Presentation of QR Code on Product Packages: Information Content from the Perspective of Cognitive Fit Theory

WEN-CHIN TSAO

Associate Professor of Department of Business Administration, National Chin-Yi University of
Technology, Taipei, Taiwan, Republic of China.
E-mail: tsao@ncut.edu.tw
Tel: +886-4-23924505 ext. 7775
Fax: +886-4-23929584

YU-HSIA TU

Postgraduate of Department of Business Administration, National Chin-Yi University of Technology,
Taipei, Taiwan, Republic of China.
E-mail: debra60933@hotmail.com
Tel: +886-930969146
Fax: +886-930969146

Abstract

This study investigated the benefits that could be gained by including QR codes in packaging strategies as well as the means by which QR codes should be presented in order to enhance purchase intention. To facilitate the manipulation of scenarios and the study variables, this study adopted an experimental design based on two discrete investigations. Two experiments were conducted to collect data from 290 participants. The results indicate that (1) using QR codes to provide additional information on food packaging can increase the purchase intention of consumers; (2) the aforementioned increasing effect is more significant with ready-to-cook food than with ready-to-eat food; (3) pairing ready-to-eat food with utilitarian information is more effective than pairing it with hedonic information, whereas pairing ready-to-cook food with either utilitarian or hedonic information can increase purchase intention. The findings verify the feasibility of applying QR codes to packaging and help to identify the content best conveyed by QR codes when paired with specific products.

Key Words: QR Codes, Cognitive fit Theory, Hedonic Information, Mobile Marketing, Ready-to-Cook.

Introduction

QR codes (Quick Response Codes) have become ubiquitous following the explosive growth of mobile communications. QR codes are widely applied in advertisements and promotions, due to their low cost, large storage capacity, and rapid readability, representing an innovative tool for mobile marketing as well as online distribution and product packaging (Lin et al., 2013). Decoding software in smart handheld devices (SHDs) is used to read the information hidden within QR codes. The continuing expansion of SHD ownership also means that the use of QR codes will become increasingly important in the formulation of marketing strategies. QR codes originated in Japan and are particularly popular in Asian countries. For

instance, QR codes are widely applied in sale promotions in Japan, providing discount coupons, product samples, and loyalty points (Okazaki et al., 2012). In South Korea, many corporations use QR codes in the form of coupons. British retailer TESCO even invested in Home Plus in South Korea, using QR codes to achieve a click-and-mortar business model that expands on the display capacity of physical stores and enables consumers to complete their shopping quickly and efficiently, even when engaged in other activities such as commuting (AlSaeed, 2011). QR code applications enable swift offline-to-online (O2O) integration and updating. This two-dimensional barcode is already widely used in mobile marketing mixes as a new O2O marketing tool (Bamoriya, 2014; Asare and Asare, 2015).

QR code applications facilitate communication between brands and consumers. Consumers are able to obtain more information concerning the product they want to buy (Okazaki et al., 2012; Narang et al., 2012). Previous studies have shown that consumers use product-related information such as price, brand, and place of production to gain an understanding of products and predict their quality, thereby helping to reduce uncertainty in their purchase decisions (Wilcox, et al., 2011). Thus, consumers can leverage internet technology to obtain product information at any time and any place, thereby facilitating purchase decisions (Okazaki et al., 2012). This is a clear demonstration of the effectiveness of including QR codes on product packaging as a source of product-related information and an excellent application of green technology in the field of marketing.

A review of the existing literature revealed that scholars now differentiate information appeal and product benefits/value into two categories. One is the rational, or utilitarian aspect, and the other is the emotional or hedonic aspect. This categorization has been applied to issues related advertising appeal (Stafford and Day, 1995; Alberts-Miller and Stafford, 1999), consumer behavior (Hirschman and Holbrook, 1982), and product benefits or value (Batra and Ahtola 1990; Babin et al., 1994; Voss et al., 2003). This study also adopted this approach in classifying the content of the information provided by QR codes. Research has indicated that product type influences information search behavior and the willingness of consumers to pay the cost of obtaining information (time and effort) (Girard et al., 2003; Wu and Tsao, 2006). Based on cognitive fit theory (Vessey, 1991), this study posits that the persuasiveness of the additional information provided by QR codes varies with the type of the product.

