Wines with sustainable attributes: How much do consumers know about them, and why does it matter?

Abstract

Product knowledge is one of the key factors affecting consumer decisions, including purchasing sustainable products. Yet, it is not clear how much consumers know about non-conventional wines and whether they can differentiate between the different types of such wines. The current paper investigates the impact of consumers' knowledge types on their attitudes and purchase intention for non-conventional wines. The data were obtained using an online survey of 201 wine consumers. The findings suggest that product knowledge should be viewed as a multidimensional concept requiring categorization into distinct types. The results also revealed that subjective and objective knowledge of sustainable and organic wines appear to be strongly linked to positive attitudes and purchasing decisions. However, the prior experience did not impact forming positive attitudes and purchase intentions. Regarding biodynamic wines, it was shown that only subjective knowledge influenced attitude and purchase intention. The findings provide important implications, especially for retailers or marketers attempting to sell non-conventional wines because consumers' purchase intention and attitudes could be positively stimulated when marketing activities focus on certain types of knowledge.

Keywords: Objective knowledge, subjective knowledge, prior experience, non-conventional wines, sustainable wines, organic wines, biodynamic wines, attitude, purchase intention, consumer behavior

INTRODUCTION

The global wine market is competitive and highly saturated (Sogari et al., 2016). The modern wine industry is undergoing many changes, such as decreased consumption in traditional wine-producing countries and growth in emerging markets (Nassivera et al., 2020). To stay competitive, wine producers need to differentiate their products. One way to do so is through the production of non-conventional wines (organic, biodynamic, sustainable, and natural) (CBI, 2016; Vastola & Tanyeri-Abur, 2009). Environmental, economic, and social pressures from stakeholders and consumers make it necessary for brands to align their products with consumers' preferences. Previous research showed that, within the last decade, consumers expressed particular interest in purchasing products with sustainable attributes (Vazquez-Brust & Sarkis, 2012). Sustainability in wine production has been found essential, especially for consumers in New World wine-producing countries, particularly in the US (Szolnoki, 2013).

Casini et al. (2010) proposed a classification of previous research on wines with sustainable attributes, which includes four main streams: 1) principles and practices, 2) orientation and its determinants, 3) consumer attitudes, and 4) marketing and strategy. Rather than focusing on the business perspective, the current study will analyze consumer behavior since the success and survival of a business are tightly associated with being consumer-oriented (Horvat et al., 2019).

Specifically, this study will investigate the factors impacting consumers' attitudes toward non-conventional wines. Product knowledge is one of the key factors affecting consumer decisions (Burton et al., 2009), including purchasing sustainable products (Peschel et al., 2016). Brucks (1985) divided consumer product knowledge into three categories: (1) subjective knowledge, referring to an individual's perception about how much they know about a product; (2) objective knowledge, related to what consumers actually know about a product; and (3) prior

experience, which can lead to gaining knowledge about a product directly and indirectly (Daugherty et al. 2008). Although numerous studies have focused on product knowledge in the wine context, to the best of the author's knowledge, the present study is the first one attempting to explore the role of different knowledge types in purchase intention regarding non-conventional wines.

Attitude refers to positive or negative assessment, and it reflects a person's responses to certain stimuli (Hwang et al., 2019). These responses are manifested through individuals' behaviors. Intentions can be the determinant of actual behavior; therefore, they are sometimes used as a proxy for actual behaviors (Manika et al., 2018). Intention refers to the amount of effort an individual makes or the motivation they have to do a behavior (Conner, 2020). Previous research found that consumers differ in their attitudes towards green (sustainable) products and the level of action they take to secure these products (Chen & Chai, 2010). These differences highlight the need for a greater understanding of wine consumers' interest in non-conventional wines. Yet, it is not clear how much consumers know about non-conventional wines and whether they are able to clearly differentiate between the different types of such wines. Research on consumer perceptions of non-conventional wines is still limited.

Therefore, the current paper aims to investigate the role of consumers' knowledge on their perceptions, preferences, and willingness to pay for non-conventional wines. To achieve this purpose, the study applies the Stimulus-Organism-Response model (Mehrabian & Russell, 1974) and extends it based on different types of consumer knowledge and consumer behavior (Brucks, 1985; Manika et al., 2018). The following research questions are addressed in this study:

RQ_1: How much do US consumers know about wines with sustainable attributes?

RQ_2: What are US consumers' attitudes toward wines with sustainable attributes?

RQ_3: Are US consumers willing to buy and pay more for wines with sustainable attributes?

LITERATURE REVIEW

Theoretical Background

This study adapts the Stimulus-Organism-Response theory, which was initially proposed by Woodworth (1929). The S-O-R model explains the behavioral results of various phenomena and comprises three constructs: stimulus, organism, and response. Mehrabian and Russell (1974) further developed the S-O-R Model (Figure 1). In the model, the environment (Stimulus) is associated with an individual's response (Response) to the environment, and this relationship is mediated by emotional states (Organisms). The *Stimulus* construct can be defined as the outside forces influencing an individual's psychological state (Fu et al., 2021). *Organism* refers to internal processes resulting from the stimulus and mediating the relationship between stimulus and response (Fu et al., 2021). Mehrabian and Russell (1974) associated organism with three emotional states: pleasure, arousal, and dominance (PAD). Criticized by several authors, organism was later defined as an individual's cognitive and affective internal state (Lee et al., 2011). In this sense, *Response* is associated with the final behavioral outcome, which may be positive or negative (Jang & Namkung, 2009) and may be manifested as approach or avoidance behaviors (Kawaf & Tagg, 2012). Although Mehrabian and Russell (1974) applied the S-O-R model to examine consumer behavior in environmental psychology, it was later used in many other contexts (e.g., Chang et al., 2011; Rose et al., 2012; Kim & Lennon, 2013; Islam & Rahman, 2017).

In the current study, the *stimulus* is approached as the individual's knowledge and experience with wines with sustainable attributes that may affect the experiential response. *Organisms* are the internal processes and states between external stimuli and the final behavior (or responses) expressed as attitudes toward non-conventional wines. The *response* is the result and the consumers' final decision, manifested as avoidance or approach behavior (Kawaf & Tagg, 2012). Therefore, in this study, the response is defined as the intention to purchase non-conventional wines.

