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An Exploratory Study to Develop Korean Food and Wine Pairing Criteria

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Abstract: Despite the increased sales of wine in Korea, fewer Koreans consume wine with Korean food, although many Koreans believe that Western food pairs well with wine. This could reduce wine consumption in Korea and critically influence the future growth of the Korean wine market. Therefore, this study aims to develop Korean food and wine pairing criteria by examining the adaptability of food and wine pairing guidelines to the Korean palate. This exploratory study uses sequential mixed methods. The qualitative study was done by performing 12 one-on-one interviews and one focus group interview. The characteristics influencing Korean food and wine pairing were identified from the qualitative study. The quantitative study was followed by a survey of Korean wine consumers. Of the 151 questionnaires distributed, 138 valid responses were received. The qualitative results were tested and showed the following outcomes: spiciness, strong flavors, and hot food temperature were identified as three specific characteristics that hinder wine pairing. Although wine-friendly Korean dishes did not commonly include those features. Koreans' daily diet has influenced their different wine preference. A segment of Korean wine consumers enjoy the burning sensation in the mouth and prefer to match tannic red wine to spicy dishes. As a result, nine criteria of Korean food and wine pairing were developed. Among them, two criteria were newly identified from this research, and are the main focus of this study: wine with an oak flavor pairs well with food that has a soy sauce flavor; and dry, tannic wine can be paired with spicy dishes.

Keywords: Korean food; wine; food and wine pairing

1. Introduction

Due to globalization, wine drinking as part of the lifestyle in Asian countries has increased, especially after the 1990s [1]. To Asian consumers, however, matching food and wine is not an important criterion for the choice of wine [2]. Most Koreans think that Western food combines better with wine than Korean food, and therefore few Koreans drink wine with Korean dishes [3,4]. This might hinder the wine market growth in Korea. Both wine and beer are of Western origin, but Koreans far prefer beer to wine with Korean food. Although both beer and wine originated in the West, beer is now the top alcoholic drink. Koreans frequently consume beer with Korean food. In 2011, the share of wine in the Korean alcoholic drinks market was only 4.5%, spirits accounted for 33.6%, and beer (including cider and flavored alcoholic beverages) accounted for 61.9% [5]. This indicates that frequent consumption with local food could be a key factor to increasing market share.

The common notion of food and wine pairing, such as white wine with fish and red wine with meat, developed from the centuries-old relationship between food and wine [6]. However, these criteria are based mainly on Western cuisine and developed for Western palates. Koreans' dining

culture centers on a one-course meal that combines all side dishes together with steamed rice, soup, and kimchi [7]. That is also true in many other Asian countries such as China (with its different culinary provinces: Anhui, Cantonese, Fujian, Hunan, Jiangsu, Shandong, Sichuan, and Zhejiang but also Xinjiang, Shanghainese, Shaanxi, and the Pekingese areas), South-East Asia (Thailand, Singapore, Malaysia, Vietnam, Indonesia), India, and Taiwan. Spiciness, together with sweetness, sourness, saltiness, and bitterness, is part of the Korean dining culture, and the generous use of red chili and fermented condiments has made Korean dishes famous for their strong flavors [8–13], which have been regarded as wine-killers.

However, there has been scant academic research about Korean food and wine pairing. The common aim of previous studies was finding which wine paired well with which food based on quantitative research rather than identifying principles of Korean food and wine matching that could be generally applied to various Korean dishes. 'Harmony with food' is one of the top reasons Koreans drink wine [3,14,15]. Therefore, determining the wine pairing criteria for Korean cuisine is crucial to enhancing wine consumers' satisfaction, useful for wine companies and retailers in generating marketing ideas, and helpful to professionals in the hospitality business in sourcing and recommending wines to customers. Good criteria for food and wine pairing might also help with the acceptance of Korean food worldwide. Moreover, Korea has recently started producing grape wines, and an in-depth understanding of these criteria could help improve their wine style to better suit Korean dishes. Lastly, this study could also be useful to academics who are developing theories of Korean food and wine pairing.

2. Literature Review

2.1. Cultural Differences in Taste

Academics performed many studies in the 1980s and 1990s to discover the cultural differences in taste perception between East and West. Regardless of doing the experiments with solutions [16–18] or foods [19–22], there was no cultural difference in the ability to perceive taste and discriminate the intensity. However, those studies discovered that there is a cultural difference in 'likings' of taste, and the difference did not exist simply as a preference for sweetness or saltiness, but rather existed as an optimal level of tastiness in each food. When the panels were blind to the products' origins, they gave higher hedonic ratings to their domestic products or to the products they were familiar with. This familiarity determines the optimum level of tastiness and sensitivity [23,24], which often affects preference, not only for food but also for beverages including wine.

From the study of Williamson, Robichaud, and Francis [25], 23% of Australian subjects were impacted by the familiarity of the prevalence of new oak treatment in many Australian red wines. Lund et al. [26] found that New Zealanders significantly preferred New Zealand-style Sauvignon Blanc from among 52 wines from six countries. J. C. Lee [27] also stated that Asians (such as Koreans and northern Chinese) who love black tea, bitter green tea, or bitter vegetables could better tolerate bitterness and high tannins in wine varieties. Southeast Asians, whose food reflects sweeter flavors rather than bitterness, could be less tolerant of tannins. However, it is not only the familiarity learned from local food and drink that affects wine preference. The level of wine involvement also affects consumers' wine selection because repeated consumption of wine changes their preference, leading them to accept a wine they initially rejected. For instance, a wine originally deemed too dry might later become a more enjoyable choice than previously preferred sweet wines [28]. These studies all demonstrate that repeated consumption and experience influence wine taste preferences.