Very little research has been conducted on the application of QR codes in marketing. Some studies have focused on consumer behavior, such as the attitudes or acceptance of consumers with regard to QR codes and the factors influencing the success of QR code application (Bamoriya, 2014; Narang et al., 2012; Asare and Asare, 2015). Other researchers have investigated the design aspect and discussed how conventional QR codes with black and white squares can be modified to include aesthetic elements to make them more appealing and recognizable without affecting scanning readability (Lin et al., 2013). Other studies have focused on marketing communications, examining the factors of mobile advertising usage (Atkinson, 2013) or categorizing the link content of QR codes (Okazaki et al., 2012; Probst, 2012). To the best of our knowledge, no previous researchers have discussed the means by which QR codes are implemented within a packaging strategy. QR codes are low cost but provide large storage capacity, high mobility, interactivity, immediacy, and environmental friendliness. Thus, they can be extremely valuable in marketing when used to provide additional information related to a given product. Increasing concern for the environmental effects of conventional advertising is likely to enhance their appeal for marketers as well.

This study sought to fill the above mentioned the gaps in the previous research by examining food products using a quasi-experimental design. This study performed two coherent studies: one to determine the influence of QR code technology when used on packaging and the other to determine how food type and information type should be paired to optimize persuasiveness and increase purchase intention. The achievements of this study should be of considerable value to food manufacturers seeking to use QR codes to communicate with consumers.

Study 1: Relationship between Purchase Intention and the Nature of Information Presented by QR Codes

The information conventionally found on food packaging includes little more than that required by government; i.e., the name of the product, the ingredients, the quantity of the contents, the expiration date, and the country of origin. Other information, such as cooking suggestions and promotions, are found only on a limited number of products. QR codes make it possible for manufacturers to provide information of far greater diversity without the need for additional packaging material. The information associated with QR codes is relevant, targeted, and interactive (Atkinson, 2013). The primary objective of Study 1 was to determine the effectiveness of applying QR codes to food packaging to enhance purchase intention.

Conceptual Background and Research Hypotheses

Introduction to QR code and its Marketing Applications

QR code was invented in Japan in 1994 (Bamoriya, 2014); however, it has been widely adopted only in recent years (Okazaki et al., 2012; Probst, 2012). QR codes are a two-dimensional barcode comprising white squares and black or color geometric shapes. QR codes have an indexing function linked to databases capable of integrating a wide range of information. 2D codes are more mobile and require less data space than 1D barcodes (Lin et al., 2013). These benefits were first recognized in manufacturing and logistics. The increasing prevalence of SHDs and improved wireless internet environment has made it possible for this type of green communication technology to be adopted as an alternative to conventional marketing strategies (Atkinson, 2013). This has led to the advent of new marketing terms, such as mobile marketing, mobile shopping, and mobile communication (encompassing mobile advertising and mobile promotions).

In mobile communications, QR codes enable the merging of printed media with internet technology, thereby allowing sellers to expand the commercial information available to consumers. This tends to make marketing communication mixes (such as advertising and sales promotion) more efficient and environmentally friendly (Atkinson, 2013). QR codes provide access to a diversity of information, via website URLs, e-mail addresses, product history, multimedia (such as images), mobile shopping information, and other promotional information (coupons and discounts) (Sago, 2011; Okazaki et al.,2012). Vendors can place QR codes in media such as magazines, newspapers, flyers and handouts, posters, packages, labels, receipts, in-store/establishment materials (Okazaki, et al., 2012; Sun et al., 2007). These applications are generally associated with marketing communications; however, this study posits that QR codes could also be a part of product packaging strategies, providing information regarded as added value.

Additional Information in QR Codes

The product-related information that consumers search for can be internal or external (Leclerc et al., 1994). Internal information includes a product's performance, functions, quality, and design, whereas external information encompasses price, brand name, manufacturer image, and country of origin (Zeithaml, 1988). Packaging can be a favorable medium for the provision of external information. When internal information is difficult to obtain, external information becomes the foundation of product evaluation (Miyazaki et al., 2005).