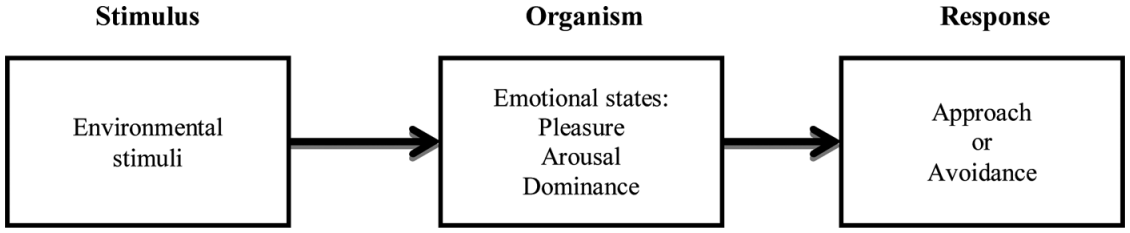

Figure 1: S-O-R Framework (Mehrabian & Russell, 1974)

Non-conventional Wines

The current study examines three types of non-conventional wines: sustainable, organic, and biodynamic wines. There are contrasting definitions for these wines in the existing literature. For sustainable wines, there is no universally agreed-upon definition (Szolnoki, 2013). However, sustainability in wine generally includes sustainable winegrowing procedures, such as: "[…] growing and winemaking practices that are sensitive to the environment (environmentally sound), responsible to the needs and interests of society at large (socially equitable) and are economically feasible to implement and maintain (economically feasible)" (California Sustainable Winegrowing Alliance, 2012). There is no consistent definition for organic wine either. Delmas and Grant (2014) define organic wine as wine made from grapes grown without using pesticides. Sulfites are prohibited in making organic wine in the US (they are, however, allowed in small quantities in the EU and Canada). Iland and Gago (2002) similarly define organic wine as wine farmed organically and following organic winemaking practices.

The third type of non-conventional wine is biodynamic wine. Biodynamic wines are made from grapes grown according to the biodynamic method developed by Rudolf Steiner (1861–1925) (Muhie, 2022). The biodynamic method is based on three principles: maintaining the soil's fertility by releasing nutrients, making healthy plants that are disease and pest-resistant, and producing the highest-quality foods possible (Cravero, 2019).

The main distinction between organic and biodynamic farming is related to implementing the so-called "preparation" techniques, which lead to an increase in soil, plant, and produce health and quality (Reeve et al., 2005). Biodynamic and organic farming share some similarities. Both prohibit synthetic chemicals, but biodynamic farming treats farms (or vineyards) as self-sufficient living organisms (Delmas et al., 2008).

Relevant Consumer Characteristics

Product Knowledge

Product knowledge is one of the critical factors influencing purchase decisions (Brucks, 1985; Burton et al., 2009). Product knowledge refers to the experiences and familiarity of an individual with a product. Brucks (1985) suggested three consumer knowledge types: subjective

knowledge (individuals' perceptions of how much they know about the product), objective knowledge (what consumers actually know about the product), and prior experience with the product.

Jin and Han (2014) reported that having higher subjective knowledge leads to more certainty about the quality of selections; therefore, subjective knowledge plays a pivotal role in satisfaction levels. It can also significantly influence consumers' decision-making (Hammond et al., 2014) and increase confidence and willingness to act (Hadar & Sood, 2014). Subjective knowledge has been found to positively affect purchasing of organic products, such as organic vegetables (Pieniak et al., 2010), and willingness to pay more for organic cotton apparel (Han, 2019).

Objective knowledge can be obtained from literature, online sources, and reviews (Hammond et al., 2013). The more knowledge an individual retains, the higher objective knowledge they possess (Taylor et al., 2008). Both objective and subjective knowledge significantly affect attitudes toward consuming organic vegetables (Aertsens et al., 2011).

However, previous research has not been consistent regarding which type of knowledge is more important in consumers' decision-making about food. While some researchers state that subjective knowledge is more influential (e.g., Lusk et al., 2004; Pieniak et al., 2010), others emphasize the importance of objective knowledge (e.g., Díaz et al., 2012; Zhang & Liu, 2015). Some authors have found that subjective knowledge is more influential in environmental behavior (Aertsens et al., 2011), while others related it more to objective knowledge (Thøgersen et al., 2010).

Scholars have examined the effect of subjective and objective knowledge in the wine context. Orth (2002) and Spielmann (2015) found that individuals with less subjective knowledge rely mostly on extrinsic cues, such as information on labels (Schiffman et al., 2014), bottle shape and color (Rocchi & Stefani, 2005), brand name (Charters & Pettigrew, 2007), grape variety (Lockshin et al., 2006), etc. They also use fewer product characteristics while purchasing wines (Viot, 2012) and depend on personal sources to obtain information about wine (Dodd et al., 2005; Barber et al., 2008). Consumers with lower subjective knowledge have a narrower vision of brands (Viot & Passebois-Ducros, 2010) and are less likely to trust unfamiliar brands (Bianchi et al., 2014). They also prefer wines that are different from what experts like (King et al., 2012). Higher subjective knowledge was found to lead to a higher willingness to pay for green wines (Barber, 2012).

Prior experience with the product leads to gaining knowledge about a product (Daugherty et al. 2008). Consumers can either directly gain experience by actively engaging in a learning process and using the product (Lüthje, 2004) or indirectly obtain experience by information search (Park et al., 1994). Individuals who have experience with eco-friendly products are more likely to select such products in their subsequent purchases (Thøgersen et al., 2010).

Although many previous studies have focused on subjective and objective knowledge in the wine context, the present study will add to the limited body of knowledge on the relationship between the product knowledge type and the intention to purchase non-conventional wines.

Attitudes

Knowledge is known to impact attitudes (Ajzen & Fishbein, 2005). Previous research findings on product knowledge shaping attitudes and influencing decisions regarding sustainable and organic products have not been consistent. Earlier studies (e.g., Hoban, 1998; Gaskell et al.,1999) found no association between higher levels of knowledge and positive attitudes towards genetically modified food. In contrast, Lu et al. (2017) found that knowledge impacts attitudes

about genetically modified wine, which in turn affects purchase intentions. Similarly, Oh and Abraham (2016) found that product knowledge positively influences attitudes toward organic cotton apparel. Aertsens et al. (2011) have also concluded that knowledge positively impacts consumer attitudes toward organic vegetable consumption. While some studies suggest that objective knowledge has no significant relationship with consumers' attitudes toward organic products (Gotschi et al., 2009), others (Zhang & Liu, 2015) found that objective knowledge was positively related to the attitude formation of genetically modified products. Finally, prior knowledge (past experience) was found to influence attitude (D'Souza et al., 2006) and behavioral intentions (Choi et al., 2013).

