QR CODES, QUICK RESPONSE OR QUICK REJECTION?

A study about the contribution of the phenomenon QR codes on food products, on the intention to seek information and the purchase intention.

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Abstract

This study focusses on the influence of QR codes on food packages, on the intention to seek information and purchase intention of consumers. By the use of a vignette study, different cases were tested and compared, knowing four different 'internet resource on package' factors (QR code, QR code and URL, URL, no QR code and URL), and four 'kind of product' factors (cheap, expensive, hedonistic, utilitarian). A total of 272 respondents participated in the research, 214 of them had a smartphone. Each of these 214 participants answered questions about all four kinds of products. Many different hierarchical multiple regression analyses and some one-way analyses of covariance (ANCOVA) have substantiated that the influence of the presence of a QR code on a food package, on the intention to seek information and the purchase intention, is (almost) nil. Besides that, the expectations that the influence of the presence of a QR code on a food package would increase for consumers who are interested in nutrition information or seeing the added value of QR codes, are not supported by the results of the study. Just as the expectations that the influence would decrease for consumers who are familiar with the product, and the expected influence of the kind of product. A possible explanation could be the result that many participants did not know the QR code or never use their QR code reader app. Further research is recommended about other 'new' internet sources on food packages like Layer, and the referral or linking by the QR code.

Keywords: QR code, URL, smart-phone, purchase intention, intention to seek information.

Preface

At the end of 2012, I drove home from the university. In front of me I saw an instruction car. On the back side of the car a QR code was shown. This made me wondering what the purpose of this QR code and QR codes in general is. Other users of the road, for example car drivers, are not allowed to use their mobile phone to scan the code while they are driving. So what is the goal of a QR code on the back of a car? Thereafter, I noticed more and more QR codes around me. In most cases, the purpose was not that clear. For instance because there was also an URL shown or the QR code led just to a general website. My interest in QR codes was born.

By this thesis, I am finishing my Master Communication Studies. A few people crucially supported me during this study. I would like to thank my advisor Dr. Alexander van Deursen for his guidance, comments and advice. Besides that, I would like to thank my co-advisor Dr. Lidwien van de Wijngaert for her assistance. Finally, I would like to thank Carlijn, my parents, family and friends for their support and all the respondents for their contribution.

Enjoy reading!

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Luc Oonk

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1. Introduction

According to Trinity Digital Marketing (2013), each year marketers spend about EUR 23.9 billion on mobile ads. These days, the QR code (Quick Response code) appears more and more. Codes are posted on many different products like leaflets, placards, foodstuff and even instruction cars. Goldman (2013) indicates that many placed QR codes are totally wasted since it is impossible for consumers to be send to the content or website they are supposed to be. For example, it is impossible to scan codes in an in-flight magazine, because in a plane there is in most cases no internet signal. Though, WIFI is increasingly available. However, to what extent is the presence of a QR code on a food product serviceable, and affects the intention to seek information and the purchase intention of customers? Or in other words, is the QR code on a food product a success or not? Besides that, this study will give answer to the question, do people perceive an added value of QR codes on food products? In this introduction the phenomenon QR code will be illustrated, next chapters will describe the study and the results.

1.1 The barcode

Lin and Lin (2011) distinguish two different kinds of barcodes. The distinction can be made based on the way the barcode represents the data. First, there is the one-dimensional (1D) barcode. This code is composed of parallel lines, colored black and white, with a various widths. A 1D barcode can be scanned by laser barcode scanners. Disadvantage of this scanner is the limitation that only one barcode at a time can be read. These days, the image-based barcode scanner is used more and more and has the ability to read different 1D and 2D barcodes at once. These two-dimensional barcodes consist of

a black and white pattern. Therefore, it is possible to develop many different kinds of 2D barcodes, all with their own 'morphological' structure. Some examples of 2D barcodes are 'Datamatrix', 'Maxicode', 'QR code' and the 'PDF417 barcode'. Some of the benefits of the 2D barcode over the 1D barcode are the ability to store more information and the 'robust error correcting capability'. The 2D barcode is increasingly used in many 'tagging systems' like electronics and life sciences.

1.2 The QR code

A QR code (Quick Response code) is a square with a white background and black boxes in a specific pattern (figure 1), and is developed by the Japanese corporation Denso Wave in 1994. At first, this code was developed to use in stock management, where error correction and speed play an important role. Over time, Denso Wave shared the code-idea with other companies and in 2004 the ISO standard for QR codes was compiled. According to this ISO standard 18004, the following code components can be distinguished: 'a quiet zone around the symbol, three finder patterns (FIP) in the corners, two timing patterns (TP) between the finder patterns, and a certain number of alignment patterns (AP) inside the data area' (Belussi & Hirata, 2012).

By a smartphone with an appropriate app this two-dimensional code can be read. In most cases, a QR code is used to encrypt a text, URL or other data. In this way, the connection between physical products and associated online information arises. 'A QR code links the physical world (e.g., poster, printout, room, physical object) to the electronic (web resource) and facilitates communication (SMS message, phone call), adding significant value by improving accessibility to information' (Robinson, 2010).

Hoy (2011) describes a number of example situations, wherein for example the data about an event can be saved on a smartphone by scanning a QR code from a poster, or wherein contact information like phone numbers or addresses can be spread by a QR code.

Figure 1 The author's name in QR code format.

According to Hoy (2011) the QR code is not comparable to the traditional barcode. By using a QR code, it is possible to store far more information (up to 4,296 alphanumeric characters). In addition, a normal barcode can be scanned in one direction, while the QR code at high speed can be scanned in the direction you want. Moreover, the QR code makes it possible to automate easy tasks like opening a website or dialing a phone number. Finally, the QR codes contain an error correction feature which enables smartphones to read the code even in the case the code is partially darkened.

1.3 QR code usage

In particular in Japan, the QR code is very popular. The phenomenon is also becoming more common in the United States (Walsh, 2009). More and more retailers (such as Macy's) use QR codes to spread special offers or additional information about products. In 2010 the number of scanned codes between July and December increased 1,200 per

cent (Taylor, 2011). These QR codes can be decoded by a so called QR code reader. In most cases such QR code readers can be downloaded from the internet to the smartphone, or are already preloaded during the production of the device. These readers are, in general, obtainable for free and quite easy in use and to install (Walsh, 2009).

A study conducted by the Pew Research Center shows that '85 per cent of Americans age 19 and older own a cell phone' (Zickuhr, 2011). According to Forrester Consulting (2013), over 54 per cent of the people in the Netherlands owned a smartphone at the end of 2012. It is expected that in 2017, 80 per cent of the Dutch people own a smartphone. Many companies respond to this trend by offering online services which can be used by mobile phones and other mobile devices. In general, using the internet on a smartphone requires typing letters and characters to some extent. Many people perceive this typing on little keyboards as very annoying. By the use of QR codes, these people can scan the code with their mobile phone instead of typing a long URL (Sekyere, 2012). Pitney Bowes (2013) indicates that about 19 per cent of the people in the US had ever used a QR code, followed by the UK, Germany and France with respectively 15, 14 and 12 per cent. A research conducted by 3GVision (2011) indicates that in the Netherlands in proportion a bit more QR codes are used, comparing to France, and a bit less comparing to the UK and Germany. About 31 per cent of the Dutch people with a smartphone have installed a QR code reader app on their phone (Forrester Consulting, 2013).

1.4 Pilot-study

A conducted pilot-study provided insight in the use of QR codes in daily life and the different kinds of information behind these codes. About 15 people (family, friends and acquaintances of the researcher) participated in the pilot-study by sending pictures of all QR codes they saw, within a period of two weeks, to the researcher. These pictures showed a QR code and the context in which it was found. This made it possible for the researcher to scan the concerning QR codes and to interpret the different contexts. Over 100 different QR codes on for example product packages, vehicles, billboards and in advertisements are studied. Normally, the content of the codes turns out to be a (general) website (76x), the opportunity to download something (for example an app, 8x), a kind of information movie (8x), a map with a route (6x) or just a plain text (for example contact information, 3x). Codes on food packages from the pilot-study contained one of the information categories below:

- General website (12x);
- Information about the ingredients and their origin (5x);
- Information about the preparation and usage of the products (3x);
- Product reviews of other consumers (2x);
- Information about durability (1x).

2. Theoretical framework

Imagine, after a long day of work, you are walking in a supermarket looking for something to have for supper. On one of the shelves you see a food product with a QR code on the package. Would this make you decide to seek information or purchase the product? In this chapter, literature on among others intention to seek information, purchase intention and QR codes will be reviewed in order to get insight into the possible impact of the presence of QR codes on food packages. Besides the presence of the QR code, several often mentioned factors that might influence purchase intention or intention to seek information are introduced. In paragraph 2.6 these factors are presented in a research model, highlighting proposed hypotheses.

2.1 Intention to seek information

According to Bezerra and Carvalho (2004) is information seeking 'the act of obtaining information from existing resources in both human and technological contexts'. The extent to which someone seeks for information depends on three main factors, which together constitute the 'information needs radar model (INRM)'. This model is composed by Shih, Chen, Chu and Chen (2012). The first factor is 'behavior', the amount of attention the content attracts. 'Concept', the importance of the content, is the second factor. Finally, 'interesting', represents the degree of interest in the information or content. The more the content corresponds to these factors the larger the need for information. However, Kahlor (2010) indicates that also the factor risk plays a role in the seeking intent of people. For example, when it comes to the personal health of people this factor is important. In the 'Planned risk information seeking model (PRISM)', the

'perceived current knowledge' of the people is the central factor which influences the 'perceived knowledge insufficiency'. The 'risk perception' and 'affective response to risk' affect the lack of knowledge. Other main factors in the model are 'attitude toward seeking', 'seeking-related subjective norms' and 'perceived seeking control'. In the end, all mentioned factors influence the 'seeking intent' of people.

According to Wilson (2006), this need for information leads to information-seeking behavior. Someone can look for different kinds of information like advice, opinions and facts. It is expected that consumers having an information-seeking behavior, with regard to a product, start to look for information on the package. This confirms the importance of product information on packages (Teigen, 1987). This information-seeking behavior results in approaches to information systems and sources like libraries, estate agents and online services. These online services can be offered by, for example, the presence of a QR code or URL.

2.2 Purchase intention

In their Total Food Quality Model (TFQM), Grunert, Larsen, Madsen and Baadsgaard (1996) distinguish two different kinds of purchases. First, before consumers purchase a product they could have the intention to purchase a product. This intention is influenced by the perceived costs and the expected quality of the product. After the first time a consumer buys a product, future purchases may take place. However, this depends on the experienced quality of the product.