2.2. Food and Wine Pairing

Many authors agree that the sensory properties of food and wine can be grouped into three categories: components, texture, and flavor [6,29–34]. The components are the first things detected by the tongue and give the initial impression of food and wine [34]. The most typically perceived

components are sweetness, saltiness, sourness, and bitterness [31,34]. After the tongue detects those components, it next perceives the texture [35]. While the texture in food can be affected by the fattiness, cooking method, and overall body of the food, the texture in wine can be determined by tannin, alcohol, oak, and body [31,32]. Flavors are detected mainly by the interaction of the nose and the palate. Although flavors are recognized by the nose before they are tasted, when food and wine are in the mouth, chewed, and warmed up, the flavors are further released, picked up through the back of the mouth and then into the nose [36]. Although food and wine pairing criteria has been studied by many food and wine experts [6,27,30–32,34,37–41], the most recent research that would be suitable for this research was performed by Klosse in 2014 [42] and is called the Flavour Styles Cube (FSC) model (see Figure 1), which is based on the variables:

- The mouthfeel, the feeling a product gives in the mouth, is composed of two dimensions:

  ○ The contracting mouthfeel (that is, the mouthfeel contraction generated by acidity, bitterness, saltiness, carbonation, or spiciness; but also the drying effect in the mouth caused by the tannins of red wines) gives the impression of refreshment and cleansing the mouth.
  ○ Coating mouthfeel (which leaves a thin layer in the mouth such as sweet wines): the sugar, fat, and proteins give this creamy and fatty texture. In beverages, alcohol and sugars are viscous and coating elements.

- The flavor richness is composed of the flavor intensity and the flavor type

  ○ Flavor intensity is the amount of flavor, which is different from complex flavors that keep on surprising you
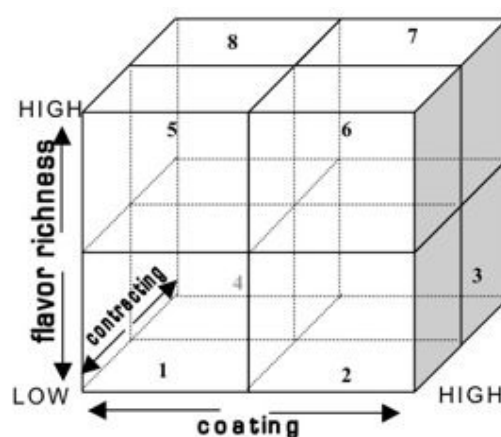 ○ Flavor type (fresh and ripe dimensions)

Figure 1. Flavor styles cube (FSC).

Food and drink can be classified according to the three abovementioned parameters and generate eight following flavor profiles, arranged in what is called the flavor styles cube (FSC) with three basic dimensions: (1) contracting mouthfeel; (2) coating mouthfeel; and (3) flavor richness. They can all be scaled from low to high.

Table 1 shows the eight flavor styles of beverages (with a focus on wine):

(1) Flavor style 1 is neutral, such as water
(2) Flavor style 2 is round, such as wines with a touch of sweetness (coating)
(3) Flavor style 3 is balance low which corresponds to a simple easy thick wine
(4) Flavor style 4 is fresh (contracting), which corresponds to acidic white wine

(5) Flavor style 5 is robust, which is associated with tannic red wines with oak character

(6) Flavor style 6 is full, such as sweet and fortified wines

(7) Flavor style 7 is balance high or full-bodied and balanced wine

(8) Flavor style 8 is pungent, such as sparkling wines

To sum up Table 1:

- Style 1 and style 5 represent two extremes: neutral vs. robust (such as tannins);
- Styles 2 and 6 go from round (wines with a touch of sweetness) to full coating wines such as sweet and fortified wines;
- Styles 4 and 8 go from fresh to pungent; the contracting dimension is influenced by acidity, salt, and CO_2;
- Styles 3 and 7 represent balanced wines from low to high (the flavor becomes balanced if coating and contracting forces more or less compensate for each other (e.g. umami)).

Table 1. Description of the flavor styles.

Description of the Flavor Style	Example of Beverages	Primary Flavor Factors		
		Contracting Mouthfeel	Coating Mouthfeel	Flavor Richness
1. NEUTRAL (light)	Plain water	Low/neutral	Low/neutral	Low
2. ROUND (smooth, supple, creamy)	Wine with a touch of sweetness	Low	High	Low
3. BALANCE LOW (can be drunk continually, simple)	Balanced daily wine	High	High	Low
4. FRESH (sour, contracting)	Acidic white wine	High	Low	Low
5. ROBUST (powerful/dry)	Tannic red wines with oak character	Low/Dry	Low/dry	High
6. FULL (rich, ripe flavor, filling)	Sweet, concentrated wine, fortified wine	Low	High	High
7. BALANCE HIGH (ripe, complex, differentiated, subtle)	Rich, full-bodied balanced wine	High	High	High
8. PUNGENT (spicy, hot, explosive)	Sparkling wine	High	Low	High

In practice, flavor is what wines and food have in common. Thus, the same descriptors can be used. This leads to new guidelines for the paring of food and wine. Basically, good combinations are found if the flavor profile of wines and foods resemble one another. In other words:

- Contracting wines go well with contracting foods
- Coating wines go well with coating foods
- The flavor richness of wines and foods should be about the same
- The sequence when composing a menu is to progress from contracting to coating foods and wines, and from lower levels of flavor richness to higher levels.

