

COMPETITIVE PAPERS

THE ROLE OF PRODUCT INFORMATION FOR WINE INNOVATION ADOPTION: THE CASE OF FUNGUS RESISTANT GRAPE VARIETIES

Lucas Nesselhauf, Heilbronn University of Applied Sciences

Ruth Fleuchaus, Heilbronn University of Applied Sciences

Ludwig Theuvsen, University of Goettingen

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Abstract

Fungus resistant grape varieties (in the following: FRGVs) as eco-innovation in the wine industry could be the key to a significantly lower use of fungicides and therefore, to sustainable wine growing. The purpose of this paper is to examine the link between information about the environmental benefits of FRGVs and the purchase probability. This study is based on an online survey among 1,500 German wine consumers. The results show that the information increases the purchase probability. The information is particularly relevant for women, young and environmentally conscious consumers. Therefore, environmentally conscious consumers are a first target group for the diffusion of FRGVs. Moreover, the results show that more involved consumers tend to be more open to buy FRGV wines. The paper shows that information about the environmental benefits can accelerate the adoption of FRGVs as eco-innovation and that their target group of green-minded consumers might be best approached in organic grocery stores.

Introduction

Wine is deeply embedded in the European culture. Therefore, it is not surprising that about 60 percent of the global wine production comes from Europe (Deutsches Weininstitut, 2017).

Nevertheless, only seven percent of the European farmland is used for wine growing. Alarmingly, 70 percent of all fungicides used in Europe are used for grapes (Eurostat, 2000). These figures clearly show that the wine industry needs to find new, innovative solutions to reduce the amount of fungicides used in vineyards.

Fungus resistant grape varieties (FRGVs, in German: PIWIs) could be a part of the solution. FRGVs have one significant benefit compared to common grape varieties: they need fewer fungicides. Due to natural (not genetically modified) cross-breeding of fungus resistant varieties with European grape varieties, the FRGVs have developed a natural resistance against powdery and downy mildew. This

natural resistance allows wine growers to reduce the amount of fungicides by around 70 to 80 percent (Pedneault and Provost, 2016).

The FRGVs' environmental benefit is undoubted, however, only around 2.5 percent of the German wine-growing area is planted with FRGVs (Statistisches Bundesamt, 2016). So far, wine growers do not plant FRGVs on a large scale because they doubt the commercial success of FRGVs. These grape varieties have new names and a different, yet pleasing taste. The biggest issue for wine growers is that consumers are currently not aware of FRGVs (Pedneault and Provost, 2016). Thus, consumers do not actively look for these varieties while purchasing wine.

Since FRGVs can be seen as an eco-innovation in the wine industry, the question arises whether it is possible to accelerate the diffusion of these innovative grape varieties. This paper seeks to answer this question and tries to identify target groups for wines made from FRGVs. The aim of this study is to characterize possible early adopters and the early majority adopting FRGVs regarding their attitudes and their socio-demographics. Therefore, an online survey among 1,500 German wine consumers was conducted to investigate whether information about the environmental benefits of FRGVs can serve as a means to promote the adoption of FRGVs among consumers.

Beginning with a literature review about innovation adoption, environmentalism and involvement, the paper leads to the hypotheses and the methodology section. This is followed by the results and the managerial implications drawn from this study. At last, the conclusion with limitations and recommendations for further research is drawn to top this paper off.

Literature Review and Problem Studied

The relevant literature for this study stems from three different fields of research. First, the following section examines the literature on innovations and the influence of information on the adoption process. The second part sheds light on the link between environmentalism and wine. The last section of the literature review focuses on the wine product involvement which is widely used to analyse consumer behaviour. In addition, the section connects FRGVs with the extant literature in the three research areas. So far, there is no literature approaching the subject of the marketing of FRGVs and how these varieties can be promoted to consumers, which is one of the gaps in existing research that this paper attempts to fill.

