis describe the preferences of (German) consumers and especially specific consumer groups (e.g., LOHAS, Lifestyles of Health and Sustainability) for sustainable horticultural production described in the literature (Grunert et al., 2014; Meyerding, 2016b; Yue et al., 2016). For many consumers, sustainability is an important attribute that influences the purchase decision (Santini et al., 2013; Schmitt et al., 2017). Many consumers are motivated to buy sustainably, especially food, but other factors (e.g., nutritional information) can also influence the purchase decision at the point of sale (Grunert et al., 2014). Accordingly, sustainable product characteristics can have a positive impact on the demand and distribution of German production companies, but only in connection with other influencing factors (e.g., price, place of purchase).

Various consumer groups (e.g., LOHAS) have already been identified as having an increased interest in sustainably produced horticultural products (Dennis et al., 2010). In the US, the LOHAS consumer group represents 30% of US households (Hall et al., 2010). In Germany, this consumer group accounts for around 27% of the total population (Brünger, 2016). In addition, research has shown that many consumers are willing to pay a premium price for environmentally friendly products and that certain consumer groups have an environmentally friendly attitude (Yue et al., 2016). In the study presented here (cf. chapter 2), the focus was on consumers with a presumably increased interest in sustainable production methods.

Looking at the relevance of the different aspects of sustainability, the survey of a sample of this consumer group showed that ecological sustainability is of primary importance, regardless of the type of production (food or non-food). Social aspects are of greater importance in the food segments of horticulture than in the non-food segments. Economic characteristics are only of minor importance overall. This finding, that ecological features, above all, have a special significance in the perception of sustainable production in horticulture, could help to close the gap between consumer expectations and the actual production method. Since many features of ecological sustainability have already found their way into practice, target group-specific communication in particular could be an important management tool for horticultural farms. Selfa et al. (2008) have shown that ecological sustainability features are perceived differently by consumers and producers. Biodiversity (e.g., bee-friendliness) and peat reduction are cited as examples of ecological sustainability features already taken into account in horticultural practice. However, the lack of standardisation and certification of these features poses a challenge for companies, thus attention to these features is mainly described as a marketing innovation (Havardi-Burger et al., 2020). Overall, the implementation of sustainability features in horticultural practice is associated with economic risks. However, profitability, economic viability, prior experience and the education of farm managers, as well as operation size and customer type, also have an influence on the willingness of farmers to implement sustainability features (Hall et al., 2010b; Silva and Forbes, 2016). König et al. (2018) have shown that, from the perspective of horticultural stakeholders, it is still unclear how the institutional conditions can be designed to achieve sustainable results.

Ethical consumption has become more important in recent years for both food (e.g., bananas, meat) and non-food (e.g., cut flowers) products (Sporleder et al., 2014; Otter et al., 2018; Rombach et al., 2021a). For cut flowers, consumers mention the poor reputation of working conditions and environmental impacts in developing countries as a reason for buying fairly produced cut flowers (Rombach et al., 2021b). The socio-demographic characteristics of the consumers had no influence on the purchase decision in this study and it can be concluded from these results that the importance of social sustainability features for German horticulture is low. De Silva and Forbes (2016) found for New Zealand, a country with similar high social standards as Germany, that high legal standards lead to a low importance of social sustainability from the consumer's perspective.

From a methodological point of view, the results of this work can be viewed critically. When making purchasing decisions, it is often not just one attribute that is important, but rather a bundle of product characteristics across multiple product alternatives, forcing consumers to make trade-offs (Tonsor, 2011). In addition, there are consumer groups looking for products with specific product characteristics, such as cut roses with a sustainability label (Berki-Kiss and Menrad, 2019). This complex decision-making process cannot be represented by analysing individual sustainability features alone.

In conclusion, the following points can be deduced with regard to the actions of horticultural companies in a social consensus. The necessity to communicate sustainability features has different implications for horticultural companies. These depend on the company profile and especially on the customers of the company (e.g., consumers, processing industry). The actions of horticultural companies are not only influenced by consumers, but also by food retailers (Gabriel and Bitsch, 2016). In the target group of consumers, there are consumer types that have a high involvement in sustainability and plants. For example, Berki-Kiss and Menrad (2019) identified the consumer groups of organic enthusiasts and fair trade supporters for cut roses, among others. These groups are particularly interested in ecological and social sustainability features, which should be communicated more strongly by the horticultural sector. A major problem is the communication of sustainability using product labelling, as thus far there is no sustainability label having defined standards that take sustainability into account as an overall concept. Thus, sustainability features are trust attributes and are subject to the danger of being used by companies for greenwashing (Campbell et al., 2015; Meyer-Höfer, 2016). In addition, the lack of knowledge about the concept of sustainability makes communication difficult (Yue et al., 2016).

6.2 Measurement of horticultural reputation

Companies collect many key data in order to understand ongoing developments and to be able to decide on future developments. For this purpose, key figures for controlling different company areas (sales and demand, among others) are collected and analysed. However, the reputation of a company, which is an important strategic resource, is often neglected (Boyd et al., 2010). A positive reputation is also important for horticulture, especially if the sector is perceived by the public as a producer of food. Until now, no comprehensive analysis of reputation had been identified for horticulture, with the exception of the analysis of product group image by Stenger (2020). Only assumptions about the public reputation of the sector have been described by individual authors (Ludwig-Ohm and Dirksmeyer, 2013; Meyerding, 2016a), but these were not underpinned by a measurement model. The assessment model presented in this paper is based on a three-step approach consisting of a literature review (chapter 3), development of a model (chapter 4) and model evaluation (chapter 5). However, this model as well as the entire procedure should be critically discussed, as the following points show.

Categorizing reputation as a latent variable

The categorizing of reputation as a latent variable by the MIMIC model should be viewed critically. Some authors in the literature have already pointed out the danger of a misspecification of the direction of impact in the model (MacKenzie et al., 2005; Hautzinger, 2009), which could be seen as a sig-

nificant disadvantage of the chosen MIMIC model. To avoid this, the direction of impact of the indicators was checked again using the example of gardening and landscaping in order to improve the quality of the model (cf. chapter 5.3.5).