According to the Act Governing Food Safety and Sanitation in Taiwan, the information that must be displayed on food packaging includes (1) the name of the product, (2) the names of the ingredients, (3) the net weight, volume, or quantity, (4) the names of food additives, (5) the name and address of the manufacturer, and (6) the expiration date (Ministry of Health and Welfare, 2015). In contrast, the US Food and Drug Administration (FDA) stipulates that packaging labels include (1) the name of the product and the name and address of the manufacturer or dealer, (2) the net weight of the content, (3) nutrition facts, (4)

a list of the ingredients, (5) food allergen labelling, and (6) place of origin. As can be seen, each country has its own regulations with regard to the information that must be displayed on food packaging.

Additional information refers to supplementary content that is not required by regulations, including information that could help consumers in their evaluation of the product (such as inspection marks and product history), promotions (discounts, coupons, or other recreational information), and instructions on how the product can function better (such as product usage or cooking suggestions). In some cases, additional information can help them to make purchase decisions while shopping (Narang et al., 2012). This study therefore defines the additional information of QR codes as non-regulated supplementary content that helps to promote consumer understanding and/or an appreciation of product functions.

Purchase Intention

The difference between intention and attitude is the focus on tendencies pertaining to one's own actions. A display of personal action tendencies toward a product/brand is an indication of purchase intention on the part of the consumer (Spears and Singh, 2004). Spears and Singh (2004) described purchase intention as the conscious internal efforts and plans ones makes before purchasing a product. Other researchers have defined purchase intention as a consumer's consideration of the possibility that they will purchase a product (Dodds et al., 1991). Greater purchase intention indicates that the consumer has a greater positive commitment towards purchasing a product and is therefore more likely to purchase it.

Relevant research has shown that QR codes facilitate interactions between printed media and the internet. This has led to their widespread usage in advertisements. QR codes offer a means by which to provide consumers with additional information related to corporations or brands (Narang et al., 2012). Brenna (2011) claimed that QR codes are most suitable for printed media (such as packaging). When consumers are searching for more product or brand information, QR codes can provide comprehensive information swiftly and easily. In the Engel-Kollat-Blackwell (EKB) model, consumer behavior is regarded as a continuous process. In formulating decisions, consumers receive internal as well as external information prior to the adoption of a particular attitude; i.e., before finalizing a purchase decision. The decision-making process is divided into five phases, among which information search (the collection of internal and external information) is the second. During this phase, consumers turn to external information when they perceive that the internal information they have (such as previous consumption experience) is inadequate. External information can be obtained from product packaging or consumer word-of-mouth (Tsao and Hsieh, 2015).

In terms of food, consumers have a low degree of involvement, which means that purchases are generally impulsive and easily influenced by peripheral cues that are not directly associated with the product (Petty and Cacioppo, 1986), such as the condition or promotional atmosphere of a retailer store or the point-of-purchase. Thus, the presence of nearby information such as QR codes on the food packaging may make consumers feel curious. This changes marketing from a pushing strategy to a pulling strategy, thereby enhancing purchase intention (Atkinson, 2013). Accordingly, this study purports:

H1: The inclusion of QR codes on food packaging to provide additional information lead to greater purchase intention than without QR codes.

Methods

Design and Participants

Study 1 used a quasi-experiment design. Based on our study objectives, this study tested the hypothesis by implementing a 1 (product: instant noodles) × 2 (QR code additional information: provided/not provided) between-subject factorial design. Convenience sampling on a city street was used to recruit test subjects,

who were assigned to one of two experiment scenarios. In the first scenario, the outer packaging of the product provided the required information as well as a QR code. In the second scenario, the packaging did not include a QR code.

The test subjects included only individuals with experience scanning QR codes. Following the elimination of 12 test subjects, tests were conducted on 68 subjects, equally divided among males and females. The largest age group was individuals between 21 and 30 years of age, accounting for 54.4% of the test subjects. The highest level of education achieved by the majority of the subjects (66.2%) was a college degree, and most of the subjects (58.8%) were students. As for average monthly income, 57.4% earned less than NTD 10,000 a month.