Rettie and Brewer (2000) indicate that in most cases (73%), people make their purchase decisions at point of sale. By quickly looking at a product at point of sale,

factors like rapid perception and quick recognition are important in the decision making process. Since self-service became more and more important, the importance of the design of a product in the selling process increased (Danton de Rouffignac, 1990; Behaeghel, 1991). Burton, Garretson and Velliquette (1999) confirm this statement. Aspects like product descriptions, price, size, nutrition information and pictures on a food package affect the purchase intention of consumers.

2.3 Package

Customers in a supermarket get to see about 30,000 products or items in half an hour (Brown, 1996). This is substantiated by the facts and figures of Albert Heijn (2013, one of the biggest supermarket chains in the Netherlands). In their supermarkets, they have an assortment of about 8,000 to 30,000 products. Therefore, it is very important for companies to attract attention with their product. According to Villegas, Carbonell and Costell (2008), the purchase intention and the adoption of a product can be influenced by the 'characteristics of the package'. In case the package is unattractive and badly designed, people perhaps expect the product to have a low quality. The exact opposite appears to be true also. The researchers conclude that 'acceptance depends not only on the expectation generated by information (including nutritional facts) but also, and mostly, on the sensory properties of a food product'. Britton (1992) states that 80 per cent of all the choices in the purchasing process takes place in the last five seconds, when consumers are in front of the shelves in the supermarket. This endorses the importance of the product labels in the decision-making process of customers.

In line with Behaeghel (1991) and Villegas, Carbonell and Costell (2008), also Teigen (1987) cited the importance of information on objects. The intrinsic interest in a product or an object is linked to the information it contains, based on the 'joint presence of novel and familiar elements'. The evaluation of a food product could be influenced by aspects like information about price, product type and freshness. Products with such labels are more wanted than products without any label (Kole, Altintzoglou, Schelvis-Smit, & Luten, 2009). However, people can become overwhelmed when there is too much information on a package. On the other hand, the absence of enough information can mislead the customers (Andrews, Netemeyer, & Burton, 1998; Wansink, 2003). Finding a balance seems to be important.

QR code on package

By the use of QR codes, much information can be stored in a quite small square on the package (Hoy, 2011). Hereby, the information on the package can be limited with the result that people will not be overwhelmed by too much information. Besides that, the QR code makes it possible to provide consumers, having a smartphone (54% of the Dutch population in 2012, about 80% in 2017 (Forrester Consulting, 2013)), with sufficient information. Moreover, companies have the opportunity to design their package more attractive since the information on the package could occupy less space. A more attractive designed package is considered to be a product of higher quality (Villegas, Carbonell, & Costell, 2008) which significantly influences the buying intention of a consumer (Herrera & Blanco, 2011).

URL on package

Every web page has his own URL. Especially when it comes to classifying of the website without opening it, the URL is very useful (Kan & Thi, 2005). The fact that people gather information from the URL is confirmed by Zhou, Sun and Guo (2009). To find the web pages consumers look for, they select pages based on their URL string or anchor text. Companies take this into account and include information relevant to the topic of the website in the URL. Moreover, people can better recall the URL when a reference to the topic is included.

In general, using the internet on a smartphone requires typing letters and characters to some extent. For example, the URL of a website should normally be typed. Many people perceive this typing on little keyboards as very annoying. By the use of QR codes, these people can scan the code with their mobile phone instead of typing a long URL (Sekyere, 2012). This substantiates the expectation that people prefer scanning a QR code over typing an URL and thereby are more likely to seek information about the product on which the QR code is shown.

H1: The highest intention to seek information arises by the presence of a QR code and an URL on a food package, comparing to the other internet sources.
(H1a: QR code and URL > QR code, H1b: QR code > URL, H1c: URL > no QR code and no URL)

H2: The highest purchase intention arises by the presence of a QR code and an URL on a food package, comparing to the other internet sources.

(H2a: QR code and URL > QR code, H2b: QR code > URL, H2c: URL > no QR code and no URL)

2.4 Familiarity with product

People form their attitudes and beliefs based on their personal experiences with the different kinds of food (Fischer & De Vries, 2008) and their interpretation of external information about the specific foods (Verbeke, 2001). Bredahl (2003) stated that the degree of familiarity of consumers with a product is generally investigated by the buying frequency or consumption frequency. Herrera and Blanco (2011) developed a list with items concerning the buying frequency and variety of other comparable products the consumer usually buys. Factors that play a role are:

- Perceived risk: 'uncertainty and the consequences' (Herrera & Blanco, 2011).
- Trust: 'security of the consumer in the capacity of the brand to carry out its function correctly' (Chaudhury & Holbrook, 2001).
- Satisfaction: 'a consumer affective state resulting from the global evaluation of all the aspects that shape a relation' (Sanzo, Santos, Vázquez, & Alvarez, 2003).
- Loyalty: 'a feeling that a customer has about a brand' (Duffy, 2003). Four stages, 'cognitive, affective, conative and action' (Oliver, 1999).
- Buying intention: 'attitudes, preferences, motivations and perceptions of revenue must be taken into account' (Herrera & Blanco, 2011).

The affinity or familiarity of a consumer with a specific product appears to affect the time a consumer uses to study risk and benefits information about the product. Information

about unfamiliar products is studied for a longer time than information about familiar products. This is a consequence of the fact that consumers, in case of familiar products, base their attitude more on prior knowledge and experiences. It is expected that the presence of a QR code on a package is hardly noticed by consumers who are familiar with the product. Moreover, when familiar consumers notice the QR code, they will probably keep base their attitude mostly on prior knowledge and experiences. In the case of unfamiliar products, consumers base their attitude mostly on the first information presented. The QR code could be an information aspect that unfamiliar consumers immediately notice. Generally, consumers expect an unfamiliar product to be more risky compared to a familiar product (Fischer & Frewer, 2009).

H3: The more a consumer is familiar with a food product, the lower the intention to seek information.

H4: The more a consumer is familiar with a food product, the lower the effect of the presence of both a QR code and an URL on a food package (H4a), the presence of a QR code on a food package (H4b), the presence of an URL on a food package (H4c) and the absence of a QR code and an URL on a food package (H4d), on the intention to seek information.

H5: The more a consumer is familiar with a food product, the higher the purchase intention.

H6: The more a consumer is familiar with a food product, the lower the effect of the presence of both a QR code and an URL on a food package (H6a), the presence of

a QR code on a food package (H6b), the presence of an URL on a food package (H6c) and the absence of a QR code and an URL on a food package (H6d), on the purchase intention.

2.5 Nutrition information interest

Consumers can have many reasons to have interest in nutrition information, like for example weigh control, increasing health concern and aesthetic concerns. But also factors like the media attention seems to play a role. Besides that, the extent to which people are interested in nutrition information depends partially on some demographic characteristics (Grunert & Wills, 2007). In general, women are more interested than men, older people are more interested than young people and there can be distinguished a geographical/cultural difference. People in for example the Netherlands and the UK are more interested than people in countries like Spain and Greece. Besides that, all these demographic groups seem to use more labels in their purchase process. Moreover, these labels are, in proportion, more used by consumers in higher social classes and by higher educated consumers. This is substantiated by the study of Levy, Fein and Stephenson (1993). The more a consumer knows about nutrition, the more this consumer is able to use this information in his judgments and decisions.

About 17 per cent of the consumers in the study of Grunert, Fernández-Celemín, Wills, Storcksdieck and Nureeva (2010) looked for nutrition information on the package of a food product. In the case consumers are interested in nutrition information, they look most frequently for sugar, fat and calories. According to Burton, Garretson and Velliquette (1999), the purchase intention of consumers is more based on the

'unfavorable' nutrition information on packages (like cholesterol and fat) than on 'favorable' nutrition information (like fiber and protein).

The absence of sufficient information can mislead customers (Andrews, Netemeyer, & Burton, 1998; Wansink, 2003), it is expected that this absence has a more than average effect on customers with a high nutrition information interest. With the presence of a QR code on a food package, it can be ensured that consumers find the information they look for, since QR codes can store many information in a quite small square (Hoy, 2011). Besides that, the presence of enough information influences the product evaluation and purchase intention (Kole, Altintzoglou, Schelvis-Smit, & Luten, 2009). It is expected that this impact is more than average for customers with a high nutrition information interest. The absence of enough information may have a negative influence on the evaluation and purchase intention. This suggests that the presence of a QR code, with a lot of information as content, has a positive impact on the purchase intention of customers with a high interest in nutrition information.

H7: The more a consumer is interested in nutrition information, the higher the intention to seek information.

H8: The more a consumer is interested in nutrition information, the larger the effect of the presence of both a QR code and an URL on a food package (H8a), the presence of a QR code on a food package (H8b), the presence of an URL on a food package (H8c) and the absence of a QR code and an URL on a food package (H8d), on the intention to seek information.

H9: The more a consumer is interested in nutrition information, the higher the purchase intention.

H10: The more a consumer is interested in nutrition information, the larger the effect of the presence of both a QR code and an URL on a food package (H10a), the presence of a QR code on a food package (H10b), the presence of an URL on a food package (H10c) and the absence of a QR code and an URL on a food package (H10d), on the purchase intention.

2.6 Research model

Based on the previous paragraphs, in this section the composited research model is revealed (figure 2). The formulated hypotheses are shown by the character 'H' and a corresponding number. This entire model is tested for four product types separately, to detect a possible influence of each single product type. The four product types are explained in paragraph 2.7, related hypotheses are not presented in the research model.