Innovation and Information

Innovations of all kinds are a widely discussed topic among academics and practitioners (Fagerberg et al., 2012; Karakaya et al., 2014; Peres et al., 2010; Rogers, 2003). However, innovations face one main problem: the diffusion. Diffusion describes the process of spreading new products and services among individuals. Typically, individuals adopting innovations are characterised in different groups depending on how early they adopt the innovation: innovators, early adopters, early and late

majority, and laggards. In the diffusion of innovations, the innovators adopt the new product or service first, followed by the other groups mentioned above. The laggards are the last group to adopt the innovation (Rogers, 2003).

Ram and Sheth (1989) explain why consumers are hesitant to adopt beneficial innovations. The authors identify five main barriers that innovations need to overcome: (1) value barriers, (2) usage barriers, (3) risk barriers, (4) tradition barriers, and (5) image barriers. The first three barriers are classified as 'functional barriers' and the last two as 'psychological barriers'. The tradition barrier is particularly relevant for new foods and beverages. Therefore, the authors state that changing food consumption habits is a possibly long and difficult route. Educating consumers about the benefits of the new product, understanding and respecting the consumers' habits is the strategy to overcome the tradition barrier (Ram and Sheth, 1989). Based on that insight, Atkin, Garcia and Lockshin (2006) use the theory of innovation barriers to examine the adoption of screw cap closures in three different countries and confirm Ram and Sheth's (1989) findings. Information about the advantages of the innovations fosters the diffusion; the information can be spread among the consumers via educational advertisements as well as through word-of-mouth marketing (Atkin et al., 2006).

According to Rogers (2003), a product or an idea needs to appear to be new to an individual in order to be described as an innovation. Following Rogers' (2003) definition, FRGVs meet this requirement, so these grape varieties can be considered to be an innovation. Furthermore, the environmental advantages of FRGVs classify this innovation as an eco-innovation according to Karakaya et al. (2014). Adopting FRGVs from a consumer's perspective implies trying a new grape variety with a possibly new and unknown flavour profile. Opting for FRGV wines also means that the production of this wine is less harmful for the environment than wines made of traditional grape varieties. Most consumers, however, are not aware of this fact and have not yet come across wines produced with FRGVs. This information might be able to overcome the aforementioned tradition barrier. Thus, educating consumers could speed up the diffusion of FRGVs.

Environmentalism and Wine

The environmental advantages of FRGVs entail the link to green-minded consumers. So far, however, no study examines the link between environmentalism and the consumers' attitude towards FRGVs. Furthermore, apart from quality and taste perception studies, FRGVs have not been the topic of consumer or marketing studies so far (Pedneault and Provost, 2016). Generally speaking, organic and sustainable wines only gained attention in the course of the past decade. While Lockshin and Corsi (2012) ascribe organic and sustainable wine a small consumer segment, Schäufele and Hamm (2017) see more potential in this segment, partly due to policy changes. Hence, academia also shifted their focus on consumers of sustainable and organic wine. Many studies examine the price premium for

environmentally friendly wines (Sellers, 2016; Sogari et al., 2016; Vecchio, 2013) and the influence of labels on consumer behaviour (Loureiro, 2003; Pomarici and Vecchio, 2014; Sogari et al., 2015). Only few studies investigate the link between consumers' environmentalism and the consumption of sustainable and organic wine. D'Amico et al. (2016) suggest that consumers with more environmental concerns tend to pay higher price premiums for organic wine. Furthermore, Barber et al. (2009) show that environmental involvement increases the objective environmental wine knowledge, which in turn increases the attitude towards sustainable wine and the purchase probability.

Wine Product Involvement

The concept of the product involvement describes an individual's perceived relevance of a product category or even a product in general (Zaichkowsky, 1986). The product involvement has proven to be of great value for the analysis of wine purchase behaviour and the segmentation of wine consumers (Barber et al., 2007; Hirche and Bruwer, 2014; Lockshin et al., 2001; Taylor et al., 2018). Consumers focus on different wine product attributes depending on their level of involvement (Barber et al., 2007; Hirche and Bruwer, 2014; Zaichkowsky, 1988). The price cue is of lower interest for consumers with higher levels of involvement (Barber et al., 2007; Zaichkowsky, 1988). Moreover, consumers with a high involvement in wine tend to lay more weight to the origin of the wine (Quester and Smart, 1998), place more importance on the vintage, the grape variety and the brand (Hirche and Bruwer, 2014), and consume more wine than their lower involved counterparts (Hirche and Bruwer, 2014).