Development of Stimuli

The product type and information accessed by the QR code were determined using focus groups. This study conducted three focus groups that included a total of 80 participants. An instant noodle product was selected for use in the experiments. As for the additional content, creative recipes received the most votes (see Appendix 1). The creative recipe was designed in advance and placed on Google Cloud. Using a website for the generation of QR code, we translated the cloud address into a QR code and printed it on a sticker to be added to the packaging of an actual instant noodles product. This made the scenario more authentic to the test subjects and increased experiment validity.

Development of Measures

In this study, the creative recipe served as the additional content provided by QR codes. Our experiment involved two levels of manipulation: one with QR codes and the other without. Purchase intention is defined as the likelihood that the buyer will purchase the product (Dodds et al., 1991), which is measured using three items adapted from Dodds et al. (1991) based on a seven-point Likert scale ranging from 1 (very low) to 7 (very high) with regard to the probability, likelihood, and willingness to follow a recommendation.

Experimental Procedure

The inclusion criterion of test subjects was previous experience in the use of RQ codes. The experiment was conducted at five busy stores, and the test subjects were recruited via convenience sampling. The researcher provided a self-introduction to willing and qualified subjects, and then explained the purpose and process of the experiment. The subjects were then assigned to one of the two packaging scenarios. After the subjects observed the product packaging and read the experiment requirements, they filled out a questionnaire. Finally, the subjects were asked to leave contact information in order to enter a raffle for a prize.

Results

Reliability Analysis and Hypothesis Testing

Cronbach's α of purchase intention was 0.950, indicating a high degree of internal consistency in this construct (Wortzel, 1979). Hypothesis testing was conducted using an independent-samples t-test. As shown in Table 1, the means of the two groups, with and without the QR code differed significantly (Mean$_{Provide}$ = 5.392 > Mean$_{not\ provide}$ = 3.796; t = 5.392; p < 0.001***). Thus, H1 is supported.

Table 1 Independent-samples t-test results

Independent variable		Mean	S.D.	Mean difference	t-value
Purchase intention	Provide QR code (n = 32)	5.260	1.000	1.464	5.392***
	Not provide QR code (n =36)	3.796	1.212		

*P<0.05, **P<0.01, ***P<0.001

Discussion

The above analysis shows that including a QR code for the creative recipe on food packaging can significantly increase the purchase intention of consumers. This demonstrates that QR codes can be used in product packaging strategies as well as in marketing communication strategies. QR codes that provide additional information are able to satisfy the needs of many consumers for external information, which could enhance their understanding of the product and highlight the functions and value of the product.

Study 2: Coordination between Food Type and Type of QR Code Additional Content

The results of Study 1 show that using QR codes to provide additional information can enhance the purchase intention of consumers. However, according to relevant theories, information content can be either hedonic or utilitarian (Babin et al., 1994; Chaudhuri and Holbrook, 2001; Voss et al., 2003). Cognitive fit theory holds that the problem-solving performance of consumers depends on the degree of correspondence between problem representation and the problem-solving task (Vessey, 1991). Thus, in Study 2, this study sought to identify the type of additional information (related to these two types of food) best suited to enhancing purchase intention.

Conceptual Background and Research Hypotheses

Type of Information Content

Babin et al. (1994) categorized the value sought by consumers while shopping as hedonic and utilitarian. The latter is used when consumers have specific objectives, such that consumption behavior becomes a task or mission to be completed efficiently (Park and Moon, 2003; Tsao, 2014). In contrast, hedonic value is associated with intrinsically pleasing properties pursued by consumers, which provide enjoyment during the experiential process (Voss et al., 2003; Tsao, 2014). Voss et al. (2003) also used this definition to categorize products as utilitarian or hedonic.

This study adopted the same strategy, defining utilitarian information as content that is relevant to the attributes, performance, or functions of the product, which could help consumers to solve specific problems. For instance, caloric information is useful to anyone concerned with nutrition. This study defines hedonic information as that which can induce the internal pleasing properties of consumers. The experience of consuming the product induces in consumers feelings of fun, fantasy, or emotive aspects (Hirschman and Holbrook, 1982; Babin et al., 1994).