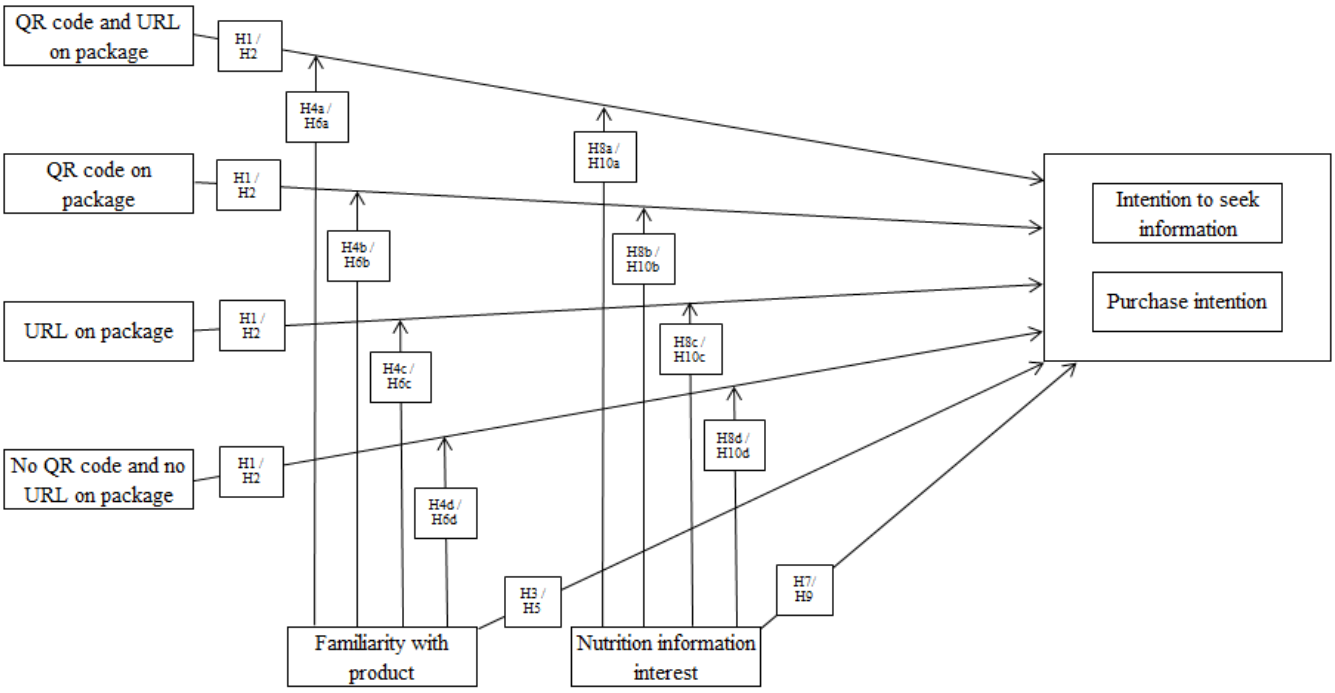

Figure 2 Research model

2.7 Product type

Besides the above mentioned factors, also the factor product type probably plays a role in this study since there are many different types of products on which people possibly respond differently. To test whether there is an influence of product type, four different types of products will be included in this study as illustrated in this paragraph.

Cheap and expensive

In this study, the first product type distinction is between cheap and expensive products. Campbell, Aravena and Hutchinson (2011) indicated that consumers rather ignore attributes, like information on packages, on cheap products than on expensive products. When consumers make decisions involving larger costs, they are more careful. The

reverse seems to be true also, decisions about cheaper products are made easier. It is expected that the effect of the presence of QR codes on food packages, on the intention to seek information and purchase intention, is smaller for cheaper products.

H11: The effect of the presence of both a QR code and an URL (H11a), a QR code (H11b), an URL (H11c) and the absence of a QR code and an URL (H11d) on a food package, on the intention to seek information is smaller for cheaper products.

H12: The effect of the presence of both a QR code and an URL (H12a), a QR code (H12b), an URL (H12c) and the absence of a QR code and an URL (H12d) on a food package, on the purchase intention is smaller for cheaper products.

Utilitarian and hedonistic

The second product type distinction in this study is between utilitarian and hedonistic products. Two kinds of shopping, and additionally two kinds of products, are distinguished by Cardoso and Pinto (2010), namely hedonic and utilitarian shopping and utilitarian and hedonic products. Utilitarian shopping is considered to be rational and effective. In most cases, utilitarian shopping is daily shopping for the purpose of necessity and probably thrift. Hedonic shopping is more based on emotive and multi-sensory aspects. The purpose of hedonic shopping is satisfying the desires of the consumers. This leads to the determination that two kinds of products can be discerned, products with functional attributes (utilitarian) and products with affective gratifications (hedonic) (Batra and Ahtola, 1990). Since utilitarian shopping is mostly based on ratio, it is expected that the information on packages of the utilitarian products is more studied by

the consumers as compared to hedonic products. This substantiates the expectation that the effect of the presence of QR codes on food packages, on the intention to seek information and purchase intention, is larger for utilitarian products.

H13: The effect of the presence of both a QR code and an URL (H13a), a QR code (H13b), an URL (H13c) and the absence of a QR code and an URL (H13d) on a food package, on the intention to seek information is larger for utilitarian products.

H14: The effect of the presence of both a QR code and an URL (H14a), a QR code (H14b), an URL (H14c) and the absence of a QR code and an URL (H14d) on a food package, on the purchase intention is larger for utilitarian products.

2.8 Added value of QR codes and the possession of smartphones

As mentioned in the introduction, this study also focuses on the perceived added value of QR codes on food products. Besides that, it is expected that this variable, and the possession of a smartphone, probably play a role in the study regarding the intention to seek information and the purchase intention. These variables are described in this paragraph. The established hypotheses will be tested but are not included in the research model.

Added value of QR codes on food packages

Added value is, by Grönroos (1997), seen as additional services in addition to the core solution or core product. This added value can be negative when it is subtracted from the

core solution. Levitt (1980) indicates that not all consumers perceive the added value since some consumers may not be able to use the additional services. In this case the QR code may add value to the core food product. Consumers without a smartphone with appropriate scanning app probably do not perceive the added value since it is for them not possible to use the additional service. It is expected that consumers seeing the added value of a QR code on a food package attach more value to the presence of a QR code. With the possible consequence that for these consumers the presence of a QR code has a larger effect on the intention to seek information and the purchase intention.

H15: The effect of the presence of a QR code on a food package, on the intention to seek information, is larger for consumers seeing the added value of a QR code on a food package.

H16: The effect of the presence of a QR code on a food package, on the purchase intention, is larger for consumers seeing the added value of a QR code on a food package.

Possession of smartphones

In 1995, about 91 million people worldwide used a mobile phone. During the years this amount increased to 5.9 billion mobile phone subscriptions in 2011. This equates to 85 mobile phones per 100 inhabitants. In Europe, there are about 36 active mobile-broadband subscriptions per 100 inhabitants. Worldwide, this amount is 15 per 100 inhabitants (International Telecommunication Union (ITU), 2012). According to De Bruyckere and Niezink (2013), in the first quarter of 2013 about 63 percent of the Dutch

population had a smartphone (52 percent in the first quarter of 2012). Most of the people who ever used a QR code are likely to have a smartphone. Which is evident from the study conducted by Pitney Bowes in 2013. This results in the expectation that consumers having a smartphone see more added value of a QR code on a food package, since consumers without a smartphone are not able to scan the QR code.

H17: Consumers having a smartphone see more added value of QR codes on food packages, compared to consumers without a smartphone.

3. Method

The hypotheses of the previous chapter are tested by an online questionnaire. One of the advantages of a quantitative instrument, like an online questionnaire, is the great reach which makes it possible to get a broad overview and calculate statistical coherence. Besides that, the research questions are suitable to be investigated by a questionnaire. Moreover, 'a questionnaire will provide insight in the influence of the identified factors on the attitude-behaviour relation' (Hardin & Hilbe, 2001).

Each respondent got to see randomly four pictures of packages of food products. The four packages that respondents got to see where of a 'Cheap product', an 'Expensive product', an 'Utilitarian product' and a 'Hedonistic product'. These packages contained a 'QR code and an URL', a 'QR code', an 'URL' or 'no QR code and no URL'. Questions in the questionnaire are related to one of the different pictures. Such a study is called a vignette study, which is explained in paragraph 3.2.

3.1 Pre-study product selection

To discover specific products that are seen as a 'Cheap product', an 'Expensive product', an 'Utilitarian product' or a 'Hedonistic product' a pre-study is conducted. 15 consumers participated in this pre-study, 9 males and 6 females. The mean age of the participants was 38.3 years (SD = 14.39).

Each participant got to see 10 different products which can be found in a supermarket and was asked to indicate to what extent these products are cheap or expensive on a 7-point Likert scale. The lower the score the more expensive, the higher the score the cheaper. The 10 examined products are comprised of 5 products expected to

be seen as cheap and 5 products expected to be seen as expensive. These products are chosen by asking 5 consumers to name a cheap and an expensive food product.

Thereafter, the participants of the pre-study got to see again 10 different supermarket products. This time, they were asked to indicate on a 7-point Likert scale to what extent the products were utilitarian or hedonistic. The higher the score the more utilitarian, the lower the score the more hedonistic. In this case, the examined products are comprised of 5 products expected to be seen as hedonistic and 5 products expected to be seen as utilitarian. These products are also chosen by 5 consumers by naming a hedonistic and an utilitarian product (appendix 4).

The results of this pre-study are shown in table 1. It is demonstrated that 'tomato paste' ($M = 5.9$, $SD = 1.55$) is seen as the most cheap, and a 'ready-to-eat meal' ($M = 2.1$, $SD = 0.96$) as the most expensive product. Besides that, 'bonbons' ($M = 1.7$, $SD = 0.96$) are seen as most hedonistic and 'bread' as most utilitarian ($M = 6.7$, $SD = 0.80$). Because of the small sample size in this pre-study, the differences should not be tested on significance basically. However, some paired-samples t-tests had been conducted. Despite of the sample size, 'ready-to-eat meals' are statistically significant seen as more expensive than 'tomato paste' ($t(14) = 7.92$, $p < .0005$ (two-tailed)) and even 'orange juice' ($t(14) = 2.36$, $p < .05$ (two-tailed)). On the other side, 'tomato paste' is statistically significant seen as cheaper than a 'bottle water' ($t(14) = 2.35$, $p < .05$ (two-tailed)). Besides that, 'bread' is statistically significant seen as more utilitarian than 'bonbons' ($t(14) = 12.08$, $p < .0005$ (two-tailed)) and even 'bananas' ($t(14) = 3.55$, $p < .005$ (two-tailed)). These four, as extremes mentioned, products are used in the questionnaire, representing the concerning product categories.

	M	*SD*		*M*	*SD*
Ready-to-eat meal	2.1	0.96	***Bonbon***	1.7	0.96
Coffee	2.8	1.08	***Steak***	1.9	0.96
Orange juice	3.3	1.58	***Pie***	2.1	0.99
Wine	3.3	1.39	***Tuna***	3.1	1.22
Ice cream	3.5	0.83	***World cuisine box***	4.5	1.36
Yogurt	4.7	0.72	***Onion***	5.2	1.37
Potatoes	4.7	1.33	***Eggs***	5.6	1.24
Bottle water	4.9	1.51	***Bananas***	5.7	1.35
Rice	5.7	0.96	***Milk***	6.6	0.83
Tomato paste	5.9	1.55	***Bread***	6.7	0.80
1 = Expensive - 7 = Cheap			*1 = Hedonistic - 7 = Utilitarian*		

Table 1 Results pre-study

3.2 Vignette study

Hypothetical case scenarios are also called vignettes. These vignettes are 'partial descriptions of life situations' and normally used to reveal the beliefs, opinions, knowledge, judgement, attitudes and decisions of participants in a study or education. Especially when the decision-making process is complex, vignettes can be usable in discovering information on cognitive processes (Brauer, Hanning, Arocha, Royall, Goy, Grant, Dietrich, Martino, & Horrocks, 2009). Such vignettes are used in studies regarding life-threatening and ingrain illnesses to comprehend the hypothetical decisions of the patients. This method turns out to be viable, since researchers can just change one individual factor while all other factors remain constant (Martinez & Guarnaccia, 2007). In this study, the factors 'internet resource on package', and 'kind of product' changed.