Barber et al. (2009) examine the relationship between wine product involvement, environmental involvement, subjective and objective environmental wine knowledge. The results suggest that the main precedent of objective environmental wine knowledge is the environmental involvement. Their study shows that a higher wine product involvement does not necessarily mean that the consumers are aware of environmental issues within the product category.

The review of the literature about innovation adoption, information, environmentalism and involvement regarding wine suggests that there is a research gap that this paper seeks to fill. As Pedneault and Provost (2016) state, the commercialisation of FRGVs needs to be part of further research. The question that this study will answer is whether information about the environmental benefits of FRGVs can foster the adoption of these varieties. And if so, what are the socio-demographics and the attitudes of those people who are willing to purchase these varieties. As shown in the literature review, especially the wine product involvement and the environmentalism could lead to more insights regarding the adoption process. The next section will develop hypotheses in order to analyse these questions.

Hypotheses

Based on the extant literature about information about and in the context of innovations, the first hypothesis is as follows:

- H₁: The information about the environmental advantages of FRGVs influences the purchase probability positively.

The information about the FRGVs serves as a means to overcome the tradition barrier as suggested by Ram and Sheth (1989). The educating text helps consumers to identify the link between these specific grape varieties and the environmental consequences of wine growing and consumption.

The following hypotheses concern the initial purchase probability. Hence, the participants have not been aware of the information about the FRGVs' benefits for the environment so far. Therefore, these hypotheses consider the participants' involvement and their current knowledge about these varieties.

- H₂: The initial purchase probability increases with an increasing level of wine product involvement.

- H₃: The initial purchase probability increases with an increasing number of individually known FRGVs.

The reasoning for H₂ is mainly that more involved participants might have a more thorough expertise about wine in general and could thus be more receptive to new and unknown varieties. Moreover, the name 'fungus resistant' might be easier to understand for more involved participants.

Furthermore, it is reasonable to assume that consumers' environmentalism would influence the initial purchase probability as well. Participants who are more environmentally aware would possibly be informed about FRGVs and therefore, the fourth hypothesis is as follows:

- H₄: The initial purchase probability increases with an increasing level of environmentalism.

Regarding the change of purchase probability, it is arguable that the number of known FRGVs does not come into play. Whether participants know many FRGVs or only a few is not relevant for the influence of the information provided.

- H₅: The influence of the information about FRGVs is independent from the number of individually known FRGVs.

Following Barber et al. (2009), the wine product involvement would have no influence on the actual knowledge about the environmental issues. Therefore, the information about the FRGVs' benefits would influence more involved participants in the same way as less involved participants.

- H₆: The influence of the information about FRGVs is independent from the level of involvement.

Based on the results from D’Amico et al. (2016), the relationship between the information about the FRGVs’ environmental benefits and the participants’ environmentalism is supposed to be positive.

Therefore, the seventh hypothesis is as follows:

H₇: The influence of the information about FRGVs is more important to participants with higher levels of environmentalism.