Food Type

Food can be divided into (1) ready-to-eat and (2) ready-to-cook. The former can be eaten directly without being cooked after opening (such as cooked food, fresh fruit and vegetables, spices, and seasoning), whereas the latter requires a simple cooking (such as seasoning or heating) before it can be consumed (such

as frozen food, pizza, instant noodles, and instant soup) (FDA, 2009). Economic advancements have largely eliminated cost as the primary consideration of consumers while shopping. In a society that emphasizes efficiency and performance, time pressure prompts consumers to purchase ready-to-eat food (Hughes, 2004). According to a study in the Economist (2002), ready-to-cook foods are extremely popular in the US, the UK, and Sweden, due mainly to two consumer groups: single-parent families and working women. Preparing ready-to-cook foods does not create a mess, while still providing autonomy in cooking. Ready-to-cook foods are a suitable choice for those who do not want to spend too much time preparing ingredients.

General Problem-Solving Model

Vessey (1991) developed the general model of problem solving based on cognitive fit theory. This model views problem solving as an outcome of the relationship between problem representation and problem-solving task, wherein, the correspondence between the two factors determines problem-solving performance. When decision makers face a problem, they must gauge the degree to which problem representation matches the task. They then include memories of their own experiences (i.e., mental representation) in determining the means by which to solve the problem (i.e., problem solution). It should be noted that mental representation is derived from the interaction of the appropriate processes on the information in the problem representation and that required to solve the problem.

Cognitive fit theory holds that matching problem representation to problem solving tasks creates a cognitive fit that produces consistency in subsequent cognitive processing, thereby enabling the individual to make decisions more swiftly and with greater accuracy. A mismatch between problem representation and the problem solving task does not promote cognitive fit, such that the decision maker must convert the method of information presentation in his/her mind. This increases the effort required to make decisions and seldom produces desirable results (Hong et al., 2004).

Research Hypotheses

Jackson et al. (1985) reported that women who work outside the home are under greater time pressures than are women who do not have outside employment. In the past, this meant that women spent less time shopping and devoted more effort to cooking. However, consumption patterns gradually changed to deal with added time pressure. Bettante and Foster (1984) pointed out that buying convenience foods or ready-to-cook foods reduces the time constraints associated with cooking, thereby allowing career women to cook at home, with the result that dining out is less common. Ready-to-cook foods simplify preparation and cooking and reduce the time required for cleanup (Boer et al., 2004; Feliciano and Albisu, 2006). Thus, QR codes with utilitarian information pertaining to ready-to-cook foods can be extremely helpful, whereas hedonic information can help in killing time while waiting for food to cook. This leads to the following hypothesis:

H1: QR codes with additional information are more effective in increasing the intention to purchase ready-to-cook foods than ready-to-eat foods.

Moore and Lee (2012) claimed that the purpose of utilitarian information in advertisements is to emphasize product attributes or functions, such as the ingredients or nutritional value of a food product. In this aspect, consumers assess product performance rationally. In contrast, the objective of hedonic information focuses on the pleasure derived from the consumption or possession of the product. Utilitarian information addresses the rational side of consumers (provides little in the way of emotional stimulation), whereas hedonic information plays on the emotions of the consumer (Moore and Lee, 2012; Voss et al., 2003).

Based on the cognitive fit theory and the general model of problem solving, this study posits that consumers who buy ready-to-eat foods are probably pressed for time and therefore need to choose products

quickly (problem presentation). Hedonic information can enhance the pleasure of eating ready-to-eat foods and indirectly reduce time pressure by facilitating decision making (problem-solving task). In contrast, consumers who buy ready-to-cook foods have limited time but still want to do some simple cooking (problem presentation). Utilitarian information can help teach consumers how to make more delicious meals and thereby give them a sense of accomplishment (problem-solving task) (Vessey, 1991). Matching products and information this way can increase cognitive fit and thereby achieve greater cognitive consistency in the minds of consumers. This makes problems easier to solve and in so doing enhances purchase intention. Therefore, this study proposes the following hypotheses:

H2: (a) Pairing ready-to-eat food with hedonic information is more effective in increasing the purchase intention of consumers than pairing ready-to-eat food with utilitarian information; (b) Pairing ready-to-cook food with utilitarian additional information is more effective in increasing purchase intention of consumers than pairing ready-to-cook food with hedonic information.