2.3. Korean Food and Wine

The ingredients and cooking methods of Korean cuisine are not significantly different from those used in Western cuisine [7,13]. However, the generous use of red chili and fermented condiments lends specificity to Korean food. A recent study by Cha et al. [8] explored typical tastes and flavors of Korea and selected representative flavors and food products. The top eight flavors were identified as red chili pepper, umami, goso (a flavor related to protein and the presence of lipids), gusu (the flavor

of roasted carbohydrate), dambaek (plain taste), salty, matured/fermented, and kal-kal (spiciness with refreshing characteristics). The top eight food products were kimchi, soy sauce, garlic, gochujang (red chili paste), doenjang (soybean paste), steamed rice, sesame oil, and roasted sesame seed. These results demonstrate the distinctiveness of Korean cuisine.

Koreans' dining culture is centered on a single-course meal with all the dishes served at once. Koreans regard the harmony of taste and flavor as the most important element of dining. Korean meals offer steamed rice as a main dish, combined with a complex blend of side dishes that are warm or cold, mild or spicy, with a variety of textures and colors [9,43,44]. By choosing a side dish for each spoonful of rice, a different taste is created every time [7]. In addition, a Korean meal almost always has side dishes containing a high water content, such as soup and jjigae (stew) [7]. Because those dishes satisfy the necessity of liquid to help chew food, perhaps there has been no need to include an additional separate drink. In Western culture, wine is normally consumed with a meal. Koreans, however, have a separate table setting for alcoholic drinks called juansang, arranged with the beverage and the cups and anju (snack foods) in the middle for sharing [13,45]. Anju is chosen according to the type of drink [11,46,47]. Pancakes, meat dishes, tofu, and jellied foods were ranked as the top three anjus for Korean traditional liquors [47].

As a result of the literature review, the research questions below were developed to identify the criteria of Korean food and wine pairing.

- Which feature of Korean cuisine influences wine pairing?
- From their daily diet, have Korean consumers developed a wine preference that could affect wine pairing to Korean food?
- To what extent are the existing pairing criteria applicable to Korean cuisine?
- Are there any new criteria of wine pairing to be identified for the Korean palate and Korean cuisine?

3. Research Methods

Because information about Korean food and wine pairing is scarce, an exploratory study was required to discover specific features of Korean cuisine and Koreans' taste preference of wine. A qualitative study alone could have problems with the generalization of findings as it depends on subjective opinions from a small number of participants. Therefore, after a thorough review of the research methods, sequential mixed methods were selected as the most suitable methodology for this research.

In the qualitative study, which was performed first, 12 semi-structured one-on-one interviews were carried out with academics, chefs, sommeliers, and food/wine writers who had expertise in both Korean food and wine. Additionally, a focus group interview with seven professional Korean sommeliers was conducted. The three main topics for the interviews were: (i) the specific characteristics of Korean food that could affect food and wine pairing; (ii) Koreans' taste preference of wine; and (iii) Korean food and wine pairing ideas. The interviews were voice recorded and then transcribed. The transcriptions were reorganized into four research theme questions, and then keywords were assigned to them for the analysis and development of propositions to be tested in the quantitative study.

For the quantitative study, a survey was conducted, composed of 35 questions:

- 24 questions on food and wine pairings: a set of three questions per course (Here is a list of the eight courses: (1) deep-fried sweet chicken (ingredients: chicken, starch, egg white, frying powder and condiments: clear rice wine, sugar, starch syrup, soy sauce, garlic, ginger, lemon juice, soy, pepper, red chili paste, sesame oil); (2) sour cold jellyfish salad (ingredients: jellyfish, cucumber and condiments: vinegar, sesame oil, salt, sugar, soy sauce, garlic); (3) crab marinated in soy sauce (ingredients: crab, soy sauce, mirin, garlic, chili, pepper, ginger, kelp, anchovy); (4) acorn jello (ingredients: acorn powder, water, a bit of salt); (5) spicy stir-fried pork (ingredients: pork, cabbage, onion, chili, spring onion, carrot and condiments: red chili paste, red chili powder,

mirin, soy sauce, sugar, garlic, ginger juice, pepper, sesame oil); (6) spicy stir-fried baby octopus (ingredients: baby octopus, cabbage, carrot, chives, red chili, onion, oil, and condiments: red chili paste, red chili powder, soy sauce, sugar, garlic, ginger, salt, sesame); (7) spicy stir-fried rice pasta (ingredients: rice pasta, spring onions, red chili and condiments: red chili paste, soy sauce, pepper, sesame oil, sesame, sugar, starch syrup); (8) simmering kimchi stew (ingredients: matured kimchi, pork, tofu, spring onion, oil, red chili powder, garlic): type of wines they would like to pair with: red, white, rosé, sparkling, no pairing; the level of tannins, sweetness, acidity, sourness and body (from low/light to high/heavy) of the wine to pair with; the dominant flavor of the wine to pair with (oaky, spicy, fruity, flowery, vegetal)

- 7 questions on snack and wine habits (the best Korean snacks to be paired with wine, ease of pairing Korean food with wine, frequency of pairing Korean food with wine, preferred country, preferred variety, price range and frequency of wine consumption)
- 2 questions on wine involvement (to assess level of expertise: deep knowledge, studying wine, wine beginner and traditional drinker; though the convenience sample is involved in wine-related activities) and 1 question to check the participation in wine-related activities (wine class, reading, sharing information with friends and wine club)
- 2 on demographics (gender and age).