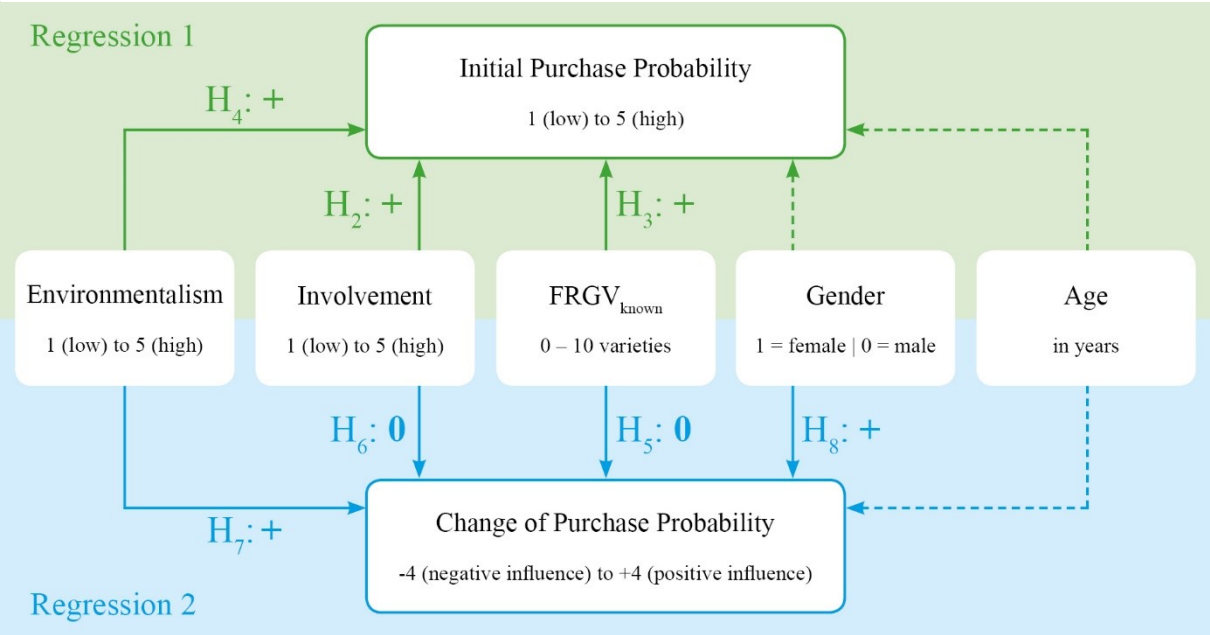
At last, the literature shows that gender plays a role in analysing the consumer behaviour regarding organic and environmentally friendly wines (Schäufele and Hamm, 2017). Women tend to consume more organic wine (Mann et al., 2012). Since the information about the environmental benefits of FRGVs are not present in the elicitation of the initial purchase probability, the following hypothesis only relates to the change of purchase probability.

H₈: The information about FRGVs is more important for women than for men.

Because the literature on organic wine and the age of consumers is not conclusive, the age of the participants will be analysed within the regression analysis, but is not part of any of the hypotheses.

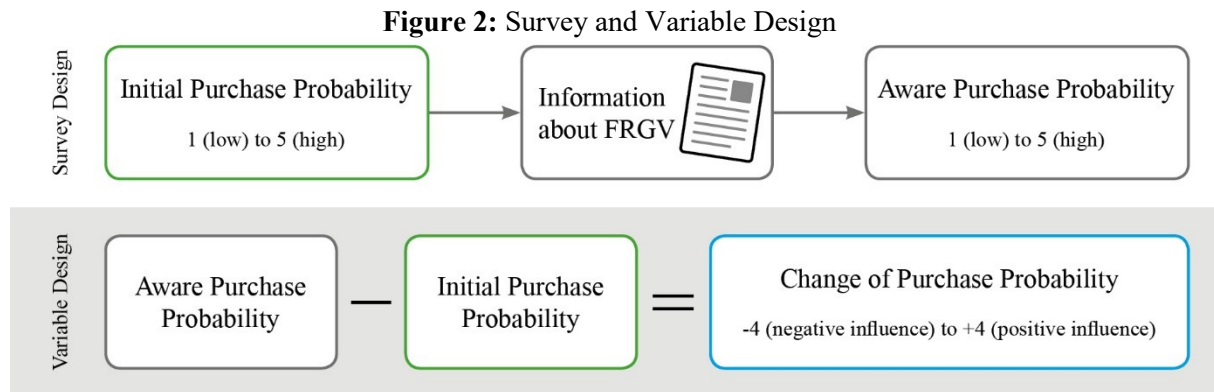
Figure 1 visualizes the eight hypotheses with all variables and the respective scale.

Figure 1: Model Design and Visualisation of Hypotheses



Research Methodology and Dataset

The basis for this study is an online survey among 1,500 German wine consumers. The participants of the survey were selected with a quota sampling method within an online access panel. The quota for age and gender were obtained from the “b4p - best for planning” data about the wine drinking population in Germany. Another screening parameter for the participants of the survey was their



wine consumption. All participants consume wine at least once per month.