Methods

Design and Subjects

In study 2, this study adopted a 2 (food type: ready-to-eat/ready-to-cook) × 2 (additional information type: utilitarian/hedonic) between-subject factorial design. Convenience sampling on a city street was used to recruit test subjects. Each subject was designated to one of four scenarios for the experiment. For the type of food, this study again selected instant noodles for the ready-to-cook food. Interviews with the focus groups led us to select cookies for the ready-to-eat food. The content of the utilitarian information was the same as that used in Study 1; i.e., creative recipes. The focus groups led us to select jokes as the content of the hedonic informations. This led to the creation of four manipulation scenarios. Appendix 2 displays one sample expermental stimulus of four scenarios.

As in Study 1, the test subjects in Study 2 were required to have previous experience in using QR codes. This study recruited a total of 240 test subjects, 60 for each scenario. A two-step manipulation check resulted in 222 valid questionnaires. Females accounted for 49.1% of the subjects. The largest age group was individuals between 21 and 30 years of age, which accounted for 37.4% of the test subjects. The highest level of education achieved by the majority of the subjects (66.2%) was a college degree. Half of the subjects (50%) were students, while the next largest group comprising 23% of the subjects worked in service industries.

Experiment Procedures

For the sake of authenticity, this study used actual food packaging in the experiment. QR code stickers designed beforehand were placed on the packaging of instant noodles and cookies. The QR code stickers were made in the same way as described in Study 1. Voluntary test subjects were recruited at five fixed locations on the street. Qualified subjects were then assigned to one of the four experiment scenarios. Those assigned to scenarios with QR codes on the food packaging were required to scan the QR code with their smartphone in addition to reading the information on the packaging. The procedure was the same as that in Study 1. After completing the experiment, the subjects were given the experiment product as a thank-you gift.

Results

Reliability Analysis and Manipulation Check

The Cronbach's α of purchase intention was 0.950, indicating that the construct has a high degree of internal consistency (Wortzel, 1979). To determine whether the manipulation of information type was

appropriate, this study referred to relevant studies in the past that included question items in the hedonic and utilitarian constructs (Batra and Ahtola, 1990; Babin et al., 1994; Voss et al., 2003). Five items (useful, delicious, functional, practical and necessary) were used to measure the utilitarian information. Five other items (fun, interesting, pleasant, exciting, and happy) were used to measure the hedonic information. In the scenario with jokes as the additional information, the mean of hedonic information perceived by the subjects was higher than that of the utilitarian information ($M_{hedonic} = 4.827$, $M_{utilitarian} = 4.162$; $t = 5.879$, $p < 0.001$). In contrast, in the scenario with creative recipes as the additional information, the mean value of utilitarian information perceived by the subjects was higher than that of the hedonic information ($Mean_{hedonic} = 4.899$, $Mean_{utilitarian} = 5.084$; $t = -2.075$, $p < 0.001$). This confirms that the manipulation of information type was appropriate. To be included as a valid subject, test participants were also required to identify the product used in the experiment. After eliminating 18 test subjects who misidentified the product, this study obtained a total of 222 valid subjects. These results indicate that manipulation of the two factors in this experiment was successful and found to be effective in Study 2.

Hypothesis Testing

The hypotheses were tested using 2×2 analysis of variance. As shown in Table 2, the main effect of food type revealed a significant difference in purchase intention ($F_{(1, 218)} = 30.462$***, $p < 0.001$). A comparison of the mean values in Table 3 indicated that the influence of ready-to-cook foods on the purchase intention of consumers significantly exceeded that of ready-to-eat foods ($Mean_{ready-to-eat} = 4.458$, $Mean_{ready-to-cook} = 5.424$; $t = -6.277$; $p < 0.001$). This demonstrates that using QR codes to provide additional information on ready-to-cook foods is much more effective in increasing purchase intention than using QR codes to provide additional information on ready-to-eat foods. Thus, H1 is supported.