Two types of vignette studies can be distinguished, knowing the 'factorial method' and the 'storytelling method'. The factorial method is normally used in a decision making process and includes predetermined factors. These vignettes comprise all or some of the possible combinations of factors. Factors are categorical variables with

at least two levels, like sex (female or male) (Taylor, 2006; Ganong & Coleman, 2006). In case of the storytelling method, just one or a few 'typical' or 'illustrative' scenarios are created (Finch, 1987; Kahn, Docherty, Carpenter, & Frances, 1997).

In the present study, the factorial method is applied. By using the 'multiplication principle or product rule' (Devore, 2008), the number of possible compositions of factors can be calculated. The formula of the rule looks as follows:

$$N = n1 \times n2 \times n3 \times \ldots nk$$

The character 'N' is the total number of possible compositions, 'k' stands for number of factors and 'n' for the number of categories for each factor. The present study contains therefore 16 possible different compositions of factors (4 x 4), since there are four different 'internet resource on package' factors and four 'kind of product' factors. A list with all the vignettes is included in appendix 1.

However, there is no limitation regarding the amount of factors, researchers should take this into account since the human brain can handle just a limited number of factors simultaneously (Simon, 1990). Within a factorial design, the sample of each possible combination of factors is not necessary to be over a minimum size. The overall sample and subgroups are important in the determination of the sample size, since about these groups conclusions are drawn (Taylor, 2006).

3.3 Sample

The hypotheses out of the second chapter are tested by a sample of 272 participants, 116 male and 156 female. The youngest and oldest participants were 19 and 67 years old, with a mean age of 37.99 (SD= 12.64). QR codes are known by 203 participants (74.6%).

The mean age of the different vignette groups differ slightly, however this does not differ significantly from the mean age of all participants with a smartphone. Besides that, the gender distribution per vignette seems to be comparable in most cases. Males seem to be somewhat overrepresented in two vignette groups. The same applies for the education distribution. Each vignette has a large majority high educated respondents. Exactly 200 of the participants are higher educated (HBO/WO). Table 2 provides an overview of these mean ages and the gender and education distribution for each vignette group. The distribution of these demographic variables seems to be no restriction when comparing the vignettes.

		n	*Mean age*	*Gender (male/female)*	*Education (other/high)*
Expensive product (ready-to-eat meal)	***QR***	56	37.54	21/35	15/41
	URL	54	36.37	28/26	13/41
	QR+URL	52	34.27	22/30	14/38
	no QR+URL	52	37.33	23/29	8/44
Utilitarian product (bread)	***QR***	54	36.39	21/33	9/45
	URL	54	36.89	25/29	16/38
	QR+URL	54	35.89	23/31	11/43
	no QR+URL	52	36.42	25/27	14/38
Cheap product (tomato paste)	***QR***	53	37.51	30/23	12/41
	URL	55	39.04	22/33	11/44
	QR+URL	53	34.74	20/33	12/41
	no QR+URL	53	34.21	22/31	15/38
Hedonistic product (bonbons)	***QR***	55	36.53	20/35	12/43
	URL	53	35.72	23/30	10/43
	QR+URL	52	38.08	26/26	14/38
	no QR+URL	54	35.31	25/29	14/40
Total smartphone owners		214	36.40	94/120	50/164
No smartphone		58	43.88	22/36	22/36
	Total	272	37.99	116/156	72/200

Table 2 Demographic variables **s**ample by vignette

Since only smartphone owners are able to use QR codes, the main questions of this study are just asked to these people. This group consists of 214 participants with a mean age of 36.40 (SD= 12.56), 94 male and 120 female. QR codes are known by 175 participants (81.8%). About 60 per cent (126 participants) of the smartphone owners has a QR code reader app on their smartphone. Just 6 of them (4.8%) use the app every day or several times a week, while 60 people use it several times a year (47.6%) and 36 participants never use this app (28.6%). Of the 90 participants that use the app, 30 participants would use the app to scan a QR code when they see one on a food package.

Participants without a QR code reader app indicate that they have no interest in the QR codes, think it is devious, not see the added value or do not know how it works. The same applies for participants who never use the QR code reader app on their smartphone. Besides that, participants who would not use the app when they see a QR code on a food package, indicate that all the info they need is already on the package. Moreover, some participants always buy the same product making it not necessary to check the package again and again. While other participants overlook the QR codes on packages.

On the other hand, participants use QR codes since they think it is fast and easy, out of curiosity, or to look for more information. Although, various participants indicate that QR codes are not well used in many cases. These people see the added value of QR codes when they lead to a specific webpage, but in many cases the QR code leads to a general website. Besides that, it is not always clear to what kind of webpage you are forwarded after scanning the code.

3.4 Measures

As cited above, the research instrument of this study is an online questionnaire. In this paragraph the different validated scales, out of the literature, are listed and explained. Appendix 2 contains the fully elaborated questionnaire. The sequence of the questions is aligned to the questions about the QR codes. To restrict, as much as possible, the 'pink elephant effect', questions about the added value of QR codes are asked in the end of the questionnaire. After seeing one of the pictures with a product, first the questions about the intention to seek information, purchase intention and their familiarity with the product had been asked. Consequently, the respondents were not be emphatically made aware of the possible presence of a QR code on the product.

The questionnaire starts with a question about the possession of a smartphone, thereafter four pictures of food packages are shown. After each picture of one of the possible vignette options (appendix 3), the respondents firstly had to answer mixed questions about their intention to seek information, the purchase intention and familiarity with the product. These questions had been answered for each of the four different vignettes the respondent got to see. To discover the extent to which the respondents are interested in nutrition information, part four contained questions about this topic. The last main topic was about the added value of the QR code. Thereafter the respondents were asked about the kind of information sources they saw on the different food packages and the use of QR code reader apps. Some demographics were also requested in the final part of the questionnaire.

Before the spreading of the questionnaire and the recruiting of respondents, the questionnaire and the concerning measuring scales were tested by 15 participants (mean

age 38.7, SD = 13.81, 7 males and 8 females). Based on these tests the final version of the questionnaire is composed. The Cronbach's alphas of the test study are shown in table 3.

Dependent variables

Intention to seek information: Is measured by use of a scale, based on scales developed by Kahlor (2007) and Van Leeuwen (2012). The scale consists of six items with a Cronbach's alpha of $\alpha = .912$.

Purchase intention: Burton et. al. (1999) developed a measuring scale to measure the purchase intention of people based upon information about the product on the product package. This scale consist of three items, like for example 'Given the information shown on the package, it is likely that I would purchase this product'. An item of the measuring scale of Baker and Churchill (1977) was added to measure the purchase intention. The four items achieved a Cronbach's alpha of $\alpha = .930$.

Independent variables

Internet resource on package: To discover the influence of the presence of one of the internet resources on a food package, a vignette study is performed. As mentioned in the research model of chapter two, the influence of four different resources or vignettes had been tested. The four different vignettes were 'QR code and URL on package', 'QR code on package', URL on package' and 'no QR code and no URL on package'.

Kind of product: The research model had been tested for four kinds of products, to discover the influence of product type. Again four different vignettes had been distinguished, knowing 'Cheap product', 'Expensive product', 'Utilitarian product' and 'Hedonistic product'. Each of these four vignettes contain a product that represents the concerning group of products, respectively 'Tomato paste', 'Ready-to-eat meal', 'Bread' and 'Bonbons'. The products are chosen, based on the results of the pre-study (paragraph 3.1).

Influencing variables

Familiarity with product: Herrera and Blanco (2011) used three items to measure the extent to which people are familiar with a product. This scale consist of the items 'I'm very familiar with the product', 'I have much experience with quality and prestige about the product' and 'I have much experience with the different products that exist in the market'. The item 'I'm a … expert' of Roehm and Sternthal (2001) was added to this measuring scale. The Cronbach's alpha was $\alpha = .938$.

Nutrition information interest: Burton et. al. (1999) developed a 'Nutrition Information Usage' scale. With the addition of an item of the measuring scale of Moorman (1998), the scale consist of four items making a Cronbach's alpha of $\alpha = .964$.

Other variables

Besides the previous variables, some other and general variables are included in the questionnaire. These other variables are described below.

Added value QR code: Is measured by the 'New Product Attributes' scale, developed by Mukherjee and Hoyer (2001). This scale consists of three items, like for example 'It is likely that the QR code will offer advantages to the consumer'. One item of the measuring scale of Moreau, Lehmann and Markman (2001) was added. The Cronbach's alpha was $\alpha = .844$.

Noticed internet source: To check whether or not the respondents noticed the different internet resources on the food packages, a question about this topic is included in the questionnaire. For each package, the respondents had logically the choice between 'QR code', 'URL', 'QR code and URL' and 'no QR code and URL'.

QR code reader app: Participants with a smartphone got in the end of the questionnaire some questions about the presence and usage of QR code reader apps.

Demographics: In the final part, some demographic variables had been asked. The concerning questions were 'What is your age?', 'What is your gender?' and 'What is your highest level of education?'.

Smartphone: The first question of the questionnaire was related to the possession of a smartphone.

	α test study	α study
Intention to seek information	.926	.912
Familiarity with product	.939	.938
Purchase intention	.912	.930
Nutrition information interest	.950	.964
Added value QR code	.806	.844

Table 3 Cronbach alphas

Data collection

The previously discussed scales were, with the aid of a research tool, scripted in an online setting. This online questionnaire was accessible through a generic URL or personified URL-link. Potential respondents, in first place, were invited by personal e-mail invitations, containing such personal URL's. In this way, it was possible to check who had or had not participated in the study. Based on these insights, reminder e-mails with the same personal links had been send to people who had not yet participated in the study.

Besides these e-mail invitations, recruiting of participants took place via social media like Facebook and Twitter. By the use of these social media, the generic URL to the online questionnaire had been shared as much as possible. Along with the link to the questionnaire the potential respondent got the request to share and forward the link to their acquaintances. This way of selecting participants is named snowball sampling (Babbie, 2012).