After the screening questions, the participants were asked about the grape varieties they know. First, each participant had to select whether they prefer red or white wines, and accordingly they were shown a list of 20 grape varieties. Ten of these grape varieties were the most common grape varieties in Germany, such as Riesling and Chardonnay or Pinot Noir and Merlot. The remaining ten grape varieties were FRGVs that are available in Germany, such as Cabernet Blanc and Regent. The number of FRGVs that the participant knows is reflected in the variable $FRGV_{known}$.

The main items for this study are the questions about the purchase probability for wines made of FRGVs in combination with an information text about FRGVs for consumers. First, the participants were asked “Would you buy wines made of strong, fungus resistant grape varieties given that the price is acceptable?” (5-point rating scale from ‘yes, sure’ to ‘no, certainly not’). Hence, the first question is labelled as ‘initial purchase probability’ (IPP). This first question was followed by the information text about FRGVs for consumers. Third, the first question was asked again to measure the difference that is attributable to the information text. This second question is labelled as ‘aware purchase probability’ (APP). As a further variable, the ‘change of purchase probability’ (CPP) was calculated by subtracting the IPP from the APP. Figure 2 shows the survey design and the variable design of the CPP.

The information about FRGV focus on the environmental advantages while avoiding the defamation of traditional grape varieties. For the survey, the name ‘PIWI’ was avoided and replaced by ‘strong grape varieties’. The information consisted of the following text, originally formulated in German:

Strong grape varieties for a strong environment

Strong for the environment – Strong grape varieties are fungus resistant by nature and therefore, need fewer fungicides: the pollution from chemical pesticides can be reduced for plants, animals and humans.

Strong through fewer carbon emissions – Since fewer fungicides need to be sprayed with tractors, the carbon emissions – and obviously costs – can be reduced. Furthermore, the reduced demand for fungicides would lead to a lower production of fungicides. This also reduces the carbon emissions.

Strong through natural breeding – Strong, fungus resistant grape varieties are the result of cross breeding of European grape varieties and American or Asian wild grape varieties. Strong grape varieties are e.g. Cabernet Blanc and Sauvignon Gris (whites), Cabernet Cortis and Monarch (reds).

Strong for wine growing on every slope – Steep slopes are part of the tradition and the culture of winegrowing. The cultivation on extremely steep slopes is effortful and expensive. Thanks to the reduced amount of fungicides for strong grape varieties, less manual labour and effort is necessary.

As construct for the involvement in the product category wine, Hirche and Bruwer's (2014) wine product involvement construct was chosen. The construct combines ten items about wine consumption and wine related behaviour.

Table 1 lists the ten items of the construct.

Table 1: Wine Product Involvement Construct by Hirche & Bruwer (2014)

– I have good general knowledge about wine.	– Every now and then I visit a wine seminar.
– Other people often ask me advice regarding wine.	– Sometimes, when drinking wine, I like the intellectual challenge of complex tastes.
– Wine offers me relaxation and fun when life's pressures build up.	– I am or would consider getting a member in a wine club.
– I take particular pleasure from wine.	– I regularly attend wine events / festivals.
– I very much enjoy spending time in a wine shop.	– Every now and then I participate at a wine tasting.
All items on a 5-point Likert scale	Cronbach's α : 0.875

The nine items for the environmentalism construct (see **Error! Not a valid bookmark self-reference.**) originate from the feasibility study by Scholl et al. (2016). Their feasibility study for an environmentalism construct in Germany listed many items with regard to the behaviour and the attitude towards environmentalism. Due to the limited scope of this study's online survey, these nine items were selected to cover the environmentalism as good as possible. The nine items focus on actual consumption of organic food and sustainable products, and concerns about a sustainable lifestyle.