Adapting the structural model through expert interviews

The development of a measurement model (cf. chapter 4) with the help of an expert survey is based on the assumption that publicly perceived characteristics can be reflected by expert opinions. On the one hand, there is a risk that the experts' assessment is influenced more by an internal perspective on horticulture. This procedure may have led to the inclusion of features in the structural model that are not or only slightly perceived by society. On the other hand, empirical studies have pointed to the importance of the processes of adaptation and specification of the indicators (Helm, 2007; Hautzinger, 2009).

Evaluating the model using the example of gardening and landscaping

The collection of data for the model was based on a consumer survey that was conducted online. In addition to the disadvantages of surveys already known from the literature (e.g., social desirability) (Meyerding, 2016b), it remains unclear in the analysis how strongly the respondents can differentiate between the gardening and landscaping segment and the entire sector. It is also known from the literature that "knowledge" and the availability of information influence the respondent's assessment of the company or sector being assessed (Newburry, 2010). This makes it difficult to derive concrete recommendations for action for the gardening and landscaping segment. The difficulties described in the survey of reputation using the developed model also make active reputation management within the entire horticultural sector more difficult.

6.3 Active reputation management based on the developed structural model

The aim of this work was to provide information for active reputation management based on a multistage approach. Active reputation management refers to actions that positively influence the public perception of a company or sector. Recommendations for actions can be derived from the indicators of the structural model for measuring reputation.

Reputation management can be designed for specific target groups (consumers, stakeholder groups, etc.) (Zavyalova et al., 2016; Veh et al., 2019) and a target group-specific evaluation of the structural model could contribute to this. In the reputation measurement of the example of gardening and landscaping, no target group-specific differences could be found on the basis of the demographic variables (cf. chapter 5.3.5). However, the analysis of sustainability has shown that the demographic variable of age is important (cf. chapter 2.4). In addition, in horticulture, individual segments have a varying impact on the reputation of the entire sector (cf. chapter 4.4.4), so that reputation management in the

individual segments has a varying impact on the reputation of the horticultural sector as a whole. Based on surveys and analyses, it was also possible to reveal that experts of the sector evaluate the reputation of horticulture in society slightly more negatively (internal perspective, cf. chapter 4.4) than the reputation evaluated by society (external perspective, cf. chapter 5.3).

Knowledge and perception of consumers and society

Perception and knowledge are important bases for reputation building (Kim, 2019), and therefore society's knowledge of horticulture is considered a moderator in reputation measurement and thus indirectly affects reputation-building indicators such as production method (cf. chapter 5.3.4) (Luomaaho, 2008; Hautzinger, 2009). For the German horticulture sector, Stenger (2020) has shown that there is a clear information deficit in society. Social cognitions, such as knowledge, impressions, perceptions and beliefs, are essential basics for active reputation management (Rindova et al., 2010).

Communication options

Communication channels that are already used by many stakeholders for public relations include print and online media, trade fairs and garden shows or social media. However, the indicators “media presence” and “communication and customer focus” have a low significance in the structure model. A connection can be assumed between the methodological weaknesses of the model and the rather unexpected results (cf. chapter 5.3.3).

6.3.1 Consequences for the horticultural sector

The thesis was able to show that the first step is to create awareness for the sector and its products (cf. chapter 1.3) before knowledge about the production method can be imparted in a second step. In this respect, the sector can act much more efficiently and widely through interest representatives (e.g., associations, producer groups).

Perception of the horticultural sector in society

Perception is the prerequisite for successful communication with the customer or with society. The communication itself can also be carried out by individual companies. The perception or, in particular, admiration of products or services is closely linked to seasonal availability, e.g., regionally grown vegetables or fruit (cf. chapter 4.5). This seasonality can be better exploited by the sector through its wider reach than individual horticultural companies.

Topics currently under public discussion (e.g., climate protection, groundwater pollution or biodiversity) should also be addressed, as long as horticulture can make a positive contribution to these topics, to generate public awareness. Overall, an increased interest in the origin, production and ingredients of food has developed in recent years (Battacchi et al., 2020). The consumer survey on sustainability has made it clear that society is interested in the topics of climate, nutrient leaching and biodiversity

in the context of horticulture (cf. chapter 2.4.4). The horticultural sector should use this interest to actively shape discussions on these topics and ensure that positive external effects (e.g., CO_2 reduction) are made known to the public.

Confidence in the sector's production methods

The purchase decision for horticultural food products is shaped by experience and trust. In this case, reputation represents an expectation of the quality of the products (Shapiro, 1982). At the same time, few consumers have knowledge about the producers' working methods or production methods (cf. chapter 1.3 and chapter 5.3.4). Therefore, individual companies have little control over the reputation of the company or the product (Winfree and McCluskey, 2005). In addition, product groups can take a central position in public communication, as they represent an existing connection to the sector due to their distribution and the associated awareness (Stenger, 2020). Winfree and McCluskey (2005) also refer to reputation in this context as collective reputation, which can be regarded as the common property of a group of producers. However, a collective negative reputation can also be a barrier to market entry for new companies (Tegtmeyer, 2005). This once again highlights the special importance of sector reputation for individual companies.

6.3.2 Consequences for horticultural companies

A positive corporate reputation can have various advantages for horticultural companies. Since, for some products, the producer is hardly visible to the consumer due to product homogeneity and distribution structure, a positive corporate reputation can increase visibility, contribute to differentiation from competitors and reduce consumer uncertainty (Boyd et al., 2010; Wæraas and Byrkjeflot, 2012). In this context, Rindova et al. (2005) have shown that awareness and good reputation can lead to a price premium. In addition, corporate reputation can have a positive impact on sector reputation for homogeneous product groups (Winfree and McCluskey, 2005).

Communication with customers and society

Active communication can be a management tool for a positive corporate reputation. Communication can close the gap between consumer expectations and current production methods with the aim of creating greater acceptance for one's own actions (Sageder et al., 2018). In this work, it was shown that it is not the end product that influences reputation but rather production method (cf. chapter 5.3.3). Essential communication content can be sustainability aspects that are already implemented in production (e.g., soil-conserving production, the use of beneficial organisms, bee-friendliness) or are pursued as part of corporate responsibility (e.g., employee training). To this end, the consumer survey of sustainability in horticulture showed that ecological characteristics are of the highest relevance compared to the other pillars of sustainability (cf. chapter 2.4).