Table 2 Two-way ANOVA test Results

Dependent variable: purchase intention	F	p
Additional information type (A)	46.552	0.000***
Food type (B)	30.462	0.000***
A×B	18.718	0.000***

*P<0.05, **P<0.01, ***P<0.001

Table 3 The cell means for purchase intention—two factors

Dependent variable: purchase intention		Food type		Additional information type
		ready-to-eat	ready-to-cook	
Additional information type	hedonic	n= 57 3.784 (1.115)[a]	n= 54 5.340 (0.778)	n= 111 4.541 (1.239)
	utilitarian	n= 55 5.158 (1.299)	n= 56 5.506 (0.881)	n= 111 5.333 (1.116)
Food type		n= 112 4.458 (1.387)	n= 110 5.424 (0.832)	

Note: [a]Mean value is outside the parentheses, and standard deviation is in the parentheses

Table 2 shows that the interaction effect of food type and information type had a significant influence on purchase intention ($F_{(1, 218)} = 18.718$***; $p < 0.001$). The horn shape depicted in Fig. 1 shows that information type has a greater effect on purchase intention when dealing with ready-to-eat foods. Furthermore, testing the difference in mean values using a two-sample t-test revealed that pairing ready-to-eat food with hedonic information has significantly less influence on purchase intention than pairing it with utilitarian information ($Mean_{hedonic} = 3.784$, $Mean_{utilitarian} = 5.158$; $t = -6.013$; $p < 0.001$). For ready-to-cook food, no significant differences were observed between utilitarian or hedonic information with regard to

their effect on purchase intention (Mean$_{hedonic}$ = 5.340, Mean$_{utilitarian}$ = 5.506, t = -1.049; p > 0.05). Thus, H2a and H2b are not supported.
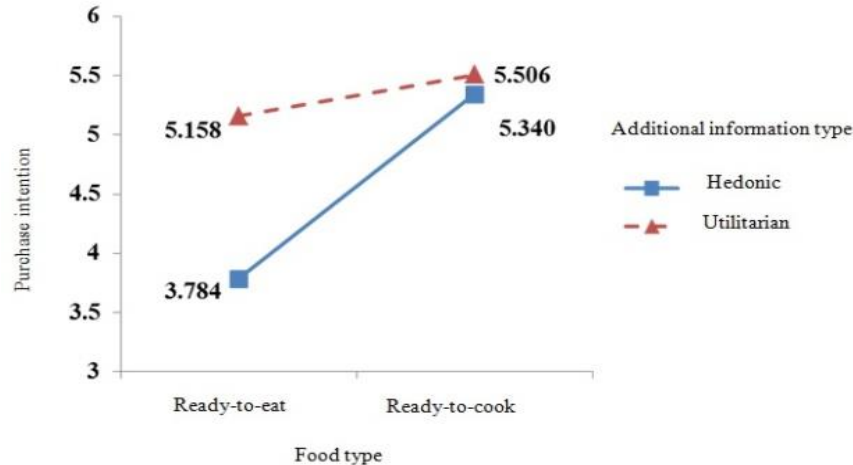

Figure 1 Interaction effect between food type and information type on purchase intention

Discussion

The results of Study 2 show that the interaction between food type and the type of additional information provided by QR codes has a significant impact on purchase intention; however, the influence is the opposite of what we hypothesized. Figure 1 shows that information type indeed has a significant influence on the purchase intention of consumers with regard to ready-to-eat foods. Pairing utilitarian information with ready-to-eat food significantly increased purchase intention; however, the two types of additional information had similar influence on the intention to purchase ready-to-cook foods.

General Discussion

Summary of Findings

The results of Study 1 revealed that applying QR codes to food packaging as a source of additional information indeed enhances purchase intention. This novel finding has practical value from academic as well as practical perspectives. Brenna (2011) claimed that QR codes work most effectively in printed media. When consumers are making purchase decisions in a retail store, QR codes make it quick and easy for them to obtain a great deal of information on a product to help in making a purchase decision (Atkinson, 2013). This approach is also a type of click-and-mortar O2O application. The additional information provided in this manner gives consumers a feeling of novelty and connectedness when scanning the QR code. From a practical perspective, it also gives them persuasive reasons to purchase the product. This effect is even more pronounced when considering items associated with impulse buying (Narang et al., 2012).