Intentions

Understanding intentions is essential because they can predict consumer behavior (Ajzen, 1985). Intention can be related to the amount of effort an individual makes or their motivation to do a behavior (Conner, 2020). Behavioral intentions can be used as a proxy for actual behaviors (Ajzen, 1985; Fishbein & Ajzen, 1975; Verdegem & De Marez, 2011; Manika et al., 2018). Previous literature has found that positive attitudes will affect the purchase intention of sustainable products (Chan & Lau, 2002).

Therefore, this study investigates the role of different types of product knowledge in shaping consumers' attitudes toward non-conventional wines and their purchase intention. The study makes several contributions. Theoretically, it expands the literature on knowledge about, attuites toward, and purchase intention of conventional wines. It also adds to the literature on the SOR model. It also provides insights for managers and policymakers on how to motivate consumers to purchase such wines and achieve differentiation.

Hypotheses

Based on the S-O-R model and the previous literature overview, the following hypotheses were advanced:

H1a. Subjective knowledge of sustainable wines will positively influence attitudes toward such wines.

H1b. Subjective knowledge of organic wines will positively influence attitudes toward such wines.

H1c. Subjective knowledge of biodynamic wines will positively influence attitudes toward such wines.

H2a. Objective knowledge of sustainable wines will positively influence attitudes toward such wines.

H2b. Objective knowledge of organic wines will positively influence attitudes toward such wines.

H2c. Objective knowledge of biodynamic wines will positively influence attitudes toward such wines.

H3a. Prior experience with sustainable wines will positively influence attitudes toward such wines.

H3b. Prior experience with organic wines will positively influence attitudes toward such wines.

H3c. Prior experience with biodynamic wines will positively influence attitudes toward such wines.

H4a. Consumers' attitudes toward sustainable wines will have a positive and significant relationship with their intention to purchase such wines.

H4b. Consumers' attitudes toward organic wines will have a positive and significant relationship with their intention to purchase such wines.

H4c. Consumers' attitudes toward biodynamic wines will have a positive and significant relationship with their intention to purchase such wines.

Proposed Model

Figure 2 presents the conceptual model of the relationships among different product knowledge types, attitudes, and intentions to purchase non-conventional wines.

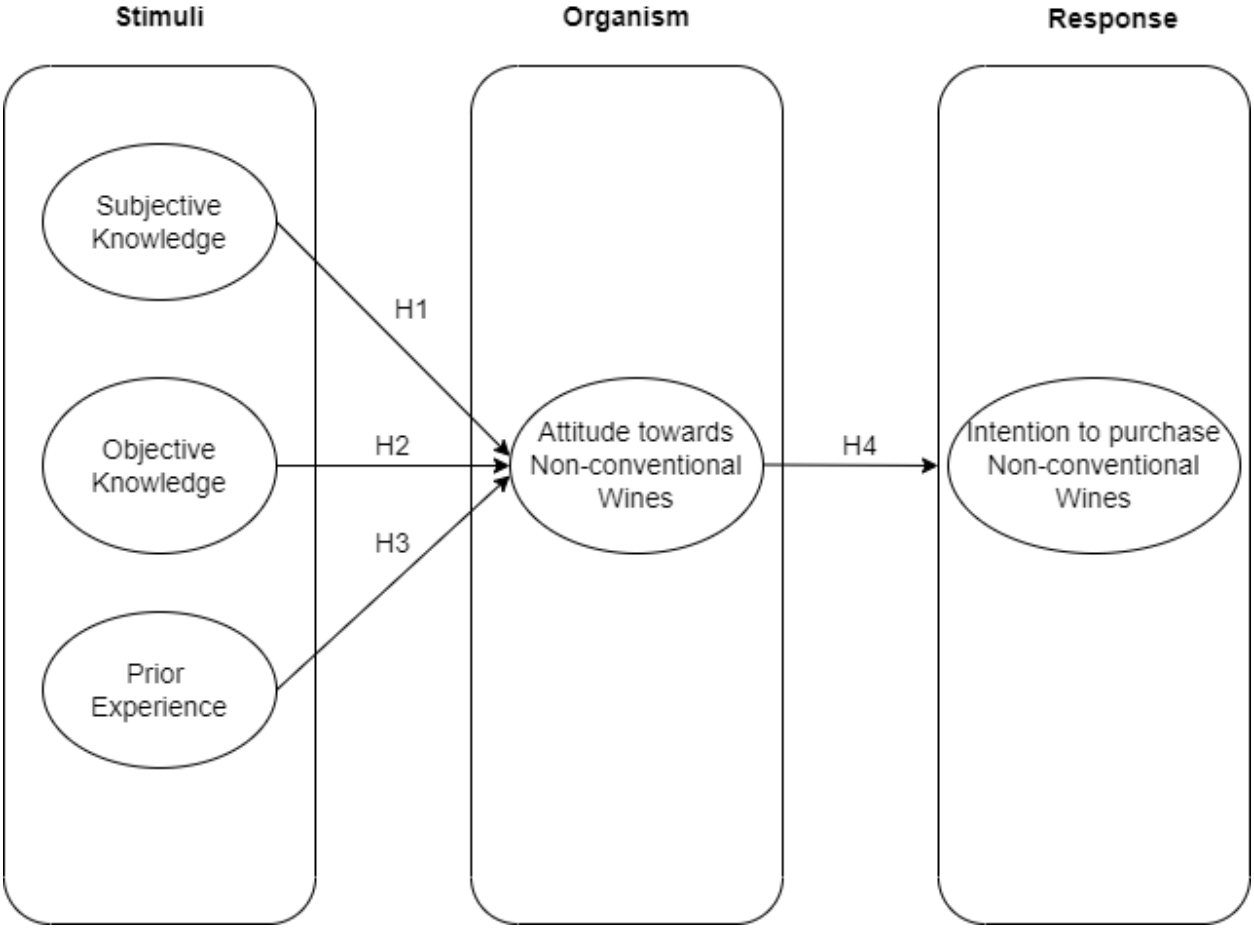

Figure 2: The Proposed Model

METHODOLOGY

Data Collection and Participants

The data were obtained using an online survey of wine consumers recruited through the MTurk platform. The survey instrument was pre-tested with 40 undergraduate students at a large southwest US university, and modifications were made before launching the survey. Given the context of the study, respondents were screened to be of legal drinking age (21 +) and to be wine consumers. Two hundred and one usable responses were collected. Table 1 shows the demographic characteristics of the participants.