Various communication channels (e.g., social engagement, social media, information at the point of sale) are available for active communication with the consumer. The research on reputation in horticulture indicates that interaction with the consumer or with society can influence reputation (Helm et al., 2011; Isaak et al., 2021). Active engagement of the owner (e.g., fire brigade or in associations) in the neighbourhood or in the close vicinity of the place of production can contribute to this (cf. Table 3 in chapter 4.4.3). Active communication in the local community is already being pursued by many farmers.

Effect of distribution channel on the perception of companies in society

However, horticultural production lacks direct contact with the consumer due to the indirect distribution of products via food retailers (cf. chapter 1.1). The surveys were able to show that consumer groups who buy horticultural products through direct sales are much more aware of the producer (cf. Table 3 in chapter 4.4.3).

Corporate reputation is not a stand-alone variable that can be controlled by the company independently of other external influencing factors. Mahon (2002) has described that it is not yet clear whether and to what extent a positive corporate reputation is influenced by a negative sector reputation.

6.4 Need for further research

Further research is needed in the areas of sustainability and reputation. For the topic of sustainability, the perspective of horticultural practice could be examined in addition to the results presented here. By surveying the status quo of the sustainability features in horticultural practice mentioned here, gaps between the actual implementation of sustainability features and the perception in society can be identified. In addition, further consumer studies on the willingness to pay for sustainably produced horticultural products or the actual purchasing behaviour at the point of sale could be conducted.

The topic of reputation in horticulture has received little attention in the research until now. On a methodological level, the MIMIC model presented in this thesis for measuring reputation could be further improved and adapted to the individual horticultural sectors. In addition, the suitability of existing measuring instruments (e.g., RepTrak, Reputation Quotient (RQ)) could be investigated and compared with the model specially developed for horticulture.

For further and specific recommendations for action for the horticultural sector, reputation measurement in different growing regions could be helpful (e.g., fruit growing in the Altes Land area or at Lake Constance) in order to investigate the importance of specialised growing regions. The influence of other special features on reputation, such as marketing cooperatives as a homogeneous producer

group, could also provide useful results for the entire sector. Overall, the topic of reputation in horticulture still offers many open questions for further scientific research.

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Appendix

Chapter 2

Questionnaire for Ornamental Plants and Tree Nursery Products

1. General information on the housing situation

How many people live in your household in total? (The answer must be at least 1)

____ People

How many of the previously mentioned persons in your household are under 18 years of age?

____ People

How do you describe your housing situation? Please tick the relevant statements.

1 ☐ I live in a family home.

2 ☐ I live in a flat in a block of flats.

3 ☐ I have a garden.

4 ☐ I have a balcony.

5 ☐ I have an allotment garden.

Approximately how many inhabitants live in your town? (Please tick only one of the following answers)

1 ☐ Villiage (< 5.000 inhabitants)

2 ☐ Small town (from 5.001 up to 10.000 inhabitants**)**

3 ☐ Large town (from 10.001 up to 20.000 Einwohner)

4 ☐ Small middle-sized city (from 20.001 up to 50.000 inhabitants)

5 ☐ Large middle-sized city (from 50.001 up to 100.000 inhabitants)

6 ☐ Metropolis (> 100.000 inhabitants)

2. Purchasing behavior

Please specify when you last purchased an ornamental plant and/or nursery product!

	Within the last 4 weeks	**Within the last 6 months**	**In the last 12 months**	**More than 12 months ago**	**Never before**
Ornamental plants	☐	☐	☐	☐	☐

Tree nursery products	☐	☐	☐	☐	☐

Where did you buy the previously mentioned ornamental plants and nursery products?

	Food retail (e.g. Edeka, Rewe)	Discount store (e.g. Aldi, Lidl)	DIY store	Garden center	Specialist flower shops	Tree nurseries	Weekly market	Internet	Further places of purchase	No information on the place of purchase
Ornamental plants	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tree nursery products	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Please characterize more precisely the ornamental plant you last purchased.

1 ☐ Bedding and balcony plants

2 ☐ Green house plants

3 ☐ Flowering house plants

4 ☐ Potted plants

5 ☐ Cut flowers

6 ☐ No knowledge about the purchased plant

Please characterize more precisely the nursery product you last purchased.

1 ☐ Perennials, grasses, fern

2 ☐ Deciduous trees (including the rhododendron)

3 ☐ Roses

4 ☐ Fruit trees

5 ☐ Conifers (this includes the Christmas tree)

6 ☐ Bamboo

7 ☐ Topiaries (e.g. hedge plants)

8 ☐ No knowledge about the purchased plant

3. Social sustainability

You buy a sustainably produced ornamental plant or a sustainably produced nursery tree product Social sustainability in production is considered in comparison to conventional production. Which characteristics are important to you in a sustainably managed company? (Please tick the appropriate answer for each statement).

	completely unimportant	**unimportant**	**important**	**very important**
The company remunerates its employees appropriately.	☐	☐	☐	☐
The company's human resources management pays attention to employee satisfaction.	☐	☐	☐	☐
The company promotes the training and further education of its employees.	☐	☐	☐	☐
Attention is paid to gender equality in the employee structure.	☐	☐	☐	☐
The occupational safety and health of the employees is taken care of by the company.	☐	☐	☐	☐
The company is in dialogue with critics and contributes to the resolution of conflicts.	☐	☐	☐	☐
The company is involved in society and the region.	☐	☐	☐	☐
The company does not commit any violations of the law.	☐	☐	☐	☐

4. Environmental sustainability

You buy a sustainably produced ornamental plant or a sustainably produced nursery tree product. The ecological sustainability of production is considered in comparison to conventional production. Which characteristics are important to you in a sustainably managed company? (Please tick the appropriate answer for each statement).

	completely unimportant	**unimportant**	**important**	**very important**
Fewer resources were consumed in production (e.g. through energy savings).	☐	☐	☐	☐
Less fertilizer (e.g. nitrogen, phosphate) was used for production.	☐	☐	☐	☐