The questionnaires were distributed to wine consumers who studied wine and/or were involved in wine-related activities such as wine clubs (convenience sample). The main reason for choosing this option is linked to the difficulty of finding wine connoisseurs given their limited number in South Korea. Furthermore, even if they belonged to wine clubs, some clients were more involved: those who categorized themselves as wine connoisseurs (possessing deep knowledge about wine; drink wine more than five times a month) or aspirants (studying wine actively; drink wine 3–4 times a month) formed 57.3% of the respondents (79 participants); those categorizing themselves as newcomers (started learning wine; drink wine once or twice a month) or wine outsiders (occasional wine drinkers) formed the remainder 42.7% (59 participants). A total of 151 people participated in the survey between 3 and 9 July 2013. The printed questionnaires were administered in wine clubs and wine classes. Those needing more time were given a URL link to complete the survey online. We collected 91% of the responses in print; 9% were done via the Internet (for those interviewees who wanted to fill out the questionnaire later). Excluding 13 answers that were incomplete or had reliability issues, 138 questionnaires were accepted as valid.

4. Qualitative Findings and Discussions

The three following sections on characteristics of Korean food, Koreans' taste preferences for wine, and Korean food and wine pairing come from our qualitative findings.

4.1. Characteristics of Korean Food

The interviewees agreed that facets of Korean dining discourage having wine as an accompaniment. The single-course meal of steamed rice and various side dishes allows diners to create a different taste for each bite. Soup and jjigae (stew) work as lubricants for chewing and swallowing, which is the role of wine in Western dining. Thus, serving wine with soup and stew creates overlapping functions (in Western gastronomy, there is no unanimity about the appropriateness of wine with soup either, although truffle soup can be paired with Bienvenues-Batard-Montrachet, [48]). Kimchi, the mandatory Korean side dish, provides another impediment to wine pairing. While the acidity in wine stimulates the appetite for the Western palate, the spiciness and sourness of kimchi refreshes the Korean palate. The strong flavor of kimchi easily overpowers wine. As a result, Korean meal settings set many restrictions on wine pairing, and those same limitations also interfere with the accompaniment of other alcoholic drinks.

Different from a meal table, juansang (drinking table) was discovered to be more favorable to wine pairing. Only one or two main dishes are served as anju (snack food) for sharing, and soup and kimchi are not mandatory side dishes. The interviewees generally agreed that alcoholic drinks were easier to pair with mildly flavored dishes prepared with few or no strong-flavored condiments to overwhelm the flavors of the drinks. Wine-friendly foods they identified were fish pancakes, Japchae (sautéed vegetables with potato noodles) and meat dishes such as grilled pork belly and braised short ribs.

However, dishes with a strong flavor, fiery spiciness, and/or hot temperature were discovered to be wine-killers because they easily overwhelm the wine and make the tongue dull and unable to taste the complexity and subtlety of the wine. Those dishes are made with generous amounts of strong condiments such as gochujang (red chili paste), doenjang (soy bean paste), fermented fish sauces, and red chili powder. Dishes such as jjigae (stews) and jeongol (hot pot) are frequently served at a boiling-hot temperature, and the heat interferes with tasting the subtlety and complexity of the wine.

4.2. Koreans' Taste Preferences for Wine

In Korean cuisine, more dishes are made with strong flavors and fiery spiciness than with mild flavors. In addition, the Koreans' familiarity with soju, with an alcohol level of around 20% ABV, has led to a preference for strong red wine, especially among wine consumers aged 30 to 50. As this segment of the population is used to eating fiery dishes with soju, they expect a similar sensation in the mouth from wine, and may prefer a tannic, fuller-bodied wine with spicy dishes. This is entirely different from the classic criteria, which pairs fiery dishes with refreshing wine to calm down the burning sensation.

In addition, many interviewees stated that a preference gap exists based on the level of wine involvement. They said that wine lovers between 30 and 50 prefer dry red wine while young newcomers prefer easy-drinking wines with some sweetness and low alcohol content. This complies with Fieldhouse's argument. The repeated consumption of wine changes consumers' preference. They come to consider a wine they initially rejected as being too dry as being more enjoyable than the previously preferred sweet wine [28].

4.3. Korean Food and Wine Pairing

To understand whether traditional food and wine pairing criteria work for Korean cuisine, the interviewees were asked to provide Korean snack food and wine pairing ideas based on four primary tastes (sweetness, sourness, saltiness, and bitterness) plus spiciness. (In Western culture, there are five primary tastes (sweetness, sourness, saltiness, bitterness, and umami). In traditional Korean cuisine, sweetness, acidity, sourness, bitterness, and spiciness are the five primary tastes. The context of this study is to find the Korean food and wine matching criteria, which is why spiciness was added as a primary Korean taste. As Chung [9] pinpointed, Koreans have traditionally counted spiciness as one of the five primary tastes. From page 37 of Pettid's book on Korean cuisine [44]: *"The five phases also relate to the five tastes of sour, bitter, sweet, spicy and salty found in Korean food."*) A sample food list was presented but the interviewees were free to suggest any food. As a result, for non-spicy foods, deep-fried sweet chicken was selected for sweetness, jellyfish salad for sourness, crab marinated in soy sauce for saltiness, and acorn jello for bitterness.