3.5 Data analysis

The database with results is first of all checked for obvious errors and noteworthy missing values. An example of an obvious error could be a value outside the range of possible answers. After these checks, the reverse-scaled items are recoded and factor analyses and reliability analyses were applied. For each scale the Cronbach's alpha is assessed.

To measure the relation between all independent, influencing and dependent factors of the research model, hierarchical multiple regression analyses have been carried out

with the data of each separate vignette. Besides that, the extent to which the manipulation of the intention to seek information and the purchase intention actually succeeded was checked by the use of t-tests. Additionally, the moderating impact of the factors 'familiarity with product' and 'nutrition information interest' were (in the appendix) tested by an one-way analysis of covariance (ANCOVA).

4. Results

In this chapter the results of the study are described. The hypotheses or main topics are (almost all) divided in several headings. As mentioned in the previous chapter, the internal consistency of the measuring scales, computed by the Cronbach's alphas, is very good. The tables below show the number of respondents per vignette and the mean scores and standard deviations of the main topics per vignette.

Since each respondent with a smartphone had to evaluate four different food products and thereafter answered questions about all these four products, one respondent can in some cases be seen as four particular respondents. This is also shown in the tables below, all 214 respondents with a smartphone looked at all four different products.

			Intention to seek information		Familiarity with product		Purchase intention		Nutrition information interest		Added value QR code	
		n	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Expensive product (ready-to-eat meal)	***QR***	56	14.55	5.65	12.11	6.16	13.38	6.40	16.68	6.82	14.82	4.88
	URL	54	15.71	6.98	14.06	6.07	12.63	5.79	17.04	7.28	14.85	5.32
	QR+URL	52	15.73	5.96	12.79	5.82	13.35	6.69	16.13	6.81	15.37	5.54
	no QR+URL	52	16.65	6.94	11.60	5.61	12.63	5.96	16.56	7.33	14.10	4.57
Total smartphone owners		214	15.22	7.15	14.73	6.45	13.67	6.13	16.61	7.00	14.79	5.07
No smartphone		58	-	-	-	-	-	-	-	-	14.38	5.14
	Total	272	15.22	7.15	14.73	6.45	13.67	6.13	16.61	7.00	14.76	5.07

Table 4 Results expensive product

			Intention to seek information		Familiarity with product		Purchase intention		Nutrition information interest		Added value QR code	
		n	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Cheap product (tomato paste)	***QR***	53	15.25	8.73	13.55	6.02	13.51	5.65	16.92	6.50	15.08	4.98
	URL	55	14.60	7.32	13.40	6.63	13.53	6.38	16.75	7.66	15.05	5.21
	QR+URL	53	15.70	7.23	13.02	6.10	14.91	5.37	16.43	6.98	14.45	5.50
	no QR+URL	53	15.02	8.46	11.08	5.39	12.96	6.32	16.32	7.04	14.55	4.69
Total smartphone owners		214	15.22	7.15	14.73	6.45	13.67	6.13	16.61	7.00	14.79	5.07
No smartphone		58	-	-	-	-	-	-	-	-	14.38	5.14
	Total	272	15.22	7.15	14.73	6.45	13.67	6.13	16.61	7.00	14.76	5.07

Table 5 Results cheap product

		Intention to seek information		Familiarity with product		Purchase intention		Nutrition information interest		Added value QR code	
		n	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Utilitarian product (bread)	***QR***	54	14.28	6.57	19.72	5.48	14.26	6.77	15.87	6.46	14.37	5.15
	URL	54	16.04	6.57	20.13	4.44	13.59	6.34	17.74	7.43	15.02	5.44
	QR+URL	54	15.74	8.34	20.67	4.22	14.37	6.28	16.72	7.82	15.30	4.60
	no QR+URL	52	13.50	5.61	20.13	3.64	13.79	6.19	16.08	6.25	14.44	5.16
Total smartphone owners		214	15.22	7.15	14.73	6.45	13.67	6.13	16.61	7.00	14.79	5.07
No smartphone		58	-	-	-	-	-	-	-	-	14.38	5.14
Total		272	15.22	7.15	14.73	6.45	13.67	6.13	16.61	7.00	14.76	5.07

Table 6 Results utilitarian product

		Intention to seek information		Familiarity with product		Purchase intention		Nutrition information interest		Added value QR code	
		n	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Hedonistic product (bonbons)	***QR***	55	14.40	7.38	13.13	6.13	13.47	5.62	17.35	6.57	13.78	5.05
	URL	53	14.58	7.46	13.45	5.70	13.66	6.74	18.57	7.21	14.85	5.15
	QR+URL	52	14.87	6.73	12.65	5.62	13.87	5.61	14.29	6.65	15.29	5.42
	no QR+URL	54	16.98	7.62	14.22	6.15	14.78	6.05	16.17	7.10	15.26	4.67
Total smartphone owners		214	15.22	7.15	14.73	6.45	13.67	6.13	16.61	7.00	14.79	5.07
No smartphone		58	-	-	-	-	-	-	-	-	14.38	5.14
Total		272	15.22	7.15	14.73	6.45	13.67	6.13	16.61	7.00	14.76	5.07

Table 7 Results hedonistic product

4.1 Intention to seek information

In H1, it was hypothesized that the highest intention to seek information about a food product arises by the presence of a QR code and an URL. The results of the study show that this is not the case, since the intention to seek is the highest without a QR code and URL on the package (M= 15.55, SD= 7.32). Thereafter, the intention is in succession the highest with the presence of a QR code and URL (M= 15.51, SD= 7.09), an URL (M= 15.23, SD= 7.07) and a QR code (M= 14.61, SD= 7.11). Comparing the results of the QR code and the no QR code and URL group by an independent samples t-test shows no significant difference (t (427)= 1.34, *ns*). So, H1a is not substantiated by the results, though the intention to seek was higher by the presence of a QR code and URL

comparing to the presence of just a QR code. These differences were not significant. The first hypotheses (H1a, H1b, H1c) should be rejected.

	Highest - Lowest	***t-value***	***p-value***
Expensive product	no QR and URL - QR code	1.731	.086
Utilitarian product	URL - no QR and URL	2.135	.035
Cheap product	QR and URL - URL	.784	.435
Hedonistic product	no QR and URL - QR code	1.797	.075
All products	no QR and URL - QR code	1.341	.180

Table 8 Independent samples t-test for intention to seek information

4.2 Purchase intention

Besides the intention to seek information was also expected that the purchase intention is the highest for food packages with a QR code and URL (H2). This hypothesis can also be rejected since the results are as follows, QR code and URL on the package (M= 14.13, SD= 6.00), QR code (M= 13.65, SD= 6.10), no QR code and URL (M= 13.55, SD= 6.15) and an URL on the package (M= 13.35, SD= 6.29). These differences are not significant, this is evident from the comparison of the scores from the QR code and URL group and the URL group by an independent samples t-test (t (425)= 1.31, *ns*). The hypotheses H2a and H2b should be rejected, since the differences between the presence of both the QR code and URL and just the QR code, and presence of just the QR code and just the URL in purchase intention are not significant.

	Highest - Lowest	***t-value***	***p-value***
Expensive product	QR code - URL	.640	.524
Utilitarian product	QR and URL - URL	.640	.523
Cheap product	QR and URL - no QR and URL	1.705	.091
Hedonistic product	no QR and URL - QR code	1.167	.246
All products	QR and URL - URL	1.305	.193

Table 9 Independent samples t-test for purchase intention

		R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.001	.498	.029	.976	.329
	Familiarity with product	.139	.000	.281	9.148	.000
	Nutrition information interest	.078	.000	.292	8.985	.000
	Added value QR code	.044	.000	.217	7.248	.000
	Age	.000	.733	-.013	-.416	.678
	Gender	.001	.297	.030	.971	.332
	Education level	.001	.205	-.039	-1.269	.205
QR	***Source***	.002	.146	-.041	-1.404	.161
	Familiarity with product	.139	.000	.281	9.157	.000
	Nutrition information interest	.077	.000	.290	8.946	.000
	Added value QR code	.044	.000	.217	7.249	.000
	Age	.000	.746	-0.12	-.394	.694
	Gender	.001	.275	.031	1.021	.307
	Education level	.001	.216	-.038	-1.239	.216
URL	***Source***	.000	.982	-.038	-1.273	.203
	Familiarity with product	.140	.000	.283	9.207	.000
	Nutrition information interest	.077	.000	.293	9.013	.000
	Added value QR code	.045	.000	.218	7.308	.000
	Age	.000	.729	-.013	-.423	.672
	Gender	.001	.303	.029	.956	.339
	Education level	.001	.197	-.039	-1.292	.197
no QR+URL	***Source***	.001	.443	.051	1.725	.085
	Familiarity with product	.141	.000	.284	9.239	.000
	Nutrition information interest	.077	.000	.291	8.967	.000
	Added value QR code	.045	.000	.219	7.331	.000
	Age	.000	.742	-.012	-.402	.688
	Gender	.001	.276	.031	1.018	.309
	Education level	.001	.207	-.038	-1.263	.207

Table 10 Hierarchical multiple regression analyses for intention to seek information by internet source

4.3 Familiarity with a food product and intention to seek information

Based on the literature, it was expected that the more a consumer is familiar with a food product, the lower the intention to seek information (H3). This is tested by a hierarchical multiple regression analysis (table 10), to detect the influence of the familiarity with the product (independent variable) on the intention to seek information (dependent variable). For each type of internet source, it was assessed that the familiarity explained 13.9 to

14.1 per cent of the variance in intention to seek information. In all four cases, the beta-value is positive and significant, so the more a consumer is familiar with a food product, the higher the intention to seek information. This also holds for the hierarchical multiple regression analysis with all products together (table 11, beta= .282, $p < .001$). In this case, the 'source' represents the presence of a QR code (the QR+URL and QR group) and the absence of a QR code (the URL and no QR+URL group). The total variance explained by the model as a whole was 26.3 per cent ($F(7,848)= 43.287$, $p < .001$). The third hypothesis can be rejected.

Table 10 also shows the very small influence of the internet sources on the variance in intention to seek information. The corresponding beta-values were far from significant. There seems to be no influence of familiarity on the effect of the presence of the internet sources on the intention to seek information. Adding the independent variable familiarity to the hierarchical multiple regression model with the intention to seek as dependent- and the internet source as independent variable, gives no significant effect. This is also evident from an one-way analysis of covariance (ANCOVA) from appendix 5 ($F(3,851)= 1.127$, $p= .337$) .The fourth hypotheses (H4a, H4b, H4c, H4d) should therefore be rejected.