Table 1

Sample Demographic

Consumer Characteristic	Number of respondents (N=201)	Percentage
Gender		
Male	111	55.2
Female	89	44.3
Non-binary / third gender	0	0
Prefer not to say	1	0.5
Annual household income		
Less than $25,000	21	10.4
$25,001 - $50,000	59	29.4
$50,001- $75,000	52	25.9
$75,001- $100,000	39	19.4
$101,001- $125,000	9	4.5
More than $125,000	21	10.4
Marital status		
Single	69	34.3
Married or living with a partner	122	60.7
Divorced or separated	9	4.5
Widowed	0	0
Other	1	.5
Education level		
High school graduate	11	5.5
Some college, no degree	23	11.4
Associate degree	16	8.0
Bachelor's degree	100	49.8
Master's degree	40	19.9
Professional degree	6	3.0
Doctorate degree	5	2.5
Ethnic background		
White, non-Hispanic	150	74.6
Hispanic or Latino	14	7.0
Black or African American	14	7.0
Asian	14	7.0
Native American or Alaska Native	2	1.0
Native Hawaiian or Other Pacific Islander	1	.5
Mixed races	4	2.0
Other	2	1.0
Age		
21-30 years	52	25.9
31-40 years	84	41.8
41-50 years	35	17.4
Older than 50 years	30	14.9

Measures

The questionnaire was divided into five sections. The first section asked about respondents' wine consumption and purchasing habits, as well as knowledge of wine in general. The survey was structured in a way that participants who did not have any knowledge of wine or had never consumed wine were redirected to the end of the survey at the end of this section. The second section focused on customers' objective and subjective knowledge about non-traditional wines and prior experiences with these wines. Section three included questions about consumers' attitudes toward non-conventional wines. Section four asked about consumers' willingness to buy and pay for non-conventional wines. Lastly, section five collected demographic data.

Subjective knowledge was assessed using a single item that asked how much respondents knew about each type of wine, ranging from very little (1) to very much (5). Objective knowledge was measured by four statements about each type of wine. Respondents were also asked how confident they were about their answer choice. Several professional experts checked the validity of the statements. One of the statements was true, and the others were false. The score for objective knowledge was calculated as follows: if the respondent selected an incorrect answer along with a certainty level of 5, it would result in a score of 0; for an incorrect response with a certainty level of 4, the score would be 1; a wrong answer with a certainty of 3 would result in a score of 2, and so on. If respondents selected a correct response with a certainty of 1, their score would be 5; a correct answer with a certainty of 2 would result in a score of 6, and so on. By following this method, the maximum would be associated with a correct response with a certainty of 5, which would be a score of 9. Then, by adding the scores on each of the four statements, the total objective knowledge score was calculated and ranged between 0 and 36.

Product usage is deemed a direct experience because consumers can be involved with the product (Hamilton & Thompson, 2007). Therefore, to measure prior experience through product usage, following Han (2019), participants were asked how often (if ever) they drink non-conventional wines.

Attitudes towards organic, biodynamic, and sustainable wines were measured through seven items on a 5-point Likert Scale, which were adjusted from Gil et al. (2000) to fit the context of the current study.

To measure the purchase intention of non-conventional wines, willingness to pay (WTP) and willingness to buy (WTB) measures were employed (Han, 2019). For WTP, participants indicated how much more they were willing to pay for organic/ sustainable/ biodynamic wines. The measure was adapted from Vapa-Tankosic et al. (2018). To measure WTB, respondents indicated their agreement with the statement, "I am willing to go to another store if sustainable/ organic/ biodynamic wine is not available."

ANALYSIS

Evaluation of Measurement Models

Reliability and Validity

To determine the reliability of the questionnaire, emphasizing the internal consistency of the questions, Cronbach's alpha and composite reliability coefficient were used. Generally, a value of 0.7 for alpha (Bland & Altman, 1997) and composite reliability (Henseler et al., 2015) is required for a tool to be considered reliable.

Two indices were used to calculate convergent validity: the average variance extracted (AVE) and factor loadings. AVE values over 0.5 for each variable indicate the appropriate convergent validity (Bagozzi & Yi, 1988). Values higher than 0.4 for factor loadings indicate the convergent validity of the research variables (Hulland, 1999).

Table 2

Measurement Items, Reliability, and Validity Assessment

Construct	Items	Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Attitude					
Sustainable Wine	Att 1 Att 2 Att 3 Att 4 Att 5 Att 6 Att 7	0.834 0.707 0.827 0.738 0.834 0.611 0.757	0.879	0.906	0.581
Organic Wine	Att 1 Att 2 Att 3 Att 4 Att 5 Att 6 Att 7	0.795 0.656 0.819 0.624 0.814 0.731 0.820	0.875	0.902	0.570
Biodynamic Wine	Att 1 Att 2 Att 3 Att 4 Att 5 Att 6 Att 7	0.820 0.748 0.844 0.777 0.848 0.679 0.776	0.898	0.919	0.619
Purchase Intention					
Sustainable Wine	PurInt 1 PurInt 2 PurInt3	0.765 0.898 0.765	0.739	0.852	0.659
Organic Wine	PurInt 1 PurInt 2 PurInt3	0.815 0.858 0.787	0.757	0.861	0.674
Biodynamic Wine	PurInt 1 PurInt 2 PurInt3	0.875 0.890 0.839	0.837	0.902	0.754
Objective Knowledge					
Sustainable Wine	Obj. 1 Obj. 2 Obj. 3 Obj. 4	0.803 0.825 0.796 0.708	0.792	0.864	0.615
Organic Wine	Obj. 1 Obj. 2 Obj. 3 Obj. 4	0.845 0.849 0.760 0.750	0.815	0.878	0.643
Biodynamic Wine	Obj. 1 Obj. 2 Obj. 3 Obj. 4	0.864 0.925 0.888 0.879	0.914	0.938	0.790

Note: See Appendix 1 for the names of items

According to Table 2, all values are greater than the minimum cut-off points. Therefore, the reliability of the measurement tool was confirmed. Convergent validity examining the degree of correlation between each construct and its indicators was also confirmed.