Table 2: Environmentalism Construct adapted from Scholl et al. (2016)

–It worries me when I think about the environment, in which our children and grandchildren will probably live.*	–We all have to cut back on our lifestyle to protect our natural basis of existence.*
–A functioning and natural environment is necessarily a part of a good life.*	–I often engage in social and ecological issues.*
–In Germany, the protection of the environment should be the first priority, even though it could mean less economic growth.*	–I pay attention to the sustainability of products (ecology, durability, fair working conditions).*
–We can solve our environmental problems by changing our economic system and our lifestyle.*	–Within the last four weeks, how often did you choose to buy organic food / beverages?***
	–Within the last two years, how often did you choose to buy environmentally friendly clothes?***

*Items on a 5-point Likert scale / ***Items on a 5-point frequency scale (never to always)

Cronbach's α : 0.886

The analysis of the sample and the following calculations were carried out with IBM SPSS Statistics 24. The sample of 1,500 German wine consumers is composed of 57.4 percent female and 42.6 percent male participants. The distribution of the age within the sample is as follows: (1) up to 29 years: 7.9 percent; (2) 30-39 years: 10.2 percent; (3) 40-49 years: 15.1 percent; (4) 50-59 years: 17.1 percent; (5) 60-69 years: 36.1 percent; and (6) over 70 years: 13.7 percent.

Table 3: Environmentalism and Involvement within the Sample

Construct	1 to 1.99	2 to 2.99	3 to 3.99	4 to 5	Total
Environmentalism	43 (2.9%)	239 (15.9%)	739 (49.3%)	479 (31.9%)	1,500
Involvement	230 (15.3%)	683 (45.5%)	478 (31.9%)	109 (7.3%)	1,500

The constructs for environmentalism and involvement show sufficient variation within the sample. Table 3 shows the distribution in four classes for both constructs. The attitude towards environmentalism is rather positive (mean: 3.56; median: 3.67; std. deviation: 0.74). On average, the sample reflects a medium involvement (mean: 2.76; median: 2.70; std. deviation: 0.77). The majority of the sample lies between 2 and 2.99 on the 5-point Likert scale.

The eight hypotheses will be analysed with the above mentioned constructs and variables. The following results section looks at each hypothesis separately after presenting the sample composition. The results section leads to a discussion of the results, which is followed by the implications.

Results

To analyse hypothesis H₁, the influence of an information about FRGVs on the purchase probability, a paired t-test with the variables IPP and APP, was carried out. The results (Table 4) show a significant positive change [$t(1499) = 17.054, p < 0.000$]. Therefore, the data clearly supports H₁. Due to the within subject design and the close proximity of the questions and the information, it can be

assumed that the participants, who changed their rating, did not know about the environmental advantages of FRGVs.

Table 4: Paired t-Test for the Influence of the Information

Mean	Std. Deviation	Std. Mean	Error	t	df	Sig.
0.326	0.740	0.019		17.054	1499	0.000

The analysis of the hypotheses H₂, H₃ and H₄ is based on a regression analysis of the variable *IPP* as dependent variable and the variables *Environmentalism*, *Involvement*, *FRGV_{known}*, *Age*, and *Gender* as independent variables. Table 5 shows the results of the regression analysis in detail. The R² of the model is 0.047 and the Cohen's effect size is 0.221, which stands for a small to medium effect size (Field, 2005).

The data supports hypotheses H₂ and H₃. The variables *Involvement* and *FRGV_{known}* are significant to an α-level of 0.05. The IPP increases with an increasing level of involvement, therefore, the highly involved participants are more open to purchasing wines made of FRGVs. As expected, the more FRGVs a participant knows, the higher the IPP. The variable *Environmentalism* is not significant (p > 0.05), hence H₄ cannot be supported. The level of environmental awareness does not influence the IPP. The variables *Age* and *Gender* are significant (p < 0.05). According to the data, the IPP increases with increasing age. Furthermore, men tend to have a higher IPP than women.

Table 5: Results of the First Regression Analysis - IPP

R	R ²	Adjusted R ²	Std. Error of the Estimate	Durbin-Watson	Cohen's Effect Size
0.216	0.047	0.043	0.787	2.017	0.221
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Constant	2.912	0.140		20.865	0.000
Environmentalism	0.019	0.029	0.017	0.643	0.520
Involvement	0.165	0.029	0.157	5.639	0.000
FRGV _{known}	0.032	0.014	0.061	2.275	0.023
Age	0.004	0.001	0.067	2.504	0.012
Gender (f = 1)	-0.099	0.043	-0.061	-2.289	0.022

$$\hat{y}_i = 2.912 + 0.165 \times Involvement_i + 0.032 \times PIWI_{known\ i} + 0.004 \times Age_i - 0.09 \times Gender_i$$

The regression to analyse the hypotheses H₅, H₆, H₇ and H₈ is set up with the CPP as dependent variable and the five variables *Environmentalism*, *Involvement*, *FRGV_{known}*, *Age* and *Gender* as independent variables. The CPP reflects the change in purchase probability that is attributable to the information about FRGVs.