		R Square Change	Sig. F Change	Beta	t	Sig.
Intention to seek	***Source***	.001	.496	-.011	-.382	.702
	Familiarity with product	.139	.000	.282	9.170	.000
	Nutrition information interest	.076	.000	.290	8.906	.000
	Added value QR code	.045	.000	.218	7.292	.000
	Age	.000	.717	-.013	-.435	.664
	Gender	.001	.279	.031	1.010	.313
	Education level	.001	.207	-.038	-1.262	.207

Table 11 Hierarchical multiple regression analysis for intention to seek information

		R Square Change	Sig. F Change	Beta	t	Sig.
Purchase intention	***Source***	.001	.298	.037	1.204	.229
	Familiarity with product	.174	.000	.412	12.988	.000
	Nutrition information interest	.000	.627	.037	1.110	.267
	Added value QR code	.004	.034	.087	2.800	.005
	Age	.030	.000	-.177	-5.672	.000
	Gender	.003	.072	.055	1.757	.079
	Education level	.000	.465	-.023	-.732	.465

Table 12 Hierarchical multiple regression analysis for purchase intention

4.4 Familiarity with a food product and purchase intention

The fifth hypothesis consisted the more a consumer is familiar with a food product, the higher the purchase intention. A hierarchical multiple regression analysis (table 13) was conducted and revealed that 17.4 to 17.6 per cent of the variance in purchase intention is explained by the familiarity with the product. The beta-values were positive and significant, so it can be assumed that the more a consumer is familiar with a food product, the higher the purchase intention. In table 12, the hierarchical multiple regression analysis of all products together is shown (beta= .412, $p < .001$). The total variance explained by the model as a whole was 21.4 per cent ($F(7,848)= 32.891$, $p < .001$). These results demonstrate that the fifth hypothesis can be accepted.

Also on the purchase intention, the influence of the internet sources is very small. The beta-values were very small and not significant at all. Just as shown in the one-way analysis of covariance (ANCOVA) in appendix 5 ($F(3,851)= 1.058$, $p= .366$), there is no significant effect after adding the independent variable familiarity to the hierarchical multiple regression model with the purchase intention as dependent- and the internet source as independent variable. As a consequence, the hypotheses six (H6a, H6b, H6c,

H6d) should be rejected since there seems to be no influence of familiarity on the effect of the presence of the internet sources on the purchase intention.

		R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.002	.210	.033	1.065	.287
	Familiarity with product	.174	.000	.412	12.968	.000
	Nutrition information interest	.000	.608	.037	1.110	.267
	Added value QR code	.004	.037	.085	2.764	.006
	Age	.030	.000	-.176	-5.635	.000
	Gender	.003	.069	.056	1.775	.076
	Education level	.000	.479	-.022	-.708	.479
QR	***Source***	.000	.963	.010	.329	.742
	Familiarity with product	.174	.000	.413	12.991	.000
	Nutrition information interest	.000	.665	.035	1.048	.295
	Added value QR code	.004	.033	.087	2.815	.005
	Age	.030	.000	-.177	-5.665	.000
	Gender	.003	.066	.057	1.796	.073
	Education level	.000	.474	-.023	-.716	.474
URL	***Source***	.001	.381	-.048	-1.571	.117
	Familiarity with product	.176	.000	.414	13.043	.000
	Nutrition information interest	.000	.589	.039	1.155	.249
	Added value QR code	.004	.031	.087	2.825	.005
	Age	.030	.000	-.176	-5.646	.000
	Gender	.003	.072	.055	1.754	.080
	Education level	.001	.462	-.023	-.736	.462
no QR+URL	***Source***	.000	.747	.006	.181	.856
	Familiarity with product	.174	.000	.413	12.985	.000
	Nutrition information interest	.000	.662	.035	1.049	.295
	Added value QR code	.004	.033	.087	2.809	.005
	Age	.030	.000	-.176	-5.652	.000
	Gender	.003	.065	.057	1.804	.072
	Education level	.000	.479	-.022	-.708	.479

Table 13 Hierarchical multiple regression analyses for purchase intention by internet source

4.5 Interest in nutrition information and intention to seek information

By the use of a hierarchical multiple regression analysis (table 10) it is tested whether or not the intention to seek information is higher for consumers who are interested in

nutrition information (H7). About 7.7 to 7.8 per cent (depending on the internet source) of the variance in intention to seek information is explained by the nutrition information interest. The hypothesis can be accepted since all beta-values of the individual products and of the total analysis (beta= .290, $p < .001$) were positive and significant.

Before this study, it was expected that the more a consumer is interested in nutrition information, the larger the effect of the presence of an internet source on a food package on the intention to seek information (H8). Again, adding the independent variable interest in nutrition information to the hierarchical multiple regression model with the intention to seek as dependent- and the internet source as independent variable, does not show any significant influence. This is also tested by an one-way analysis of covariance (ANCOVA), in appendix 5 ($F(3,851)= 1.674$, $p= .171$). The eight hypotheses (H8a, H8b, H8c, H8d) should be rejected.

4.6 Interest in nutrition information and purchase intention

The ninth hypothesis was as follows: the more a consumer is interested in nutrition information, the higher the purchase intention. This does not hold, since hierarchical multiple regression analyses (table 13) demonstrated that the beta-values of all the products were positive but not significant. The results of the products together (table 12) substantiate these results (beta= .037, p= .267). Besides that, the interest in nutrition information seems to have no unique explanation in the variance of the purchase intention. The hypothesis should be rejected.

Hypothesis ten stated that the more a consumer is interested in nutrition information, the larger the effect of the presence of an internet source on the purchase

intention. These hypotheses (H10a, H10b, H10c, H10d) should be rejected based on the fact that adding the independent variable interest in nutrition information to the hierarchical multiple regression model with the purchase intention as dependent- and the internet source as independent variable, does not show any significant influence. By the use of an ANCOVA test in appendix 5 ($F(3,851)= .899$, $p= .441$), these results are substantiated.

4.7 Intention to seek information on cheap products

The intention to seek information seems to be marginally higher in cases with more expensive products. However, these differences are not significant (t (408.17)= .726, *ns*).

As seen in table 11 with all the products as a total, the impact of the internet source on the intention to seek information was marginally. In the appendix 6, some hierarchical multiple regression analyses for each separate product and internet source combination are inserted. The tables show no significant unique contribution from the internet sources to the variance in intention to seek for both the cheap and expensive products. However, the beta-value of the absence of a QR code and URL on the expensive product was significant (beta= .146, $p < .012$). So, the absence of a QR code and URL on a food package of an expensive product seems to have a positive influence on the intention to seek information.

Strictly speaking, we can not use a two-way between-groups ANOVA to test the effect of the presence of an internet source, as it assumes equal variances. In this case, the sample is pretty large, which restrains the problem, the ANOVA is used and interpreted with care. In the appendix 5, the results are shown. There is no significant interaction

effect between the internet source and the price of the product on the intention to seek information (F(3,420)= .563, p= .639, partial eta squared= .004). So the eleventh hypotheses (H11a, H11b, H11c), which expected that the effect of the presence of, for example a QR code on a food package, on the intention to seek information is smaller for cheaper products, should be rejected. Only hypothesis 11d, about the absence of a QR code and URL, should be accepted.

4.8 Purchase intention for cheap products

The purchase intention of consumers in this study is marginally higher for cheaper products. By the use of an independent samples t-test (*t* (426)= -1.23, *ns*), it can be concluded that the differences are not significant.

Annex 6 shows the hierarchical multiple regression analyses with the different internet sources and the cheap and expensive products. There seems to be no significant unique contribution of the internet sources on the variance in purchase intention for both the product groups. To illustrate, the impact of a QR code and URL on a cheap product has an unique contribution of .13 per cent on the purchase intention. Also the results of a two-way between-groups ANOVA test (appendix 5) show that there is no significant effect of the presence of one of the internet sources and the price of the product on the purchase intention (F(3,420)= .294, p= .829, partial eta squared= .002). So hypotheses twelve should be rejected (H12a, H12b, H12c, H12d).

4.9 Intention to seek information on utilitarian products

Utilitarian products appear to provide a marginally lower, but not significant, intention to seek information (*t* (426)= -.448, *ns*). The results in appendix 6 show no significant beta-values for each separate internet source for both the utilitarian and hedonistic products, based on the hierarchical multiple regression analyses.

In this case, the two-way between-groups ANVOVA test officially may not be used because of the somewhat unequal variances. However, because of the pretty large sample, the results are interpreted and used with caution (appendix 5). The interaction effect of the presence of an internet source and the product type (utilitarian or hedonistic) on the intention to seek information is almost significant (F(3,420)= 2.573, p= .054, partial eta squared= .018). However, hypotheses thirteen should be rejected (H13a, H13b, H13c, H13d).

4.10 Purchase intention for utilitarian products

The purchase intention of consumers is not significant higher for utilitarian products, this is apparent from an independent samples t-test (*t* (426)= .10, *ns*). Besides that, there seems to be no significant effect of the presence of the different internet sources on the purchase intention for both the utilitarian and hedonistic products (appendix 6). Also the results of a two-way between-group ANOVA in appendix 5 gives no significant interaction effect of the presence of an internet source and the type of the product (utilitarian or hedonistic) on the purchase intention (F(3,420)= .425, p= .735, partial eta squared= .003). Therefore, we rejected hypotheses fourteen (H14a, H14b, H14c, H14d).

4.11 Added value of a QR code on a food package

The intention to seek information seems to be marginally higher (not significant (*t* (854)= -.68, *ns*) in cases without a QR code on the food package. By the use of two regression analyses, it is tested whether the extent to which a consumer sees the added value of a QR code on a food package plays a role (H15). This is not the case since both beta-values were not significant, and the differences were quite small (low added value beta-value= -.035, high added value beta-value= -.016), so the hypothesis should be rejected. This is also shown in the one-way analysis of covariance (ANCOVA) in appendix 5 (F(1,853)= .522, p= .470).

Besides the effect on the intention to seek information, also the effect on the purchase intention is tested. In this case, the purchase intention seems to be marginally higher (not significant (*t* (854)= 1.04, *ns*) for packages with a QR code. Hypothesis sixteen should be rejected since the conducted regression analyses showed no significant beta-values (low added value beta-value= .079, high added value beta-value= -.011). Besides that, the influence of QR codes seems to be somewhat lower for people seeing the added value of QR codes. Moreover, the in appendix 5 conducted ANCOVA test was not significant (F(1,853)= 1.08, p= .300), so there is no effect of seeing the added value of QR codes on food packages on the effect of the presence a QR code on the purchase intention.

4.12 Consumers having a smartphone

The last hypothesis (H17) assumed that consumers having a smartphone see more added value of QR codes on food packages, compared to consumers without a smartphone. In

this study, the last group appear to see a little less added value of QR codes on food packages (M= 14.38, SD= 5.14), compared to consumers having a smartphone (M= 14.79, SD= 5.08). However, based on an independent samples t-test, these differences are not significant (*t* (270)= .54, *ns*) so the hypothesis can be rejected.