As summarized in Table 2, the interviewees' wine pairing ideas for these sweet, sour, salty, and bitter foods were in general agreement with pairing criteria. The interviewees matched the level of sweetness and acidity between food and wine. They paired wine with a touch of sweetness and acidity with the salty dish. Some interviewees suggested wine with oak to counter the soy sauce flavor. For the bitter dish, they recommended wine with firm tannin and oak flavor.

Table 2. Comparison between the pairing criteria and the interviewees' wine suggestions for sweet, sour, salty, and bitter food samples.

Korean Food Samples and Their Characteristics	Wine-Pairing Criteria	Interviewees' Wine-Pairing Suggestions
Deep-fried sweet chicken (sweetness)	Match level of sweetness Wines with ripe and intense fruit Avoid heavily oaked wines	Off-dry ripe fruit red wine White wine with good fruit New world sparkling wine
Jellyfish salad (sourness)	Match level of acidity Avoid tannic and oaky wine	Acidic white wine with no oak Dry sparkling wine with good acidity
Crab marinated in soy sauce (saltiness)	Highly salty food is a wine-killer Wine with a touch of sweetness and a little acidity	Hard to pair wine White wine with some sweetness and a little acidity
	Wine with effervescence	Light bodied well-matured (oak) red wine to match the soy sauce flavor Wine with effervescence
Acorn Jello (bitterness)	Highly bitter food is a wine-killer Wine with firm tannin or oak maturation Wine with effervescence	White wine with some oak Medium bodied red wine with some spiciness and softness (oak matured)

For spicy food samples, spicy stir-fried pork was selected for low spiciness, spicy stir-fried rice pasta for medium spiciness, and baby octopus for high spiciness. The interviewees suggested both tannic red wine and refreshing wine, taking into account two different consumer segments: the segment that loves the burning sensation and the segment that prefers to calm the heat and pain. However, for the intensely spicy stir-fried baby octopus, the interviewees generally recommended refreshing wine. For the lower-spiced stir-fried pork, both red and white wines were recommended. Thus, the interviewees' red wine pairing with spicy dishes related to the level of spiciness. In addition, the author asked the interviewees about wine pairing with kimchi stew, which presents the biggest challenge to wine pairing (spiciness, soupiness, and hot temperature). Most of the interviewees said no wine could be matched, but a few suggested a well-chilled sparkling wine for refreshment. Table 3 shows the comparison of the pairing criteria and the interviewees' wine suggestions for the spicy food samples.

Table 3. Comparison between the pairing criteria and the interviewees' wine suggestions for spicy food samples.

Food Samples and Their Characteristics	Wine Pairing Criteria	Interviewees' Wine Pairing Suggestions
Spicy stir-fried pork (low spiciness)	Wine with mild sweetness and refreshing acidity Wine with effervescence Avoid high tannin and high alcohol wine	Light red wine White wine with oak Medium+ bodied tannic red wine (e.g., Australian Shiraz) for the people who love the burning sensation
Spicy stir-fried baby octopus (high spiciness)		Sparkling wine with good acidity White wine with good fruit and acidity
Spicy stir-fried rice pasta (medium spiciness)		Wine with refreshing characteristics
Kimchi stew (highly spicy, soupy and hot temperature)	No definition Cold wine to provide contrast to hot temperature	No wine to match Well-chilled sparkling wine could be the only solution

Consequently, the qualitative study identified three specific characteristics of Korean food that could influence food and wine pairing: (a) strong flavor from fermented condiments; (b) fiery spiciness from red chili; and (c) hot food temperature. The dishes without those features were able to follow the pairing criteria, but the dishes with those elements required new guidelines for wine pairing. These specific characteristics of Korean food also developed two segments of consumers: those who love the

burning sensation pair tannic red wine with spicy dishes, and those who prefer to tame the heat prefer refreshing wine with spicy dishes. The wine preference gap based on the level of wine involvement could also influence consumers' wine pairing with food.

As a result, the above qualitative findings were developed into four propositions.

- P1: The Western criteria of food and wine pairing are applicable to Korean dishes that do not include the characteristics of spiciness, strong flavor, or hot food temperature.
- P2: There is a segment of Korean wine consumers who choose tannic red wine for spicy dishes to enjoy the burning sensation in the mouth.
- P3: The combination of spiciness, soupiness, and hot food temperature creates the worst conditions for wine pairing.
- P4: The level of wine involvement affects consumers' wine preference and wine selection for food.

These propositions were tested in the following quantitative study.

5. Quantitative Findings and Discussions

5.1. Characteristics of the Respondents

Of the 138 valid answers, 53% of the participants were male; 47% were female. Additional demographic characteristics of the respondents indicated that 50% were under 30 years old and 50% were 30 years old or older. Of these, 25% said they drink less than a bottle of wine a month, 27% said they consume 1–2 bottles, 25% said 3–4 bottles, and 23% said more than five bottles a month. Nearly 60% of respondents favored spending between $30 and $58 on a bottle of wine. Of those, 34.1% said about half of their snack choices to pair with wine are Korean food. Another 34.1% said they occasionally choose Korean snack foods with wine. While 20.3% said they have not tried Korean snacks with wine, only 2.9% said they always have Korean snack foods. Regarding Korean food and wine pairing, the majority (74.6%) answered that the harmonious pairing depends on the type of Korean food. While 10.9% said Korean foods generally go well with wine, 9.4% said Korean food does not pair well with wine.