Fewer pesticides were used in production or biological pesticides and beneficial insects were used.	☐	☐	☐	☐
Water was used sparingly in production.	☐	☐	☐	☐
The plants grow in a peat-reduced substrate (plant soil).	☐	☐	☐	☐
The plants were produced in a soil-protecting process.	☐	☐	☐	☐
The diversity of plants in the production and production environment was promoted.	☐	☐	☐	☐
Greenhouse gas emissions in production have been reduced.	☐	☐	☐	☐
Recyclable materials were used in production.	☐	☐	☐	☐

5. Corporate responsibility

You buy a sustainably produced ornamental plant or a sustainably produced nursery tree product The sustainable management of the production companies is compared to conventional production companies. Which characteristics are important to you in a sustainably managed company? (Please tick the appropriate answer for each statement).

	completely unimportant	**unimportant**	**important**	**very important**
The company has long-term goals and a mission statement for the orientation of managers and employees.	☐	☐	☐	☐
The company promotes regional value added by cooperating with local suppliers and customers.	☐	☐	☐	☐
Quality is ensured by certification and is recognizable for the consumer.	☐	☐	☐	☐
The company takes responsibility for the quality and safety of the plants.	☐	☐	☐	☐
The company pays attention to a responsible and transparent cooperation with suppliers and customers.	☐	☐	☐	☐
Management promotes change and innovation within the company.	☐	☐	☐	☐

6. Economic sustainability

You buy a sustainably produced ornamental plant or a sustainably produced nursery tree product Economic sustainability in production is considered in comparison to conventional production. Which

characteristics are important to you in a sustainably managed company? (Please tick the appropriate answer for each statement).

	completely unimportant	**unim-portant**	**important**	**very im-portant**
The operating revenue can cover all operating costs.	☐	☐	☐	☐
The company achieves a high profit.	☐	☐	☐	☐
The company invests more than is consumed, for example, by the wear and tear and aging of buildings and machinery.	☐	☐	☐	☐
The company has financial stability and is creditworthy.	☐	☐	☐	☐

7. Personal details

What year were you born? ___ ___

I am …

1 ☐…male.	2 ☐…female.

I am …

1 ☐ …married.	3 ☐ …in a partnership.
2 ☐ …single.	4 ☐ … widowed.

What is your highest vocational training qualification?

1 ☐ Still school/vocational training	5 ☐ University of Applied Sciences degree
2 ☐ School-leaving certificate	6 ☐ University degree (Bachelor/Master/Diplom)
3 ☐ Apprenticeship/vocational training	7 ☐ PhD
4 ☐ Technical college degree (foreman/technician)	8 ☐ Without a degree

Please describe your current professional situation!

1 ☐ Full-time employment	5 ☐ Housewife/Husband
2 ☐ Part-time employment	6 ☐ Unemployed
3 ☐ In school/vocational training or studies	
4 ☐ Pensioner	

Please enter your zip code. ___ ___ ___ ___ ___

Questionnaire for Fruit and Vegetables

1. General information on the housing situation

How many people live in your household in total? (The answer must be at least 1)

____ People

How many of the previously mentioned persons in your household are under 18 years of age?

____ People

Approximately how many inhabitants live in your town? (Please tick only one of the following answers)

1 ☐ Villiage (< 5.000 inhabitants)

2 ☐ Small town (from 5.001 up to 10.000 inhabitants**)**

3 ☐ Large town (from 10.001 up to 20.000 Einwohner)

4 ☐ Small middle-sized city (from 20.001 up to 50.000 inhabitants)

5 ☐ Large middle-sized city (from 50.001 up to 100.000 inhabitants)

6 ☐ Metropolis (> 100.000 inhabitants)

2. Purchasing behavior

Where did you last buy fruit and vegetables? (Please tick only one of the following answers)

1 ☐ Food retail (e.g. EDEKA, REWE)

2 ☐ Discount store (e.g.. Aldi, Lidl)

3 ☐ Self-service department store (e.g.. Real, Kaufland)

4 ☐ Weekly market or farm shop

5 ☐ Internet

6 ☐ Fruit and vegetable box delivery service

7 ☐ Further places of purchase:

3. Social sustainability

You buy sustainably produced fruit or vegetables. Social sustainability in production is considered in comparison to conventional production. Which characteristics are important to you in a sustainably managed company? (Please tick the appropriate answer for each statement).

	completely unimportant	**unimportant**	**important**	**very important**

The company remunerates its employees appropriately.	☐	☐	☐	☐
The company's human resources management pays attention to employee satisfaction.	☐	☐	☐	☐
The company promotes the training and further education of its employees.	☐	☐	☐	☐
Attention is paid to gender equality in the employee structure.	☐	☐	☐	☐
The occupational safety and health of the employees is taken care of by the company.	☐	☐	☐	☐
The company is in dialogue with critics and contributes to the resolution of conflicts.	☐	☐	☐	☐
The company is involved in society and the region.	☐	☐	☐	☐
The company does not commit any violations of the law.	☐	☐	☐	☐

4. Environmental sustainability

You buy sustainably produced fruit or vegetables. The ecological sustainability of production is considered in comparison to conventional production. Which characteristics are important to you in a sustainably managed company? (Please tick the appropriate answer for each statement).

	completely unimportant	**unimportant**	**important**	**very important**
Fewer resources were consumed in production (e.g. through energy savings).	☐	☐	☐	☐
Less fertilizer (e.g. nitrogen, phosphate) was used for production.	☐	☐	☐	☐
Fewer pesticides were used in production or biological pesticides and beneficial insects were used.	☐	☐	☐	☐
Water was used sparingly in production.	☐	☐	☐	☐
The plants grow in a peat-reduced substrate (plant soil).	☐	☐	☐	☐
The plants were produced in a soil-protecting process.	☐	☐	☐	☐
The diversity of plants in the production and production environment was promoted.	☐	☐	☐	☐

Greenhouse gas emissions in production have been reduced.	☐	☐	☐	☐
Recyclable materials were used in production.	☐	☐	☐	☐

5. Corporate responsibility

You buy sustainably produced fruit or vegetables. The sustainable management of the production companies is compared to conventional production companies. Which characteristics are important to you in a sustainably managed company? (Please tick the appropriate answer for each statement).