4.13 Internet source noticed

Many of the hypotheses before are rejected, there seems to be no huge effect of the presence of a QR code on a food package on the purchase intention or intention to seek information. A possible cause could be the study result that many consumers did not notice the QR code or URL on the food packages, this is shown in table 14. A remark which has to be placed is the high number of respondents who indicate that they have not seen both the QR code or the URL.

	QR		**URL**		**QR+URL**		**no QR+URL**	
	n	***noticed***	***n***	***noticed***	***n***	***noticed***	***n***	***noticed***
Expensive product (ready-to-eat meal)	56	15 26.8%	54	13 24.1%	52	10 19.2%	52	22 42.3%
Utilitarian product (bread)	54	12 22.2%	54	14 25.9%	54	3 5.6%	52	35 67.3%
Cheap product (tomato paste)	53	8 15.1%	55	13 23.6%	53	6 11.3%	53	30 56.6%
Hedonistic product (bonbons)	55	13 23.6%	53	12 22.6%	52	12 23.1%	54	24 44.4%

Table 14 Internet source noticed

In table 15, the intention to seek information and purchase intention scores of the respondents who noticed the internet source are compared with the scores of the respondents who did not notice it. An independent samples t-test shows no significant purchase intention difference (t (854)= .573, *ns*) and no intention to seek information difference (t (854)= .290, *ns*) between both groups on total level. Besides that, on product

type or source level, only the purchase intention scores for the hedonistic product showed a significant difference ($t(212) = 2.54$, $p = .012$), respondents who noticed the internet source seemed to have a higher purchase intention for the hedonistic product.

		Intention to seek information						Purchase intention					
		Internet source noticed			Internet source not noticed			Internet source noticed			Internet source not noticed		
		n	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***
Expensive product (ready-to-eat meal)	***QR***	15	14.53	7.50	41	14.56	4.91	15	14.80	7.25	41	12.85	6.08
	URL	13	15.54	6.12	41	15.76	7.30	13	12.46	4.52	41	12.68	6.19
	QR+URL	10	14.70	6.77	42	15.98	5.82	10	13.00	6.24	42	13.43	6.86
	no QR+URL	22	15.23	7.39	30	17.70	6.51	22	12.00	5.94	30	13.10	6.04
Expensive product total		60	15.03	6.90	154	15.88	6.20	60	12.97	6.03	154	13.01	6.27
Utilitarian product (bread)	***QR***	12	16.25	7.85	42	13.71	6.15	12	13.58	6.93	42	14.45	6.80
	URL	14	17.36	7.85	40	15.58	6.10	14	14.43	6.25	40	13.30	6.42
	QR+URL	3	15.33	7.57	51	15.76	8.46	3	12.33	4.04	51	14.49	6.40
	no QR+URL	35	12.63	5.84	17	15.29	4.78	35	12.83	5.85	17	15.76	6.59
Utilitarian product total		64	14.47	6.93	150	15.09	6.88	64	13.30	5.99	150	14.31	6.51
Cheap product (tomato paste)	***QR***	8	13.25	7.57	45	15.60	8.95	8	14.88	5.82	45	13.27	5.65
	URL	13	17.77	8.48	42	13.62	6.74	13	15.00	6.12	42	13.07	6.46
	QR+URL	6	13.67	4.08	47	15.96	7.52	6	12.33	7.09	47	15.23	5.12
	no QR+URL	30	15.30	8.79	23	14.65	8.19	30	12.90	6.43	23	13.04	6.33
Cheap product total		57	15.40	8.15	157	15.04	7.85	57	13.60	6.27	157	13.77	5.85
Hedonistic product (bonbons)	***QR***	13	16.00	7.79	42	13.90	7.27	13	17.08	5.56	42	12.36	5.21
	URL	12	15.25	7.07	41	14.39	7.64	12	17.08	6.07	41	12.66	6.67
	QR+URL	12	17.92	8.01	40	13.95	6.11	12	14.67	6.71	40	13.63	5.31
	no QR+URL	24	16.63	8.25	30	17.27	7.21	24	14.46	6.06	30	15.03	6.13
Hedonistic product total		61	16.48	7.74	153	14.71	7.13	61	15.57	6.07	153	13.29	5.86
QR total		48	15.15	7.51	170	14.46	7.01	48	15.13	6.45	170	13.24	5.95
URL total		52	16.52	7.31	164	14.82	6.97	52	14.69	5.85	164	12.93	6.38
QR+URL total		31	15.81	6.85	180	15.46	7.15	31	13.45	6.22	180	14.24	5.97
no QR+URL total		111	14.73	7.61	100	16.46	6.92	111	13.04	6.04	100	14.12	6.24
Total		242	15.33	7.42	614	15.18	7.04	242	13.86	6.13	614	13.59	6.13

Table 15 Intention to seek information and purchase intention by internet source noticed

H	**Hypothesis**	**Accepted or rejected**
H1	The highest intention to seek information arises by the presence of a QR code and an URL on a food package, comparing to the other internet sources. (H1a: QR code and URL > QR code, H1b: QR code > URL, H1c: URL > no QR code and no URL)	Rejected
H2	The highest purchase intention arises by the presence of a QR code and an URL on a food package, comparing to the other internet sources. (H2a: QR code and URL > QR code, H2b: QR code > URL, H2c: URL > no QR code and no URL)	Rejected
H3	The more a consumer is familiar with a food product, the lower the intention to seek information.	Rejected
H4	The more a consumer is familiar with a food product, the lower the effect of the presence of both a QR code and an URL on a food package (H4a), the presence of a QR code on a food package (H4b), the presence of an URL on a food package (H4c) and the absence of a QR code and an URL on a food package (H4d), on the intention to seek information.	Rejected
H5	The more a consumer is familiar with a food product, the higher the purchase intention.	Accepted
H6	The more a consumer is familiar with a food product, the lower the effect of the presence of both a QR code and an URL on a food package (H6a), the presence of a QR code on a food package (H6b), the presence of an URL on a food package (H6c) and the absence of a QR code and an URL on a food package (H6d), on the purchase intention.	Rejected
H7	The more a consumer is interested in nutrition information, the higher the intention to seek information.	Accepted
H8	The more a consumer is interested in nutrition information, the larger the effect of the presence of both a QR code and an URL on a food package (H8a), the presence of a QR code on a food package (H8b), the presence of an URL on a food package (H8c) and the absence of a QR code and an URL on a food package (H8d), on the intention to seek information.	Rejected
H9	The more a consumer is interested in nutrition information, the higher the purchase intention.	Rejected
H10	The more a consumer is interested in nutrition information, the larger the effect of the presence of both a QR code and an URL on a food package (H10a), the presence of a QR code on a food package (H10b), the presence of an URL on a food package (H10c) and the absence of a QR code and an URL on a food package (H10d), on the purchase intention.	Rejected
H11	The effect of the presence of both a QR code and an URL (H11a), a QR code (H11b), an URL (H11c) and the absence of a QR code and an URL (H11d) on a food package, on the intention to seek information is smaller for cheaper products.	Rejected, H11d accepted
H12	The effect of the presence of both a QR code and an URL (H12a), a QR code (H12b), an URL (H12c) and the absence of a QR code and an URL (H12d) on a food package, on the purchase intention is smaller for cheaper products.	Rejected
H13	The effect of the presence of both a QR code and an URL (H13a), a QR code (H13b), an URL (H13c) and the absence of a QR code and an URL (H13d) on a food package, on the intention to seek information is larger for utilitarian products.	Rejected
H14	The effect of the presence of both a QR code and an URL (H14a), a QR code (H14b), an URL (H14c) and the absence of a QR code and an URL (H14d) on a food package, on the purchase intention is larger for utilitarian products.	Rejected
H15	The effect of the presence of a QR code on a food package, on the intention to seek information, is larger for consumers seeing the added value of a QR code on a food package.	Rejected
H16	The effect of the presence of a QR code on a food package, on the purchase intention, is larger for consumers seeing the added value of a QR code on a food package.	Rejected
H17	Consumers having a smartphone see more added value of QR codes on food packages, compared to consumers without a smartphone.	Rejected

Table 16 Summary of the hypotheses

5. Discussion

The research questions in this study were 'To what extent is the presence of a QR code on a food product serviceable, and affects the intention to seek information and the purchase intention of customers?' and 'Do people perceive an added value of QR codes on food products?'. This last chapter gives answer to these questions. Besides that, the implications and limitations of this study and recommendations for future research are described.

5.1 General discussion

These days, printing a QR code on for example a food product seems to be a trend. Based on the literature it is expected that this influences the purchase intention of consumers since the package design can be more attractive (less space for information) which is considered to be a product of higher quality (Herrera & Blanco, 2011; Villegas, Carbonell, & Costell, 2008). Besides that, the presence of a QR code should influence the intention to seek information. People perceive typing of characters on little keyboards, of telephones, as annoying. Give them the possibility to scan a QR code is expected to increase the intention to seek information (Sekyere, 2012).

Both expectations are not supported by the data of this study. Overall can be concluded that the presence of a QR code on a food package does not have an influence on the intention to seek information or the purchase intention of the consumer.

According to Fischer and Frewer (2009), unfamiliarity with a product ensures that consumers perceive a product as more risky. It was expected that the more someone is

familiar with a product, the lower the intention to seek information. The opposite was the case since familiarity and intention to seek information correlated positive with each other. The more someone is familiar with a product, the higher the intention to seek information. The study shows that 14 per cent of the variance in intention to seek information is explained by familiarity with a product, 8 per cent of this variance is explained by nutrition information interest. This is in accordance with the opinion of Andrews, Netemeyer and Burton (1998), who indicated that the absence of sufficient information has an effect on customers with a high nutrition information interest. Familiarity with a product also explained 17 per cent of the variance in purchase intention, familiar consumers base their attitude on prior knowledge and experiences (Fischer & Frewer, 2009).

Also the analyses regarding the different product types revealed no significant results, in contrast to what was expected from the literature. According to Campbell, Aravena and Hutchinon (2011) consumers rather ignore information on packages of cheap products, while Batra and Athola (1990) indicated that utilitarian products are more studied by consumers since this is rather based on ratio. The conclusion can be drawn that there is no influence of product type on the effect of the presence of an internet source on the intention to seek information and the purchase intention.

It can be concluded that the presence of a QR code explained just .1 per cent of the variance in intention to seek information and also .1 per cent of the variance in purchase intention. This can be seen as a zero effect. Even consumers seeing the added value of QR codes on food packages, additional service in addition to the core food

product (Grönroos, 1997), show no effect of the presence of a QR code on a food package on the intention to seek information or the purchase intention.