5.2. Wine Pairing with Sweet, Sour, Salty, and Bitter Foods

The same snack food samples from the qualitative study were also used for the survey. To provide a clear idea, the dishes' flavor profiles, a list of ingredients, and condiments for each dish were specified on the questionnaire. For each dish, the respondents were asked to choose: first, the type of wine (e.g., red, white, rosé, sparkling, or no wine), then, the attributes (e.g., none, low/light, medium, medium+, and high), the taste (e.g., sweetness, acidity, tannin, and body), and the flavor (fruity, flowery, vegetal, oak, spicy, and other). The participants' selections of wine type and style for sweet, sour, salty, and bitter dishes were overall in agreement with the pairing criteria and the qualitative results, as shown in Table 4. We have added a column for the FSC (flavor styles cube) to justify how the most recent literature on flavors is consistent with our recommendations.

The only differences from the qualitative results were the spicy flavor wine chosen to accompany the deep-fried sweet chicken and the vegetal flavor chosen for acorn jello. This could be because only a little red chili paste is used in the deep-fried sweet chicken, and acorn jello is often consumed as a salad mixed with vegetables. Other attributes of the taste were in agreement with the pairing criteria and the qualitative results. To pair with a salty food with soy sauce flavor, the participants selected a wine with oak flavor, just as the interviewees in the qualitative study suggested. This supports the first proposition: "The pairing criteria for food and wine are applicable to Korean dishes that do not include the characteristics of spiciness, strong flavor, or hot food temperature," and a new criterion of soy sauce flavor and oaky wine pairing has been discovered.

Table 4. The comparison of the Western criteria, the qualitative result, and the quantitative result.

Food Samples	Wine Pairing Criteria	Qualitative Results	Results Coming from the Quantitative Data (Those Results Come from the Collected Quantitative Data and It Is Shown in the Appendix 7 How We Found These Results Based on Statistical Analysis for the Case of "Sweetness (Deep-Fried Sweet Chicken).")	FSC (Flavor Style Cube)
Deep-fried sweet chicken (course with sweetness)	- Match level of sweetness - Chose wines with ripe and intense fruit - Avoid heavily oaked wines	- Off-dry ripe fruit red wine - White wine with good fruit - New world sparkling wine	- Off-dry spicy red wine - Fruity medium+ sweet sparkling white wine	- COATING wines go well with coating food (ROUND or FULL) - PUNGENT wines
Sour jellyfish salad (course with acidity)	- Match level of acidity - Avoid tannic and oaky wine	- Acidic wine with no oak - Dry sparkling wine with good acidity	- White wine with medium+ acidity and vegetal flavor	- FRESH wines go well with contacting food
Crab marinated in soy sauce (course with saltiness)	- Highly salty food is a wine killer - Wine with a touch of sweetness and a little acidity - Wine with effervescence	- Hard to pair wine - White wine with some sweetness and/or oak - Light bodied, well-matured red wine - Refreshing wine	- Off-dry white wine with vegetal flavor - Dry red wine with oak flavor	- ROUND wines - ROBUST wines - PUNGENT wines
Acorn Jello (course with bitterness)	- Highly bitter food is a wine killer - Wine with firm tannin or oak maturation - Wine with effervescence	- White wine with some oak - Medium-bodied red wine with some spiciness and softness (from oak maturation)	- Red wine with medium+ tannin and oak - Off-dry white wine with vegetal flavor	- ROBUST wines - ROUND wines - PUNGENT wines

5.3. Wine Pairing with Spicy Foods

For the three spicy dishes, the top chosen wine style was a spicy red wine with a tannin level of medium or medium+. This supports the proposition that a segment of Korean wine consumers choose tannic red wine for spicy dishes and enjoy the burning sensation in the mouth: it was assumed that sparkling (pungent wines), rosé, and white wines (contracting wines) have more refreshing characteristics than a red wine. The fewest respondents chose a refreshing wine to pair with the least of the three spicy dishes, the stir-fried pork. However, the biggest selection of refreshing wine was for spicy stir-fried rice pasta, which has medium spiciness, rather than spicy stir-fried baby octopus with the highest level of spiciness. This shows that the respondents' choice of refreshing wine did not follow the level of spiciness discovered from the qualitative study. Moreover, although spiciness has been regarded as a wine-killer in wine pairing criteria, the quantitative study found that Koreans do not regard spiciness as a significant problem in wine pairing.

Just as in the qualitative study, kimchi stew was added in the survey to test the third proposition: "The combination of spiciness, soupiness, and hot food temperature forms the worst conditions for wine pairing." While 20.3% of respondents answered "no wine" for the dish, 40.6% chose red wine with medium+ tannin and spicy flavor, and 39.1% chose white, rosé, or sparkling wine. This confirms the previous finding that spiciness is not regarded as a wine-killer in Korea; there is a segment of wine consumers that pair tannic red wine with spicy dishes.

However, when respondents were asked to rank the questionnaire's eight sample dishes based on their preference to consume with wine, kimchi stew came in last. This result demonstrates that although Korean wine consumers chose a wine for kimchi stew, the dish was not considered a good match with wine. As a result, the third proposition was supported.'