	completely unimportant	**unimportant**	**important**	**very important**
The company has long-term goals and a mission statement for the orientation of managers and employees.	☐	☐	☐	☐
The company promotes regional value added by cooperating with local suppliers and customers.	☐	☐	☐	☐
Quality is ensured by certification and is recognizable for the consumer.	☐	☐	☐	☐
The company takes responsibility for the quality and safety of the plants.	☐	☐	☐	☐
The company pays attention to a responsible and transparent cooperation with suppliers and customers.	☐	☐	☐	☐
Management promotes change and innovation within the company.	☐	☐	☐	☐

6. Economic sustainability

You buy sustainably produced fruit and vegetables. Economic sustainability in production is considered in comparison to conventional production. Which characteristics are important to you in a sustainably managed company? (Please tick the appropriate answer for each statement).

	completely unimportant	**unimportant**	**important**	**very important**
The operating revenue can cover all operating costs.	☐	☐	☐	☐
The company achieves a high profit.	☐	☐	☐	☐
The company invests more than is consumed, for example, by the wear and tear and aging of buildings and machinery.	☐	☐	☐	☐

The company has financial stability and is creditworthy.	☐	☐	☐	☐

7. Personal details

What year were you born? ___ ___

I am …

1 ☐…male.	2 ☐…female.

I am …

1 ☐ …married.	3 ☐ …in a partnership.
2 ☐ …single.	4 ☐ … widowed.

What is your highest vocational training qualification?

1 ☐ Still school/vocational training	5 ☐ University of Applied Sciences degree
2 ☐ School-leaving certificate	6 ☐ University degree (Bachelor/Master/Diplom)
3 ☐ Apprenticeship/vocational training	7 ☐ PhD
4 ☐ Technical college degree (foreman/technician)	8 ☐ Without a degree

Please describe your current professional situation!

1 ☐ Full-time employment	5 ☐ Housewife/Husband
2 ☐ Part-time employment	6 ☐ Unemployed
3 ☐ In school/vocational training or studies	
4 ☐ Pensioner	

Please enter your zip code. ___ ___ ___ ___ ___

Table A2.1: Mean value comparison between the two samples.

	Vegetables and Fruit	**Ornamental Plant and Tree Nursery**	***p*-Value**
	Mean Value	**Mean Value**	
Factor 1: Ecological sustainability/environment			
Fewer pesticides were used in production or biological pesticides and beneficial insects were used.	3.332	3.229	0.017 **

The plants were produced in a soil-protecting process.	3.282		
Less fertilizer (e.g., nitrogen, phosphate) was used for production.	3.526	3.424	0.008 ***
Recyclable materials were used in production.	3.399	3.323	0.099 *
Greenhouse gas emissions in production have been reduced.	3.415	3.299	0.013 **
The plants grow in a peat-reduced substrate (plant soil).	2.826	2.938	0.061 *
Water was used sparingly in production.	3.228	3.174	0.224
Fewer resources were consumed in production (e.g., through energy savings).	3.438	3.368	0.120
The diversity of plants in the production and production environment was promoted.	3.096	3.174	0.001 ***
Factor 2: Economic sustainability			
Stability: The company has financial stability and is creditworthy.	2.729	2.451	0.001 ***
Investment: The company invests more than is consumed, for example, by the wear and tear and aging of buildings and machinery.	2.618	2.563	0.004 ***
Liquidity: The operating revenue can cover all operating costs.	2.793	2.479	0.000 ***
Profitability: The company achieves a high profit.	2.762	2.660	0.023 **
Factor 3: Social sustainability/employees			
The company's human resources management pays attention to employee satisfaction.	2.987	2.597	0.000 ***
The company remunerates its employees appropriately.	3.231	2.875	0.000 ***
The occupational safety and health of the employees is taken care of by the company.	3.376	3.090	0.000 ***
The company promotes the training and further education of its employees.	2.896	2.639	0.000 ***
The company is in dialogue with critics and contributes to the resolution of conflicts.		2.681	

Factor 4: Corporate responsibility			
The company has long-term goals and a mission statement for the orientation of managers and employees.	2.995	2.965	0.823
Quality is ensured by certification and is recognizable for the consumer.	3.236	3.090	0.002 ***
Management promotes change and innovation within the company.		2.951	0.982

Chapter 3

Figure A3.1: Interactive structure of the terms reputation, image and identity.

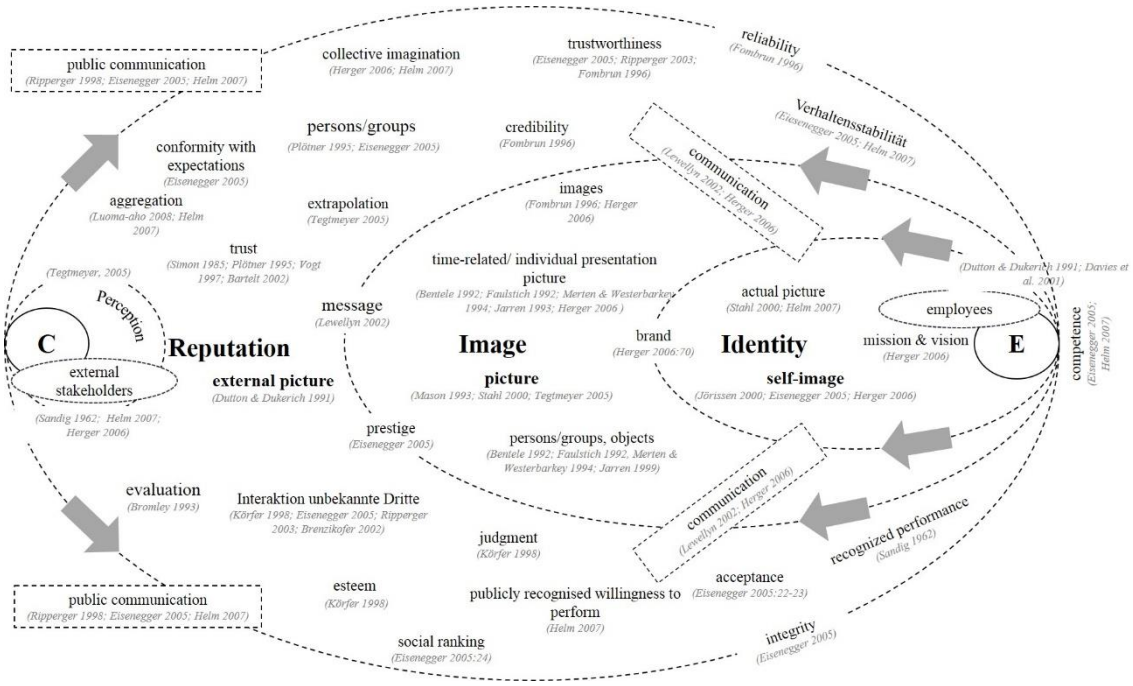

Table A3.1: Reputation indicators summarized according to factor.