Cross-factor loadings were used to assess discriminant validity (Fornell & Larcker, 1981) to compare (a) the correlation between the indicators of a construct and the construct itself and (b) the degree of correlation of a construct with its indicators versus the correlation of the same construct with other constructs.

Table 3

Cross Factor Loadings-Sustainable wine

	Attitude	Purchase Intention	Objective Knowledge	Prior Experience	Subjective Knowledge
Att 1	**0.834**	0.544	0.332	-0.277	0.434
Att 2	**0.707**	0.407	0.141	-0.024	0.214
Att 3	**0.827**	0.502	0.275	-0.276	0.357
Att 4	**0.738**	0.450	0.399	-0.211	0.247
Att 5	**0.834**	0.569	0.391	-0.212	0.330
Att 6	**0.611**	0.316	0.072	-0.008	0.222
Att 7	**0.757**	0.417	0.295	-0.067	0.221
Obj. 1	0.319	0.436	**0.803**	-0.215	0.123
Obj. 2	0.292	0.421	**0.825**	-0.126	0.167
Obj. 3	0.344	0.388	**0.796**	-0.118	0.116
Obj. 4	0.218	0.292	**0.708**	-0.115	0.261
PurInt 1	0.469	**0.765**	0.310	-0.228	0.225
PurInt 2	0.570	**0.898**	0.444	-0.376	0.441
PurInt3	0.448	**0.765**	0.446	-0.214	0.329
SubKnow	0.392	0.420	0.201	-0.555	**1.00**
PriorEx	-0.226	-0.345	-0.186	**1.00**	-0.555

Note: See Appendix 1 for items names

Table 4

Cross Factor Loadings-Organic wine

	Attitude	Purchase Intention	Objective Knowledge	Prior Experience	Subjective Knowledge
Att 1	**0.795**	0.463	0.108	-0.192	0.220
Att 2	**0.656**	0.287	0.023	-0.013	0.105
Att 3	**0.819**	0.473	0.196	-0.232	0.265
Att 4	**0.624**	0.297	0.241	-0.125	0.180
Att 5	**0.814**	0.537	0.259	-0.338	0.269
Att 6	**0.731**	0.326	0.051	-0.087	0.116
Att 7	**0.820**	0.461	0.213	-0.224	0.245
Obj. 1	0.191	0.355	**0.845**	-0.274	0.219
Obj. 2	0.187	0.295	**0.849**	-0.207	0.210
Obj. 3	0.205	0.343	**0.760**	-0.293	0.190
Obj. 4	0.126	0.263	**0.750**	-0.180	0.154

PurInt 1	0.415	**0.815**	0.187	-0.415	0.335
PurInt 2	0.551	**0.858**	0.395	-0.472	0.364
PurInt3	0.413	**0.787**	0.394	-0.463	0.426
SubKnow	0.282	0.457	0.244	-0.468	**1.00**
PriorEx	-0.259	-0.549	-0.304	**1.00**	-0.468

Note: See Appendix 1 for items names

Table 5

Cross Factor Loadings-Biodynamic wine

	Attitude	Purchase Intention	Objective Knowledge	Prior Experience	Subjective Knowledge
Att 1	**0.820**	0.531	0.161	-0.324	0.450
Att 2	**0.748**	0.376	0.098	-0.208	0.300
Att 3	**0.844**	0.420	0.152	-0.279	0.352
Att 4	**0.777**	0.467	0.192	-0.296	0.396
Att 5	**0.848**	0.480	0.074	-0.291	0.417
Att 6	**0.679**	0.289	0.064	-0.117	0.162
Att 7	**0.776**	0.440	0.140	-0.279	0.377
Obj. 1	0.085	0.169	**0.864**	-0.256	0.215
Obj. 2	0.158	0.238	**0.925**	-0.287	0.214
Obj. 3	0.196	0.255	**0.888**	-0.286	0.215
Obj. 4	0.109	0.151	**0.879**	-0.201	0.161
PurInt 1	0.486	**0.875**	0.209	-0.491	0.491
PurInt 2	0.514	**0.890**	0.193	-0.579	0.575
PurInt3	0.453	**0.839**	0.223	-0.512	0.597
SubKnow	0.464	0.640	0.229	-0.661	**1.00**
PriorEx	-0.339	-0.610	-0.296	**1.00**	-0.661

Note: See Appendix 1 for items names

As can be seen in Table 3-5, the questions of each construct were most correlated with the same construct, and the cut-off values of factor loading were higher than .70. Therefore, discriminant validity was confirmed at the question level (Hair et al., 2011).

Based on Table 6, the discriminant validity was confirmed at the construct level. For example, for sustainable wine, 0.762 in the first row and column is greater than the cells' values below it (.614, .380, -.226, and .392), confirming the discriminant validity at the construct level.

Common Method Bias (CMB)

To avoid common method bias (CMB), we applied various scales in the questionnaire design and reminded participants that their responses were anonymous and confidential (Podsakoff et al., 2003; Antonetti & Manika, 2017). A Harman single factor test was used to examine the presence of any CMB (Antonetti & Manika, 2017). The results show that one factor accounts for 30.84% of the variance for the first model (sustainable wine), 31.58% of the variance in the second model (organic wine), and 35.68% of the variance in the third model (biodynamic wine).

Table 6

Fornell and Larker Matrix

	Sustainable Wine					Organic Wine					Biodynamic Wine				
	Attitudes	Purchase Intention	Objective Knowledge	Prior Experience	Subjective Knowledge	Attitude	Purchase Intention	Objective Knowledge	Prior Experience	Subjective Knowledge	Attitude	Purchase Intention	Objective Knowledge	Prior Experience	Subjective Knowledge
Attitudes	**0.762**					**0.755**					**0.787**				
Purchase Intention	0.614	**0.812**				0.561	**0.821**				0.559	**0.868**			
Objective Knowledge	0.380	0.497	**0.784**			0.225	0.397	**0.802**			0.165	0.240	**0.889**		
Prior Experience	-0.226	-0.345	-0.186	**1.000**		-0.259	-0.549	-0.304	**1.000**		-0.339	-0.610	-0.296	**1.000**	
Subjective Knowledge	0.392	0.420	0.201	-0.555	**1.000**	0.282	0.457	0.244	-0.468	**1.000**	0.464	0.640	0.229	-0.661	**1.000**