5.4. Wine Selection Based on Wine Involvement

The last proposition was: "The level of wine involvement affects consumers' wine preference and wine selection to pair with food." To test this proposition, the respondents' wine pairing responses for each dish were revisited to evaluate the differences based on the level of wine involvement. Seventy-nine (57.2%) of 138 respondents labeled themselves as wine connoisseurs or aspirants, and 59 participants (42.8%) rated themselves as newcomers or outsiders. The highly involved group selected red wine for six dishes; the newcomers chose red wine for four dishes. When choosing wine flavors, the connoisseurs selected a spicy flavor for four dishes, whereas the low group chose fruity wines for four dishes. The choice of wine sweetness showed a clear difference. The more experienced wine drinker generally preferred dry wine, but not with the two sweet dishes of deep-fried sweet chicken and spicy stir-fried rice pasta. On the contrary, the less experienced group did not give hedonic ratings to dry wine for any dish on the questionnaire. As far as the level of tannin preferred, those with the most wine involvement preferred a slightly higher level of tannin than the group with less experience. The responses for the acidity and body of wine showed no demonstrable difference. As a result, a wine preference gap was discovered between highly experienced wine consumers and less experienced ones. Accordingly, the gap influenced consumers' wine pairing with food. Therefore, the proposition that expected different wine preferences and different wine selections for food based on the level of wine involvement was supported.

6. Conclusions

As a result, nine suggestions for Korean food and wine pairing criteria were developed.

1. For a sweet dish, match the level of sweetness: choose a wine with ripe and intense fruit, and avoid heavily oaked wine (coating effect: round wines with some residual sugars or full wines such as fortified or sweet wines).
2. For a sour dish, match the level of acidity; avoid tannic and oaky wine (contracting effect and fresh wines with vegetal characteristics).

3. For a salty dish, choose a wine with a touch of sweetness and a little acidity (round off-dry wines).
4. For a bitter dish, choose wine with firm tannin and/or oak maturation (robust red wines with oak flavors).
5. For a dish with soy sauce flavor, choose a wine with oak flavor (robust red wines).
6. For a spicy dish, choose a wine with mild sweetness and refreshing acidity to calm the burning sensation (round wines or pungent wines). Avoid high tannin and high-alcohol wine.
7. For consumers who prefer the burning sensation, dry tannic wine can be paired with a spicy dish.
8. The combination of spiciness, soupiness, and hot temperature is the worst situation for wine pairing.
9. Wine with effervescence provides a palate-cleansing effect (pungent wines).

While seven suggestions out of nine are in agreement with the classic wine pairing criteria, suggestions 5 and 7 are new findings discovered from this study. The pairing of tannic wine with spicy food could be specific to Koreans and is hard to apply to Western palates or to other Asian consumers unless their daily diet is similar to Koreans' in terms of the level of spiciness. Moreover, the quantitative study discovered that Korean wine consumers have a tendency to pair sparkling wine with sweet dishes. This could indicate that Koreans desire a more palate-cleansing impact when consuming sweet dishes rather than spicy dishes. This was not identified from the qualitative research but discovered from the quantitative study and might require further research to be confirmed as a new wine pairing criterion for Korean food. Lastly, the level of wine involvement was found to influence consumers' wine selection for food, but this was not included in the suggestion because wine involvement is personal and changeable based on consumers' accumulated wine experience.

As Koreans prefer something to nibble on when drinking, a limited selection of food for wine pairing could decrease opportunities for wine consumption. Therefore, promoting wine pairing ideas with Korean dishes could encourage more wine consumption, especially for newcomers and outsiders. Wine companies and retail stores could utilize the findings of this study to promote their wines with everyday Korean dishes. They can distribute leaflets about their wine and Korean food pairing ideas via supermarket chains, or serve Korean food when they hold their wine tasting events. The findings of this study also demonstrate that it is not necessary to stick to high-class expensive wine to pair with Korean foods. Fruity young wines and sparkling wines such as Cava, Prosecco, and new world sparkling wines could provide versatile pairing with Korean snack foods. As the price level of those wines is relatively reasonable, they have a good potential to compete with beer, and this could open the door to the wine world, especially to beginners. Korean restaurants overseas, particularly those located in Western countries, could change their wine list to include non-expensive refreshing wines and achieve better consumer satisfaction. When serving wine with Korean food, sommeliers could ask diners about their preference in terms of the burning sensation to decide which wine to pair with fiery dishes. This could lead to better choices of wine depending on consumers' taste preference. For academics, this study could be a springboard for further research to develop more principles of wine pairing with Korean foods. Recently Korea has established wineries and started producing grape wines with modern technology. Identifying the wine attributes that create a harmonious match with Korean food could also contribute to the development of Korean oenology and wine business.

7. Limitations

Because of practical constraints and scant previous literature, this research focused on Koreans' four primary tastes (sweetness, sourness, saltiness, and bitterness), plus spiciness. However, Korean foods are prepared with a variety of cooking methods, producing various dishes with different textures. Some herbs and spices used for Korean food are different from Western cuisine. The diversity of fermented seafood sauces adds specific flavor characteristics to Korean dishes. All these features were too broad to be included in this research. Therefore, further studies about how the textures and flavors

of Korean food influence wine pairing are required to complete the criteria. In addition, umami taste should also be studied.

Regarding the research methods, this study used sequential mixed methods to explore the criteria for Korean food and wine pairing. Interviews were performed to collect culinary and wine experts' opinions. Then, to generalize the findings, the quantitative method of a survey was used. Thus, the studies were based on participants' perceived taste of food and wine (convenient sample). Many academic researches about food and wine have been carried out using experiments. Therefore, performing an experimental study with trained panels using the same food samples could further confirm or disconfirm the outcome of this study.