Factor/Indicator	Company	Sector/ Group	Source
Employee satisfaction			
Human resource management	X		Fryxell & Wang, 1994
Attractiveness to managers	X		manager magazin, 2005
Employee orientation	X		manager magazin, 2005; Schwalbach, 2013
Behaviour towards employees	X		Helm, 2007

Dealing with employees		X	Albersmeier & Spiller, 2010
Exemplary function	(X)		Schwalbach, 2013
Team spirit	(X)		Schwalbach, 2013
Workstation (field)	X		Fombrun et al. 2015
Perception of employee needs		X	Geiser, 2015
Economy			
Long-term investment	X		Fryxell & Wang, 1994
Financial stability	X		Fryxell & Wang, 1994
Company assets	X		Fryxell & Wang, 1994
Earnings and financial strength	X		manager magazin, 2005
Entrepreneurial success	X		Helm, 2007
Financial situation of the company	X		Helm, 2007
Financial solidity	X		Schwalbach, 2013
Financial capacity	X		Fombrun et al. 2015
Consistent business success		X	Geiser, 2015
Social affairs			
Social responsibility	X		Fryxell & Wang, 1994
Engagement in charity	X		Helm, 2007
Social commitment and awareness		X	Hautzinger, 2009
Corporate social responsibility		X	Albersmeier & Spiller, 2010
Social commitment	(X)		Schwalbach, 2013
Awareness of social responsibility		X	Geiser, 2015
Responsibility	X		Fombrun et al. 2015
Management			
Quality of management	X		Fryxell & Wang, 1994; manager magazin, 2005; Schwalbach, 2013
Qualifications of management	X		Helm, 2007
Strategic competence	(X)		Schwalbach, 2013
Assertiveness	(X)		Schwalbach, 2013
Accurate action		X	Geiser, 2015

Management	X		Fombrun et al. 2015
Control system	X		Fombrun et al. 2015
Credibility			
Keeping advertising promises	X		Helm, 2007
Imposition of high commitments		X	Hautzinger, 2009
Seriousness		X	Hautzinger, 2009
Free from scandal		X	Hautzinger, 2009
Transparency		X	Albersmeier & Spiller, 2010
Credibility	(X)	X	Schwalbach, 2013; Hautzinger, 2009; Albersmeier & Spiller, 2010
Credible communication		X	Geiser, 2015
Environment			
Environmental orientation	X		manager magazin, 2005
Commitment to environmental protection	X		Helm, 2007
Environmentally friendly behaviour		X	Hautzinger, 2009; Geiser, 2015
Environmental protection		X	Albersmeier & Spiller, 2010
Animal welfare		X	Albersmeier & Spiller, 2010
Sustainable management	X		Schwalbach, 2013
Products & services			
Quality of products and services	X	X	Fryxell & Wang, 1994; Hautzinger, 2009; Schwalbach, 2013
Product quality	X	X	manager magazin, 2005; Helm, 2007 Albersmeier & Spiller, 2010;
Products/services have only minor negative side effects		X	Hautzinger, 2009
Reliability		X	Albersmeier & Spiller, 2010
Products & services	X		Fombrun et al. 2015
Innovation			
Innovations	X	X	Fryxell & Wang, 1994; Fombrun et al. 2015; Geiser, 2015

Innovative strength	X		manager magazin, 2005
Innovation capability	X		Schwalbach, 2013
Customers			
Customer orientation	X		manager magazin, 2005; Schwalbach, 2013; Helm, 2007
Knowledge		X	Albersmeier & Spiller, 2010
Perception of customer needs		X	Geiser, 2015
Communication			
Communication performance	X		manager magazin, 2005
Media coverage		X	Hautzinger, 2009
Communication skills	(X)		Schwalbach, 2013
Monetary attributes			
Value for money	X	X	manager magazin, 2005; Helm, 2007; Geiser, 2015
Low-cost production		X	Albersmeier & Spiller, 2010
Emotions			
Trust	X		Wiedmann, 2012
Admiration	X		Wiedmann, 2012
Positive basic attitude	X		Wiedmann, 2012
Esteem	X		Wiedmann, 2012
Location acceptance		X	Albersmeier & Spiller, 2010
Attractiveness as an employer		X	Albersmeier & Spiller, 2010
Social protest		X	Albersmeier & Spiller, 2010
Meat consumption		X	Albersmeier & Spiller, 2010
Trust in meat		X	Albersmeier & Spiller, 2010
Attitude towards meat industry		X	Albersmeier & Spiller, 2010
Relation to meat industry		X	Albersmeier & Spiller, 2010
Corporate development			
Dynamic growth	X		manager magazin, 2005
Internationalization	X		manager magazin, 2005

Independence	X		manager magazin, 2005
Policy			
Political control pressure		X	Albersmeier & Spiller, 2010

Chapter 4: Questionnaire for horticultural consultants

1. What do you associate with the term horticulture? Please explain briefly. (Free text)

2. Which 3 products do you spontaneously associate with horticulture? (Free text)

3. How do you assess the reputation of German horticulture in society?

	… very bad reputation				**...very good reputation**			**I can't tell you.**
	1	**2**	**3**	**4**	**5**	**6**	**7**	
The German horticulture has in the society a...								

4. Please justify your assessment of the industry's reputation in the company! (Free text)

5. Please evaluate how the individual horticultural segments influence the reputation of the entire horticultural sector.