RESULTS

The values of path coefficients and significance values have been used to test the hypotheses. The relationships were considered significant if the *t*-value was greater in absolute value than 1.96 at a 5% confidence level and greater in absolute value than 2.58 at a confidence level of 0.01. As can be seen in Table 7 for sustainable wine, except for the impact of prior experience on attitudes was not significant (rejecting H3a), all relationships were significant, supporting H1a and H2a. Similarly, regarding organic wine, all relationships were significant, except for the impact of the prior experience on attitudes. Therefore, H1b and H2b were supported, but H3b was rejected. Finally, regarding biodynamic wine, as evident from table 7, only subjective knowledge significantly affects attitude towards biodynamic wines among the three types of knowledge. Therefore, H1c was supported, but H2c and H3c were rejected. In addition, this study's results show a positive relationship between attitudes and behaviors for all three types of wines. Therefore, H4 a, H4b, and H4c were supported.

Table 7

Results of hypothesis testing

Relationships	Hypothesis	Original Sample	Standard deviation	*t*-values	*p*-values	Decision
subjective knowledge -> attitude	**H1a**	0.332	0.072	4.599	0.000	Supported
subjective knowledge -> attitude	**H1b**	0.187	0.080	2.339	0.020	Supported
subjective knowledge -> attitude	**H1c**	0.423	0.085	4.994	0.000	Supported
objective knowledge -> attitude	**H2a**	0.389	0.068	5.716	0.000	Supported
objective knowledge -> attitude	**H2b**	0.140	0.067	2.080	0.038	Supported
objective knowledge -> attitude	**H2c**	0.055	0.061	0.902	0.368	Not supported
prior experience -> attitude	**H3a**	-0.035	0.081	0.431	0.666	Not supported
prior experience -> attitude	**H3b**	-0.129	0.084	1.530	0.127	Not Supported
prior experience -> attitude	**H3c**	-0.043	0.105	0.410	0.682	Not supported
attitude -> intention to purchase	**H4a**	0.393	0.066	5.922	0.000	Supported
attitude -> intention to purchase	**H4b**	0.395	0.058	6.825	0.000	Supported
attitude -> intention to purchase	**H4c**	0.319	0.062	5.156	0.000	Supported

The model for sustainable wines explains a moderate amount of variation (R2 = 50.1 %) in intention to purchase and a lower amount of variation (R2 = 24.8%) in attitudes (Figure 6), suggesting that the model has adequate predictive power (Antonetti & Manika, 2017).

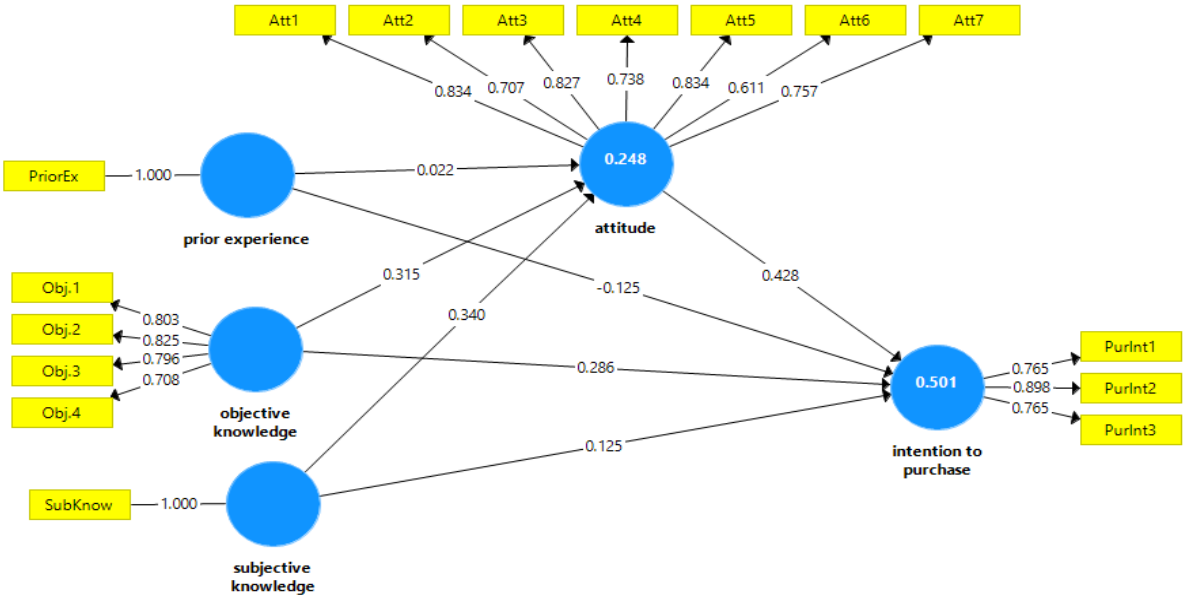

Figure 3: Structural Model (Sustainable Wine)

The proposed model for *organic wines* explains a moderate amount of variation (R^2 = 53.7 %) in intention to purchase and a lower amount of variation (R^2 = 11.8%) in attitudes (Figure 7), suggesting that the model has adequate predictive power (Antonetti & Manika, 2017).

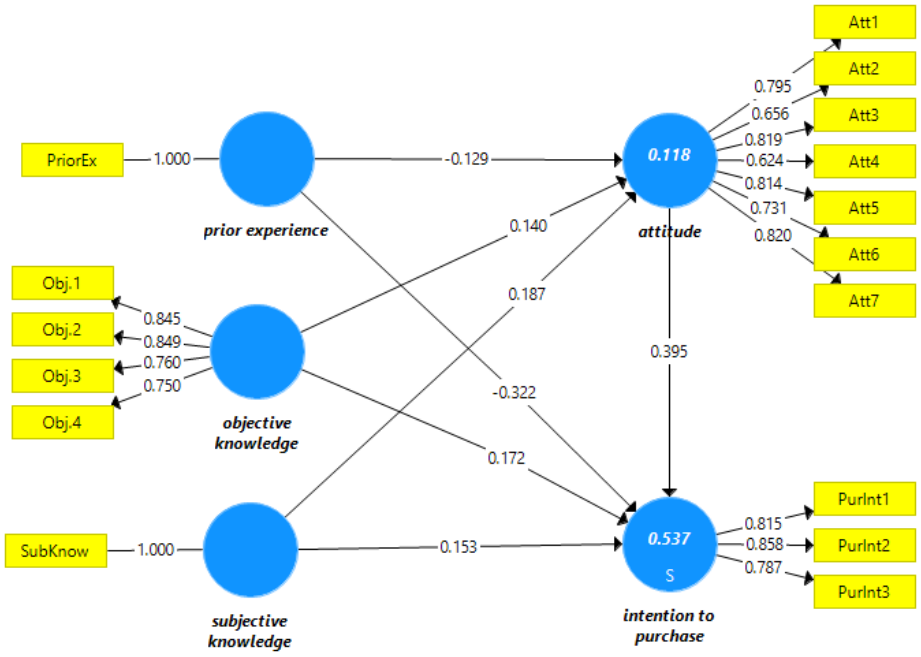

Figure 4: Structural Model (Organic Wine)