Finally, some recent developments in the literature, such as the Flavor Styles Cube (FSC) model developed by Peter Klosse [42], should be applied to build a menu. In this model, the mouthfeel is central, and three parameters for food and beverages exist: (1) contracting mouthfeel (especially the contracting response of acidity and saltiness or the drying effect in the mouth generated by the tannins coming from red wines); (2) coating mouthfeel (influence of sweetness dimension: sugar and alcohol are coating the mouth; and (3) the flavor richness (the more taste, the higher the flavor richness). The intensity from low to high for each parameter is a key concept. In order to build a menu, it is important to go from contracting to coating foods and wines, and from lower levels of flavor richness to higher levels. Moreover, the recent study of Cha et al. [8], which explores typical tastes and flavors of Korea and selected representative flavors and food products, could be compared to the FSC model.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A1. Illustration of Korean Courses

Appendix A1.1. NON-SPICY FOOD

Appendix A1.1.1. Deep-Fried Sweet Chicken (닭강정)—Sweetness

Figure A1. Ingredients: chicken, starch, egg white, frying powder and condiments: clear rice wine, sugar, starch syrup, soy sauce, garlic, ginger, lemon juice, soy, pepper, red chili paste, sesame oil; see recipe at: http://www.koreanbapsang.com/2014/03/dakgangjeong-sweet-crispy-chicken_16.html.

Appendix A1.1.2. Jellyfish Salad (해파리냉채)—Sourness

Figure A2. Ingredients: jellyfish, cucumber and condiments: vinegar, sesame oil, salt, sugar, soy sauce, garlic; see recipe at: http://kimchimari.com/cold-lemon-jellyfish-salad/.

Appendix A1.1.3. Crab Marinated in Soy Sauce (간장게장)—Saltiness

Figure A3. Ingredients: crab, soy sauce, mirin, garlic, chili, pepper, ginger, kelp, anchovy; see recipe at: http://www.maangchi.com/recipe/ganjang-gejang.

Appendix A1.1.4. Acorn Jello (도토리묵)—Bitterness

Figure A4. Ingredients: acorn powder, water, a bit of salt; see recipe at: http://www.maangchi.com/recipe/dotorimukmuchim.

A1.2. SPICY FOOD SAMPLES

Appendix A1.2.1. Spicy Stir-Fried Pork (제육볶음)

Figure A5. Ingredients: pork, cabbage, onion, chili, spring onion, carrot, and condiments (red chili paste, red chili powder, mirin, soy sauce, sugar, garlic, ginger juice, pepper, sesame oil); see recipe at: http://www.maangchi.com/recipe/dwaejigogibokkeum.

Appendix A1.2.2. Spicy Stir-Fried Baby Octopus (매운 낙지볶음)

Figure A6. Ingredients: baby octopus, cabbage, carrot, chives, red chili, onion, oil, and condiments: red chili paste, red chili powder, soy sauce, sugar, garlic, ginger, salt, sesame.

Appendix A1.2.3. Spicy Stir-Fried Rice Pasta (떡볶이)

Figure A7. Ingredients: Rice pasta, spring onions, red chili, and condiments (red chili paste, soy sauce, pepper, sesame oil, sesame, sugar, starch syrup); see recipe at: http://www.maangchi.com/recipe/ddukbokkie.

Appendix A1.2.4. Kimchi stew (김치찌개) (worst conditions for wine pairing: spiciness, soupiness, and hot temperature)

Figure A8. Ingredients: matured kimchi, pork, tofu, spring onion, oil, red chili powder, garlic; see recipe at: http://www.maangchi.com/recipe/kimchi-jjigae.

Appendix B. Type of Wine Chosen for Deep-Fried Sweet Chicken

The purpose of this appendix is to show how we deduce the results from the quantitative data. The scales of sweetness, acidity, tannin, and body are from 1 to 4 (low/light to high/Heavy); Likert scale. A Likert scale is a type of interval scale [49]. Interval data can be analyzed using means and analysis of variance tests [49]. One-way Anova and Tukey can be used to examine whether the ratings for sweetness, acidity, tannin, or body are different for each wine chosen. The individual groups are the wines chosen. Statistical differences in the means for the interval data are evaluated using one-way analysis of variance. Differences between ratings of the different wines are identified using the Tukey post-hoc test. Superscripts designate individual differences. The same superscript for two types of wines indicates there is no difference at the 0.05 level in the mean rating of the description between the two wines. Different superscripts indicate statistical difference at the 0.05 level.

The consumers that rated red wines rated them at a lower level of sweetness in comparison with white wine (in Table 4, it is recommended to have for pairing off-dry spicy red wine and fruity medium + sweet), while champagne and rosé were rated higher than white and red wines on sweetness (we recommended sparkling, though we did not mention the level of dosage to avoid confusion). White, rosé, and champagne are rated similarly on sweetness. Acidity is not significant, though the different wines are rated similarly on acidity (with the exception of red wine). Tannins are much higher for red wines (as expected, due to the skin contact during the fermentation and the use of oak and, in some cases, whole clusters/stems). The body of the wine is high for red wines.

Table A1. Statistical analysis of deep-fried sweet chicken.

Mean Rating	Red (*n* = 45)	White (*n* = 20)	Rosé (*n* = 33)	Champagne (*n* = 41)	Total (*n* = 139)	*p* Value
Sweetness	1.89	2.50	2.73	2.88	2.47	0.000 **
Acidity	2.58	2.95	2.91	3.00	2.83	0.084
Tannins	3.229	2.00	2.11	1.80	2.36	0.000 **
Body	3.39	2.60	2.48	2.63	2.84	0.000 **

Note: ** indicates *p*-values significant at the 0.05 level based on One-Way AOVA.

Similar statistical analysis was run for each course in order to recommend the approriate wine pairing.

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