The objective of Study 2 was to examine the relationship between food type and the content of the additional information provided by the QR code. In this study, the effectiveness of QR codes in enhancing the intention to purchase ready-to-cook food was more pronounced than its effect on promoting ready-to-eat food. Interaction effects also indicated that providing utilitarian information (creative recipes) with ready-to-eat food to enhance product performance (taste) is significantly more persuasive than providing hedonic information (jokes). In contrast, the same effect can be achieved with ready-to-cook food, regardless of the type of information. Our findings do not coincide perfectly with our hypotheses; however,

we have gained some important insights. Utilitarian information can be used to enhance the attractiveness of food products, and this study speculates that time is a crucial factor. According to Ahituv et al. (1998), making decisions under time constraints is a part of many people's daily lives. These people feel that they do not have enough time to complete the tasks that they want to complete (Saigal et al., 2010). Thus, providing useful information to guide consumers in solving almost any kind of problem (i.e., to complete their tasks) may be regarded as beneficial.

Research has also found that hedonic and utilitarian information positively influence purchase intentions (ready-to-cook foods) to a similar degree. Gill (2008) claimed that adding hedonic stimuli to the process of consuming utilitarian products can enhance their pleasure, such that the consumers give the products a higher rating. If we apply this logic to the results of this study, then providing jokes with instant noodles should enhance the pleasure they gain from their instant noodles and thereby indirectly improve their assessment of the product. Providing creative recipes could make the food more delicious, enhance the user's sense of accomplishment, and increase purchase intention.

Marketing Implications and Contributions

Based on the findings of two researches, this study proposes the following suggestions with regard to product packaging strategies. From a practical perspective, most food packaging now includes QR codes; however, much of the content (e.g., links to their official website of Facebook fan page) is of little practical value. This type of content is not directly related to product attributes or the interest of consumers. This study suggests that food companies use QR codes to provide additional information that could highlight or improve product performance, such as novel ways to use the product, instructions of how to assemble the product, what to pair the product with, or how to cook the product. QR codes could also be used to promote their economic and/or emotional interests by including discounts, sweepstakes, interactive games, or entertaining content. For ready-to-eat foods, suggestions on what can go with them, such as wine with snacks or coffee with cake. This concept could also be applied to suggest outfits for clothes. Hedonic and utilitarian information would both be appropriate for products that require simple assembly or practical skills on the part of the user, such as DIY products, home improvement tools, and cosmetics.

Limitations and Future Research

This study adopted an experimental design. Although this study strived for rigor during the process, a number of limitations may still have affected the results: 1. A number of food packaging elements may influence purchase intention; however, based on the objective of this study, we manipulated only the type of food and the type of additional information provided by the QR code. A number of crucial variables may have been left out. 2. During the experiment, the speed at which the test subjects could link to the experiment scenario depended on whether they had mobile internet service; if not, then Wi-Fi was made available at the location of the experiment. This increased the difficulty of the experiment and could have affected the subject's mood. 3. The software used for decoding the QR code varied with the brand of smartphone and prevented some of the subjects from successfully linking to the experiment web page. This issue was dealt with; however, it may have affected the progression of the experiment. 4. Students made up a high proportion of the subject population, which may limit the generalizability of our findings. Nonetheless, the fact that most of the people who are active online are young means that the sample is still representative (Tsao and Hsieh, 2015).

To overcome these limitations, this study proposes the following suggestions for future research: 1. Food type is not the only factor that influences the impact of QR code scanning on the purchase intention of consumers. This study suggests that future studies expand the investigation to other variables, such as brand attitude or time pressure, to increase research value. 2. In future experiments, researchers should first assess the Wi-Fi availability at the experiment locations in order to enhance the flow of the experiment process and minimize the negative effects this type of issue can have on subjects. 3. A URL that is too long can

increase the difficulty of converting the QR code and thereby affect scanning accuracy. URLs should be kept as short as possible.

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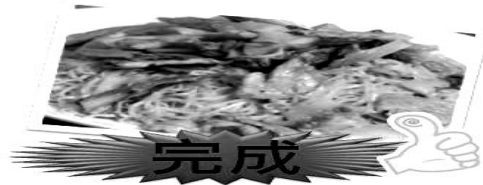Appendix 1: A copy of creative recipe provided by QR code on instant noodle packaging
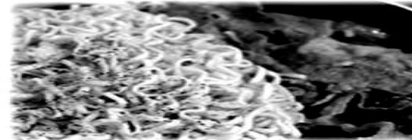
Appendix 2: A copy of jokes provided by QR code on cookie packaging