The model for *biodynamic wines* explains a moderate amount of variation (R^2 = 55.3 %) in intention to purchase and a lower amount of variation (R^2 = 22%) in attitudes (Figure 8), suggesting that the model has adequate predictive power (Antonetti & Manika, 2017).

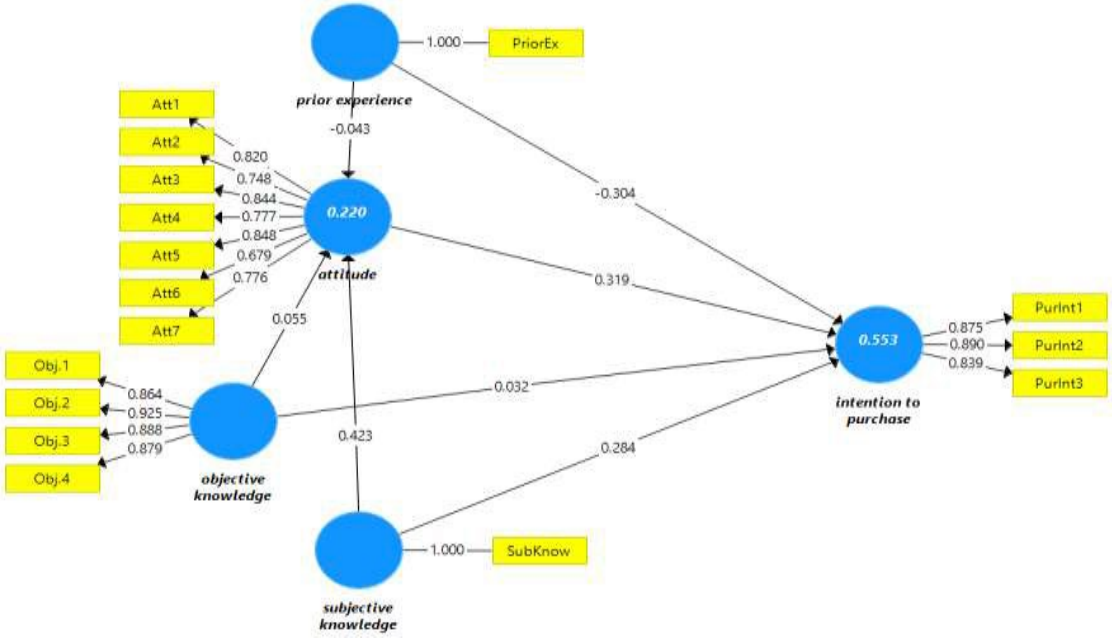

Figure 5: Structural Model (Biodynamic Wine)

DISCUSSION

The current study investigated the role of several types of product knowledge (objective knowledge, subjective knowledge, prior experience) regarding three types of non-conventional wines (sustainable, organic, and biodynamic). The influence of knowledge types on attitudes and purchase intention was also examined. It was found that objective knowledge significantly impacts the attitude toward sustainable and organic wines. This finding is consistent with the findings of Van Loo et al. (2013). In addition, there was a strong association between subjective knowledge and consumer attitudes toward sustainable and organic wines. This finding concurs well with previous studies about organic or GM foods (House et al., 2004; Gracia & De Magistris, 2007). The proposed conceptual model of this study also investigated the role of prior experience in consumers' attitudes toward non-conventional wines. The results indicate that prior experience with sustainable and organic wines did not impact attitudes. This finding contradicts some of the previous research. For example, Strandberg (2020) found that low familiarity leads to low trustworthiness in a product. The key finding is that mere experience with a product (wine in this study) alone cannot build confidence and positive attitudes toward that product. Furthermore, it cannot result in purchase intention if the product knowledge is low, be it actual or perceived. The other critical finding is that although several previous studies have found a strong connection between prior experiences and subjective knowledge (e.g., Han, 2019; Barber & Dodd, 2009), this study's findings show that prior experience is not synonymous with subjective knowledge, meaning that even if consumers try non-conventional wines without enhancing other types of knowledge on these wines, they do not form positive attitudes toward them and they do not intend to purchase such wines.

Finally, regarding biodynamic wine, this study's findings show that among the three types of knowledge, only subjective knowledge significantly affects attitude towards biodynamic wines. These results support previous studies (House et al., 2004; Gotschi et al., 2007), where no significant relations between objective knowledge, attitudes, and behavior were found. However, the findings are inconsistent with other studies about prior experience affecting attitudes and purchase intentions (McCabe & Nowlis, 2003; Koklic et al., 2019). An interesting finding is that even if consumers have objective knowledge of biodynamic wines, they do not form positive attitudes toward these wines and would not purchase them. Therefore, marketers need to enhance and focus on improving consumers' subjective knowledge to increase purchases.

Regarding RQ1, it can be said that US consumers have different types of knowledge about wines with sustainable attributes. Examining RQ2, the researchers found that attitudes towards such wines change depending on individuals' knowledge type about non-conventional wines. The results showed that subjective knowledge of all three types of wines influences consumers' positive attitudes toward these products. This means that if consumers assume that they are familiar with these types of wine and think they have a good understanding of these products, they are more likely to develop favorable attitudes, leading to higher purchase intentions.