Example question: Does vegetable growing have a positive or negative impact on the reputation of the entire horticultural sector?

The reputation of the segment influences the reputation of the entire horticultural sector...	**...strongly negative**				**...very positive**			**I can't tell you.**
	-3	**-2**	**-1**	**0**	**1**	**2**	**3**	
Vegetable growing								
Fruit growing								
Ornamental horticulture								
Tree nursery								
Gardening and landscape construction								
Retail and floristry								
Garden art, cemeteries, parks, gardening exhibitions								
Others, namely:								

6. Please evaluate to how much the reputation of the entire horticultural sector influences the reputation of the individual horticultural segments.

Example question: Does the reputation of the entire horticultural sector have a positive or negative influence on vegetable growing?

The reputation of the horticultural sector influences the reputation of the individual segments...	**...strongly negative**				**...very positive**			**I can't tell you.**
	-3	**-2**	**-1**	**0**	**1**	**2**	**3**	
Vegetable growing								
Fruit growing								
Ornamental horticulture								
Tree nursery								
Gardening and landscape construction								
Retail and floristry								
Garden art, cemeteries, parks, gardening exhibitions								
Others, namely:								

7. In your opinion, which characteristics influence the reputation of horticulture in society? Please assign them.

The reputation of the horticultural industry is … ...by this characteristic.	**…little influenced …**				**… strongly influenced...**			**I can't tell you.**
	1	**2**	**3**	**4**	**5**	**6**	**7**	
Product and service								
Innovation								
Cost-benefit ratio								
Customer focus								
Employee satisfaction								
management and organisation								
Economic performance								
Sector development								

Social responsibility								
Environmental impact								
Communication and presentation in the media								
credibility								

8. How strongly are the following characteristics influenced by the public reputation of horticulture? Please assign them.

The reputation of the horticultural industry influences the characteristic...	**...little strong**				**...very strong.**			**I can't tell you.**
	1	**2**	**3**	**4**	**5**	**6**	**7**	
Trust								
Admiration								
Positive basic stance towards Horticulture								
Esteem								
Location acceptance								
Social protest								
Consumption of horticultural products								
Attitude towards horticulture								
Relation to horticulture								

9. Please name and briefly describe other characteristics that have a significant influence on the reputation of horticulture in society. (Free text)

10. Please assign the company you work for to one of the areas below.

Production material		Technique		Other	
Plant protection	□	Greenhouse construction	□	Consultation	□
Seeds	□	Measuring and control technology	□	marketing	□
Fertilisation	□	Heating construction	□	Associations, institutions	□
Soils, peat and substrate	□	Machinery and equipment	□	marketing	□
		irrigation and drainage	□	Publishers, journals	□

	refrigeration	□	Others, namely:	□
	tools	□		

11. Which segment would you most likely classify yourself or your company in?

Vegetable growing	□	cemetery horticulture	□
Fruit growing	□	agriculture	□
Ornamental horticulture	□	food industry	□
Tree nursery	□	processing	□
Gardening and landscape construction	□	Others, namely	□
Retail and floristry	□		

Chapter 5

Table A5.1: Summary of the hypotheses

		Hypothesis confirmed
H1	The more innovatively gardens and green spaces are designed, the better the reputation.	✓
H2	The more attractive and aesthetic the green spaces and gardens, the better the reputation.	✗
H3	The more technically skilled and professionally maintained and created the gardens and green spaces, the better the reputation.	✓
H4	The more carefully the environment has been managed and the greater the contribution to a varied landscape, the better the reputation.	(✓)
H5	The better the working conditions for the employees, the better the reputation of the segment (H5).	(✓)
H6	The greater the commitment to green recreational spaces and sustainable, healthy living spaces in the city, the better the reputation.	(✓)
H7	The more communicative, customer-oriented and active the gardening and landscaping industry is in society, the better its reputation.	✗

H8	The greater the media presence, the better the reputation.	✓
H9	The more economically successful the entrepreneurs within the segment as well as the segment as a whole are, the better the reputation.	✗
H10	The stronger the turnover and size of the businesses grow, the better the reputation (H10).	✓
H11	The better the reputation, the more positive the attitude towards gardening and landscaping.	✓
H12	The better the reputation, the higher the appreciation of entrepreneurs and the entire segment.	✓
H13	The better the reputation, the higher the acceptance of the location for entrepreneurs and the entire segment in the neighbourhood (H13).	✓

✗: Hypothesis was not confirmed, ✓: Hypothesis was confirmed through a significant relationship, (✓): Hypothesis was confirmed, relationship is only weakly significant.

Questionnaire for consumers on gardening and landscaping

1. Personal details

I am …

1 ☐ male.	2 ☐ female.	3 ☐ diverse.

What year were you born? ___ ___

How many people live in your town?

1 ☐ less than 2 000 inhabitants	5 ☐ 50 001 – 100 000 inhabitants
2 ☐ 2 001 – 5 000 inhabitants	6 ☐ 100 001 – 500 000 inhabitants
3 ☐ 5 001 – 20 0000 inhabitants	7 ☐ 501 000 or more inhabitants
4 ☐ 20 001 – 50 000 inhabitants	

Please enter your zip code. ___ ___ ___ ___ ___

Please state your highest school-leaving qualification.

1 ☐ Still school/vocational training	5 ☐ Advanced technical college entrance qualification
2 ☐ Certificate of secondary education	6 ☐ No general school leaving certificate

3 ☐ Certificate of polytechnic secondary education	7 ☐ No specification of the type of qualification
4 ☐ General certificate of secondary education	

What is your highest vocational qualification?

1 ☐ Vocational training	6 ☐ Diploma
2 ☐ Technical college degree	7 ☐ Doctorate
3 ☐ University of applied sciences degree	8 ☐ Without vocational qualification
4 ☐ Bachelor's degree	9 ☐No specification of the type of vocational qualification
5 ☐ Master's degree	

Please state your monthly household net income.