Table 6 displays the results of the regression analysis. The R^2 of the model is 0.038 and the Cohen's effect size of 0.199 state a small effect (Field, 2005).

As hypothesized, the number of individually known FRGVs does not change the influence of the information provided. The variable $FRGV_{known}$ is not significant ($p > 0.05$). Thus, the data clearly supports H_5 . Moreover, the data supports H_6 , since *Involvement* is also not significant ($p > 0.05$). This means that no matter how involved the participants are, the influence of information about FRGVs does not depend on it. In other words, the text has the same influence for participants with low and high involvement.

However, participants that show a high environmental awareness, reflected by high values of *Environmentalism*, react more positively to the information about the environmental benefits of FRGVs. The effect of *Environmentalism* is significant ($p < 0.00$). This was hypothesized in H_7 and therefore, the data supports this hypothesis. Furthermore, the *Gender* variable is significant ($p < 0.00$) and positive. Hence, women tend to value the information on FRGVs more than men. Consequently, the data supports H_8 . In this regression analysis, *Age* is also significant ($p < 0.00$). However, the coefficient is negative. Therefore, the data shows that the influence of the text is greater on younger participants.

Table 6: Results of the Second Regression Analysis - CPP

R	R ²	Adjusted R ²	Std. Error of the Estimate	Durbin-Watson	Cohen's Effect Size
0.195	0.038	0.035	0.727	1.931	0.199
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Constant	0.097	0.129		0.750	0.454
Environmentalism	0.133	0.027	0.132	4.922	0.000
Involvement	-0.027	0.027	-0.028	-0.993	0.321
FRGV _{known}	-0.003	0.013	-0.007	-0.248	0.804
Age	-0.004	0.001	-0.088	-3.279	0.001
Gender (f = 1)	0.133	0.040	0.089	3.330	0.001
$\hat{y}_i = 0.097 + 0.133 \times Environmentalism_i - 0.004 \times Age_i + 0.133 \times Gender_i$					

To test for multicollinearity, the variance inflation factors for the regression analyses for model 1 and 2 were calculated. For both regression models, the variance inflation factors are between 1.114 and 1.210. These results mean that multicollinearity can be ruled out in both regressions (Field, 2005).

In conclusion, the IPP is already quite high with an average value of 3.61 on a 5-point Likert scale.

This means that the participants of this study are already fairly open to purchase wines made from FRGVs. Another look at the regression on IPP clearly reveals that highly involved, more mature, male participants have the highest purchase probability. In addition, prior knowledge of FRGVs fosters the

purchase probability as well, suggesting that the consumption or at least the knowledge of FRGV wines is a positive factor.

Turning to the information about the environmental benefits of FRGVs, the results show that the information provided increases the purchase probability significantly. This suggests that information regarding the environmental benefits is relevant for the participants of this study. On average, the information can lift the purchase probability by 0.326 points on a 5-point scale. The analysis of the second regression analysis gives an insight into the attitudes and socio-demographics of the participants who are particularly responsive to the information on FRGVs. Participants who show more environmental awareness are more responsive to the information. Furthermore, younger participants and females are particularly open to the information. Whether participants are explicitly involved in the product category wine or not does not come into play when it comes down to the environmental information about the FRGVs.

In summary, the results indicate that the diffusion of FRGVs can be supported by information about their environmental benefits. How these results can translate into practical implications is part of the following section.