In addition, this study's results show a positive relationship between attitudes and behaviors for all three types of wines. This finding substantiates previous findings (Petrovici & Ritson, 2006; Hearty et al., 2007; Chen, 2007; de Magistris & Gracia, 2008; Aertsens et al., 2009; Van Loo et al., 2013), in which attitudes are found to predict behaviors (Armitage & Conner, 2001; Ajzen & Fishbein, 2005). The relationship between attitudes and intentions is of moderate strength, supporting findings by Dean et al. (2008). The key finding is that increasing consumers' knowledge of non-conventional wines will form positive attitudes toward such wines. As a result, they are willing to pay more and even go to a different store to buy such wines if they are not available in their usual shopping place, which answers RQ3 of the study.

IMPLICATIONS

Theoretical Contributions

The results of this study theoretically support the significance of consumer attitudinal traits in understanding the purchasing decision of non-conventional wines. The findings can help with market segmentation and better targeting for such wines and can contribute to sustainability research by revealing various types of knowledge about non-conventional wines. To the authors' knowledge, no previous research has specifically examined how all three categories of knowledge affect customers' views and desire to buy such wines. By examining American consumers' knowledge of non-conventional wines and, by extension, how it affects their green purchasing behavior, this study aims to contribute to filling this gap in the literature. The authors of this study contend that rather than focusing on just one specific knowledge dimension, it would be more appropriate to use a broader assessment that takes into account a wide range of knowledge dimensions. Wine is an information-intensive product (Ellis & Thompson, 2018). The objective knowledge, or technical knowledge that individuals have about a product, was proven to have an impact on attitudes and purchase intention, which suggests that non-conventional wines are more information-intensive than other types of wines. This research showed that the S-O-R model helps analyze wine consumer behavior. The findings of this study add substantially to knowledge about consumers' preferences, perceptions, and willingness to pay for wines with sustainable features.

Managerial Implications

The findings also provide important implications, especially for retailers or marketers attempting to sell non-conventional wines because consumers' purchase intentions and attitudes could be positively stimulated when marketing activities focus on certain types of knowledge. This study shows that the role of product knowledge in explaining consumer behavior must be considered. It is suggested that retailers and winemakers consider cultivating positive attitudes towards wines with sustainable attributes to enhance consumers' purchasing intentions. Furthermore, by expanding consumer familiarity and knowledge of non-conventional wines, retailers and manufacturers can help consumers build more favorable attitudes toward these products.

It is crucial to enhance consumers' objective knowledge and provide factual information about these types of wines through advertising, marketing activities, campaigns, demonstrations, and workshops. Another way to increase consumers' objective knowledge can be through providing a visible place for such products in a retail setting, as well as employees suggesting and explaining non-conventional wines to customers. Furthermore, offering in-person training, as well as online classes or workshops on these types of wines, can improve customers' objective understanding of these wines. Customers can also learn more about these types of wines if product labels - one of the most essential sources of information - provide information about these products.

Food policymakers and marketers should also consider subjective knowledge as a significant factor influencing attitude and consumption. Information and promotion campaigns could promote wines with sustainable attributes and, at the very least, strengthen consumers' belief of being knowledgeable about such wines. More subjective knowledge about these wines may influence customers' willingness to try them and may increase consumption. Raising consumers' subjective knowledge, for example, through promotion campaigns that provide non-conventional wines at a reduced cost for a limited time, may encourage customers to purchase and try them.

The results of this study show that prior experience with non-conventional wines does not necessarily lead to forming positive attitudes and purchasing intentions. Therefore, instead of providing free trials as a way to enhance prior experience, retailers and winemakers should increase customers' subjective and objective knowledge of non-conventional wines because being equipped with such knowledge would improve their attitudes towards such wines and then would positively influence consumers' intention to purchase such wines. Moreover, based on the questions that were asked to measure the intention to purchase (i.e., willingness to pay more and willingness to go to another place if they cannot find such wines), price is not a barrier to buying non-conventional wines. If consumers have enough subjective and objective knowledge of such wines, due to the positive attitude formed in them, they are willing to pay more for non-conventional wines.

Limitations and Future Research

This work has some limitations offering avenues for future research. First, this study focused only on the US market. Future research could broaden the scope and consider a cross-cultural approach to improve the validity of the findings. Additionally, this study focused on consumers' knowledge, attitudes, and intentions toward non-conventional wines, which is just one kind of driver for sustainable behavior. Other factors may also influence individuals' sustainable behavior in real-life purchase situations, for example, health and environmental concerns, brand loyalty, and perceptions of various labels. It is recommended that future research

explore the effects of perceptions, motivations, and barriers, together with the elements analyzed in the study.

Another limitation of this study may be using a single-item measure for constructs such as prior experience and subjective knowledge. Although this study followed the approach used by previous studies in applying a single item for some constructs, it is suggested to utilize multiple items to improve the scales' validity and reliability.

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Appendix 1

List of adapted items

Construct	Measurement Items
Prior Experience	- How often do you drink Sustainable/ Organic/ Biodynamic wine?
Subjective knowledge	- How much do you know about Sustainable/ Organic/ Biodynamic wine?
Objective Knowledge- Sustainable wine	- Sustainable and biodynamic wines are the same. - Sustainable wines are organic. - Sustainable wines are produced in a socially responsible manner. - Sustainable wines do not generate waste during production.
Objective Knowledge- Organic wine	- Organic wines cannot use additional sulphites. - Synthetic fertilizers are allowed inorganic wines production. - Organic wines are biodynamic. - Organic wines may use genetically modified grapes.
Objective Knowledge- Biodynamic wine	- Cultured yeast can be used in production of biodynamic wines - Biodynamic wines are made according to the phases of the moon - Additional sulphites can be added to biodynamic wines - Chemical fertilizers may be used in production of biodynamic wines.
Attitude	- Sustainable/ Organic/ Biodynamic wines are healthier than conventional ones - Sustainable/ Organic/ Biodynamic wines are in fashion - Sustainable/ Organic/ Biodynamic wines have superior quality than conventional ones - Sustainable/ Organic/ Biodynamic wines are fraud - Sustainable/ Organic/ Biodynamic wines are tastier than conventional ones - Sustainable/ Organic/ Biodynamic wines are more expensive than conventional ones - Sustainable/ Organic/ Biodynamic wines have no harmful effect
Purchase Intention	- I am willing to pay more for Sustainable/ Organic/ Biodynamic wine - I am willing to go to another store if Sustainable/ Organic/ Biodynamic wine is not available - How much more would you be willing to pay for a Sustainable/ Organic/ Biodynamic wine?