1 ☐ less than 1 000€	5 ☐ 3 001 to 4 000 €
2 ☐ 1 001 to 2 000 €	6 ☐ 4 001 to 7 000 €
3 ☐ 2 001 to 2 500 €	7 ☐ more than 7 001 €
4 ☐ 2 501 to 3 001 €	

2. Knowledge

What is gardening for you? (Free text)

What is gardening and landscaping for you? (Free text)

What activities do you associate with gardening and landscaping? (Free text)

Activity 1:

Activity 2:

Activity 3:

How well do you know the work of the German gardening and landscaping industry?

1 ☐ I know quite a lot about the work of gardening and landscaping.
2 ☐ I am familiar with the work of gardening and landscaping.
3 ☐ I know a little about the work of gardening and landscaping.
4 ☐ I know nothing about the work of gardening and landscaping.

3. Relation to horticulture

Do you know people (relatives, acquaintances, friends) whose profession has something to do with gardening and landscaping?

1 ☐ Yes

2 ☐ No.

3 ☐ I am involved in gardening and landscaping by myself.

When I think of gardening and landscaping, a few companies spontaneously come to mind.

1 ☐ Yes

2 ☐ No.

Have you ever hired a gardening and landscaping company?

1 ☐ Yes

2 ☐ No.

4. The reputation of horticulture

How good do you think the reputation of the following sectors (or segments) is in society?

	-3 (very bad reputation)	**-2**	**-1**	**0**	**1**	**2**	**3 (very good reputation)**
Gardening and landscaping							
Fruit growing							
Horticulture							
Agriculture							
Automotive industry							
Banking							
Confectionery industry							
Chemical industry							

5. The reputation of gardening and landscaping

Please indicate how much you agree with the statements.

German gardening and landscaping stands for...

	-3 Fully reject)	-2	-1	0	1	2	3 Fully agree
... innovative design concepts.							
... for attractive green spaces and gardens							
... the creation and maintenance of green spaces and gardens according to good professional practice.							
... the design of environmentally friendly green spaces.							
... seasonal outdoor work.							
... social commitment in the immediate neighbourhood (e.g. in associations).							
... for open communication and open-mindedness towards customer wishes							
... frequent media presence.							
... sales growth							

Now you will read once again about characteristics of German gardening and landscaping. Please think about these characteristics again. Please indicate how much the statements apply to the German gardening and landscaping sector.

	-3 Fully reject)	-2	-1	0	1	2	3 Fully agree
The gardening and landscaping industry designs gardens and parks with innovative ideas and production techniques.							
Aesthetic green spaces and gardens are created by gardening and landscaping.							
The creation or maintenance of green spaces and gardens is carried out in a technically and technically professional manner.							

Gardening and landscaping create a varied landscape.	
Working conditions are characterised by physically hard work.	
Green spaces contribute to a healthy environment and sustainable living and recreational spaces in the city.	
The gardeners and landscapers present themselves actively in society and work in a strongly customer-oriented way.	
Green spaces and garden shows are regularly reported on in regional media.	
Gardening and landscaping is a relevant pillar of the German economy.	
The number of gardening and landscaping businesses will continue to increase in the future.	

What is your opinion of the following statements regarding the German gardening and landscaping sector?

	-3 Fully reject)	**-2**	**-1**	**0**	**1**	**2**	**3 Fully agree**
When I think of parks and green spaces that are created by by gardeners and landscapers I have a positive feeling.							
Before the services of gardening and landscaping I have great respect.							
I wouldn't mind if 500 m away from my house a gardening and landscaping company were to be built.							

6. Properties of gardening and landscaping

Are you aware of this information about gardening and landscaping?

Public and private green spaces, leisure and sports facilities are created and maintained by gardening and landscaping.

The gardening and landscaping sector is also involved in the greening of traffic structure and other infrastructure projects.

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1 ☐ Yes

2 ☐ No.

Are you aware of this information about gardening and landscaping?

More than half of the landscaped and maintained green spaces are private gardens.

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1 ☐ Yes

2 ☐ No.

Are you aware of this information about gardening and landscaping?

Gardening and landscaping is the strongest sector in German horticulture in terms of turnover.

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1 ☐ Yes

2 ☐ No.

Are you aware of this information about gardening and landscaping?

Gardening and landscaping uses plants from production horticulture in the shaping process.

Planting substrates, natural building materials, rubble and wood are also used.

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1 ☐ Yes

2 ☐ No.

Are you aware of this information about gardening and landscaping?

Gardening and landscaping creates gardens according to the specifications of landscape architects.

But gardening and landscaping also maintains existing green spaces.

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1 ☐ Yes

2 ☐ No.

Are you aware of this information about gardening and landscaping?

Machines are used for earthworks and to make the work easier.

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1 ☐ Yes
2 ☐ No.

7. The reputation of gardening and landscaping

Now that you have received some information about gardening and landscaping, your impression of gardening and landscaping may have changed. Therefore, I would like to ask you to reassess the characteristics of gardening and landscaping that you have read before.

Please indicate how much you agree with the statements.

German gardening and landscaping stands for...

	-3 Fully reject)	**-2**	**-1**	**0**	**1**	**2**	**3 Fully agree**
... innovative design concepts.							
... for attractive green spaces and gardens							
... the creation and maintenance of green spaces and gardens according to good professional practice.							
... the design of environmentally friendly green spaces.							
... seasonal outdoor work.							
... social commitment in the immediate neighbourhood (e.g. in associations).							
... for open communication and open-mindedness towards customer wishes							
... frequent media presence.							
... sales growth							

How good do you think the reputation of the following sectors (or segments) is in society?

	-3 (very bad reputation)	**-2**	**-1**	**0**	**1**	**2**	**3 (very good reputation)**
Gardening and landscaping							
Fruit growing							

Horticulture
Agriculture

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Die Zeit wird mir in sehr positiver Erinnerung bleiben.

Curriculum Vitae

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05/2016 bis 10/2016	**Thünen-Institut für Betriebswirtschaft, Braunschweig** Praktikantin zur Anfertigung der Masterarbeit
08/2015 bis 05/2016	**Agrarsoziale Gesellschaft e.V. Göttingen** Wissenschaftliche Hilfskraft

Studium und Schuldbildung

10/2016 bis 12/2022	**Gottfried Wilhelm Leibniz Universität Hannover** Promotion (Dr. rer. hort.)
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