Practical Managerial Implications and Recommendations

Since the results show that information can foster the adoption of FRGVs, the first practical implication regarding FRGVs is somehow simple: inform consumers about the environmental benefits of FRGVs. In order to reach those consumers that are most responsive to the information, younger and environmentally aware consumers should be focused on first. It is reasonable to assume that environmentally aware consumers tend to shop at least sometimes in organic stores (see The nine items for the environmentalism construct (see **Error! Not a valid bookmark self-reference.**) originate from the feasibility study by Scholl et al. (2016). Their feasibility study for an environmentalism construct in Germany listed many items with regard to the behaviour and the attitude towards environmentalism. Due to the limited scope of this study's online survey, these nine items were selected to cover the environmentalism as good as possible. The nine items focus on actual consumption of organic food and sustainable products, and concerns about a sustainable lifestyle.

Table 2, item 8 and 9). Thus, these stores could be a first place to approach consumers with information about FRGVs and also wines made from FRGVs on the shelf. However, regular supermarkets might also be a place to introduce FRGV wines to consumers as long as the wines and the information is somewhere close to other organic or sustainable products to reach the environmentally aware consumers.

The influence of information about the environmental benefits of FRGVs is not dependent on the consumers' wine product involvement. However, consumers with a higher level of involvement tend to have a higher initial purchase probability for FRGV wines. Since high involvement consumers tend to buy wine more often in dedicated wine shops (Nesselhauf et al., 2017), these shops could also be part of a distribution strategy. There, the information about the environmental benefits would be of less importance.

Furthermore, marketing of new products is also dependent on the abilities of the individual firms. A well-structured marketing campaign for FRGV wines can foster the diffusion among a firm's consumers. The marketing messages can target different consumers groups, such as women, millennials or environmentally aware consumers.

At last, the reduction of fungicides in the wine industry could also be seen as an issue for regulation. Quota schemes for wine growers could be imaginable to gain market share for FRGVs and force the producer to market these varieties to consumers.

Conclusions, Limitations and Academic Implications

The eco-innovation FRGVs has the potential to reduce the wine industry's environmental harm. The industry could promote these grape varieties to show its sustainable thinking and act as role model for further agricultural industries. Consumers are open to this eco-innovation. Especially the consumers with higher levels of involvement state a relatively high initial purchase probability for wines made of FRGVs.

Providing information about the environmental benefits of FRGVs supports the diffusion of FRGVs. The information enables consumers to see the advantages of these grape varieties. Even though the environmental advantages will not suffice to change the consumers' behaviour completely, it may be an additional factor to try wines made from FRGVs.

Looking at the influence of information about the FRGVs and the consumer group that is most responsive to it, it becomes obvious that the information is most effective for consumers with higher levels of environmentalism. This clearly shows that consumers who care for the environment are more open to information about products that reduce the harm for the environment. Thus, environmentally aware consumers can be seen as the first target group for wines made from FRGVs. The data further suggests that women and younger consumers tend to be more convinced by the information.

As every study, also this research has limitations. First of all, the purchase probability was elicited with direct questions about a hypothetical situation. Schäufele and Hamm (2018) show that the attitude-behaviour gap for wine consumers is low, however, the social desirability in this context should not be underestimated. Furthermore, the price cue in the purchase probability questions was

left out on purpose to eliminate price effects. However, it obstructs statements about the willingness to pay. Moreover, the sample is not representative for the German wine consuming population. Online access panels and quota sampling do not lead to a strictly representative sample. However, the sample size and the structure of the sample allow a conservative generalization.

In order to overcome some of those limitations, further research could combine attitudinal data and actual purchase behaviour of FRGV wines. Furthermore, in order to address the relatively low explained variance in this study, it is necessary to take into account that wine purchase is a very complex purchasing process. Further studies could widen the aspects that are part of the surveys, hence narrow the gap between the hypothetical and the actual situation. Another addition for this research would be to investigate the specific parts of the text and analyse the influence of each section to gain more insights in the consumers' minds. So far, the text was only examined as a whole and not in its specific parts.

The findings of this study may also be important for further eco-innovations. There are many product categories and products that are stuck in early phases of the diffusion, such as insects as food. Products that have mainly altruistic environmental benefits might face similar problems within the society. Therefore, the scope of this research could be widened and further studies could be multifaceted.

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