In the end of the questionnaire, consumers had to answer some questions about the different internet sources they noticed on the packages or not. Most of the respondents had difficulties with answering this question, which can be derived from the large number of respondents who saw no QR code and URL while these were clearly present on the packages. Quite less respondents noticed a QR code, an URL or both the internet sources. These results could be an explanation for the other study results. Since many respondents did not notice the QR code on the food package, the influence of the presence of this code may be reduced. The same holds for the presence of an URL or both of the internet sources. A cautious conclusion can be drawn that there is no unconscious effect of the presence of the QR code, since many respondents did not consciously notice the presence of the QR code and there seems to be no effect. Moreover, the respondents who noticed the internet sources seemed to have no significant higher purchase intention or intention to seek information comparing to respondents who did not notice the sources. This also holds for the presence of a QR code on the package. However the scores for respondents who notice the QR code are marginally higher, these differences are not significant.

On the other hand, the results of the study also show that most of the respondents respond rather neutral regarding the added value of QR codes on food packages. Besides that, just 126 of the 214 respondents have a QR code reader app on their smart phone. About 76 per cent use this app just several times a year or never. A total of 30 respondents (14%) would scan a QR code on a food package. So it can be expected that,

when consumers notice the QR code, this has at most a little larger effect on the purchase intention and intention to seek information comparing to the results of this study.

Almost all hypotheses of this study are rejected, although they are based on much scientific literature. However, the available scientific literature is mostly related to general food labels and information on packages. Apparently, the QR code, which requires an action (scan the code), as information source appears to be different. Probably, consumers are not (or to a lesser extent) triggered by an abstract symbol like a QR code instead of a food label which can be read directly.

5.2 Implications

These days, the phenomenon QR code appears more and more on many different places, like for example food packages. Food companies, organizations and individual people could have many different reasons to participate in the innovative trend. Perhaps they have substantiated reasons to use the QR code, however it is also possible that they choose for the code since everybody does it. One of the conclusions of this study is the practically nil influence of QR codes or internet sources on food packages, and the limited considered added value of QR codes on food packages. Putting a QR code on a food package seems to be a trend that actually has little or no effect on the purchase intention or intention to seek information of consumers. This could be interesting to know for designers of food packages. The space that is occupied by the QR code can be used for other purposes. On the other hand, better highlighting or greater displaying the QR could be an option also since many people did not notice the presence of the QR code on

a food package. However, it is important to put enough information on food packages since many consumers are interested in this information.

Another, somewhat unexpected, result of the study is the positive influence of the familiarity with a product on the intention to seek information. Designers of food packages should better not omit the usual product information on products that seem to be familiar for most of the consumers. This may lead to a lack of information about the product, even though the fact that many consumers are familiar with the product and are considered to have enough knowledge about the product.

Moreover, consumers who are familiar with a food product seem to have a higher purchase intention. For designers and producers of food packages, advertisers, marketing agencies and basically all employees in the food industry, it is important to make consumers feel familiar with a product. This would probably increase the sales figures.

Also producers and developers of QR code reader apps for mobile phones and other scannable codes should take the results of this study into account. These developers should base their activities on the extent to which the QR code appears to be a success. In this case the success seems to be not that evident when it comes to food products. This probably provides opportunities for developers of other scannable codes or internet and information sources.

In the past, many research is done about the way QR codes work and besides that there is also some research about for example the product designs. But there was less or none research about the degree of success of the QR code on food products. Moreover was not known whether the presence of a QR code on a food product influences the

purchase intention or intention to seek information of consumers. After this study, a lot more is known about the impact of the presence of a QR code on a food product.

5.3 Limitations and future research

The first limitation of this study is the overrepresentation of higher educated consumers in the sample. A total of 200 of the 272 respondents is higher educated (HBO/WO). This is in particular a limitation since labels, like nutrition information labels or QR codes, on food products are more used by higher educated people (Levy, Fein and Stephenson, 1993). This may lead to a sample selection bias (Heckman, 1979) of the results, in real life the amount of higher educated consumers is much smaller. It can be expected that the, already minimal, effect of the QR codes on food products is overestimated in this research since the overrepresentation of higher educated respondents.

The researcher in this study approached for practical reasons, at first, participants out of the region eastern Netherlands. Because of the used snowball sampling method (Babbie, 2012) to select participants, also respondents from the rest of the country are included in the study. Though, the sample will perhaps not be representative for the whole World or even Dutch population. Final conclusions of the study should, for those reasons, be interpreted as a kind of indication. To draw conclusions about the whole Dutch and World population, a new research among a representative group should be conducted. Since the percentage of QR code use in the Netherlands is reasonably comparable with countries like the UK, Germany, France and the US (3GVision, 2011), it can be expected that the results of this possible new study differ scarcely, compared to the present study.

The phenomenon QR code is not known by 39 of the 214 respondents (18%) who have a smartphone. Besides that, a large group of respondents did not notice the possible QR codes or other internet sources on the product packages. Although, these facts seem to have no direct influence on the results, this should not be completely ruled out. In a possible future study, pointing out the QR code could be interesting. Which may yield to different or other results. It is possible that, when every respondent had noticed the QR code and knows the QR code, the impact of the presence of this source on the food packages would be higher. However, the impact is expected to be at most just a little bit higher, since many respondents do not see the added value of QR codes on food packages.

Within this research, the possibility exist that the participants gave to some extent socially desirable answers. For example regarding their knowledge about QR codes and the added value of these codes. Because of the 'pink elephant' effect, these questions were asked in the last part of the questionnaire. However, this does not mean that the respondents do not think that they are expected to know QR codes. Besides that, the answers about the fact if the respondents noticed the internet sources would simply be gambled in many cases. This is substantiated by the fact that many respondents chose for the option that they did not see a QR code or URL.

Another limitation of the research is the fact that it is conducted by the use of an online questionnaire. One of the advantages of an online questionnaire, is the great reach which makes it possible to get a broad overview and calculate statistical coherence. However, a disadvantage is the lack of possibilities to ask extra questions on the basis of

the answers of the respondents. Moreover, by the use of for example a test scenario in this study, it would be possible to see the real reaction of the respondents. The respondents are able to see the product in real life and it is possible to check if they look for extra information instead of asking about the intention to seek information. The possibility exist that consumers unconsciously look for product information, which can be observed in a test scenario. Such an action may not correspond with their answer to the questions about their intention to seek information.

The referral or linking by the QR code is omitted in this research. It is possible that QR codes referring to specially designed apps are seen as more useful comparing to QR codes referring to general websites. This could be interesting for a further research.

Besides that, extra research regarding the effect of the presence of QR codes on other products or places is desirable. The conclusions about QR codes on food packages do not cover the impact of the presence of a QR code in general. Moreover, the impact of the presence of a QR code seems to be known, but what is the impact of other 'new' internet sources on food packages? Think about Layer, the Chameleon code (C-code), Blippar, Kooaba or SnapTag.

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Appendix 1 - Vignettes

The 16 possible vignettes:

1. Cheap product – QR code+URL
2. Cheap product – QR code
3. Cheap product – URL
4. Cheap product – None
5. Expensive product – QR code+URL
6. Expensive product – QR code
7. Expensive product – URL
8. Expensive product – None
9. Utilitarian product – QR code+URL
10. Utilitarian product – QR code
11. Utilitarian product – URL
12. Utilitarian product – None
13. Hedonistic product – QR code+URL
14. Hedonistic product – QR code
15. Hedonistic product – URL
16. Hedonistic product – None

Appendix 2 - Questionnaire

People got to see randomly four pictures of the vignettes (appendix 1). After each picture they had to answer the items of the questions 1 to 3 (mixed). Thereafter, questions 4 to 14 were answered.

Question. Do you have a smart phone?

a. Yes → Question 1 (intention to seek information)
b. No → Question 5 (added value QR code)

Question 1 (intention to seek information):

To what extent do you agree with the following statements.

	Totally disagree						**Totally agree**
	1	**2**	**3**	**4**	**5**	**6**	**7**
a. I am interested in information about this product.	1	2	3	4	5	6	7
b. I have the intention to seek information, to find out more about this product.	1	2	3	4	5	6	7
c. Before I buy this product, I look for information about this product.	1	2	3	4	5	6	7
d. I plan to seek more information about this product.	1	2	3	4	5	6	7
e. I intend to find more about this product.	1	2	3	4	5	6	7
f. In the future, I will try to seek as much information as I can about this product.	1	2	3	4	5	6	7

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Question 2 (familiarity with product)

To what extent do you agree with the following statements.

		Totally disagree						Totally agree
		1	**2**	**3**	**4**	**5**	**6**	**7**
a.	I'm very familiar with …	1	2	3	4	5	6	7
b.	I have much experience with quality and prestige about …	1	2	3	4	5	6	7
c.	I have much experience with the different kinds of … that exist in the market	1	2	3	4	5	6	7
d.	I'm a … expert	1	2	3	4	5	6	7

Question 3 (purchase intention):

To what extent do you agree with the following statements.

		Totally disagree						Totally agree
		1	**2**	**3**	**4**	**5**	**6**	**7**
a.	Given the information shown on the package, it is likely that I would purchase this product.	1	2	3	4	5	6	7
b.	Given the information on the front and back of the package, it is probable that I would consider the purchase of the product.	1	2	3	4	5	6	7
c.	Given the information shown on the front and back of the package, I am very likely to purchase the product.	1	2	3	4	5	6	7
d.	I would purchase this product if I see it in a store.	1	2	3	4	5	6	7

Question 4 (Nutrition information interest):

To what extent do you agree with the following statements.

		Totally disagree						Totally agree
		1	**2**	**3**	**4**	**5**	**6**	**7**
a.	In general, I read nutrition labels very often.	1	2	3	4	5	6	7
b.	In general, I am very interested in reading nutrition and health-related information at the grocery store.	1	2	3	4	5	6	7
c.	In general, I read nutrition labels on packaged foods very frequently.	1	2	3	4	5	6	7
d.	I use nutrition information on the label when making most of my food selections.	1	2	3	4	5	6	7

Question 5 (added value QR code):

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A. Do you know a QR code?

a. Yes
b. No → explanation*

To what extent do you agree with the following statements about QR codes on food packages.

		Totally disagree						Totally agree
		1	**2**	**3**	**4**	**5**	**6**	**7**
a.	It is likely that an QR code on the package will offer advantages to the consumer of the food product.	1	2	3	4	5	6	7
b.	It is likely that an QR code on the package will add value to the food product.	1	2	3	4	5	6	7
c.	An QR code on the package is likely to perform well.	1	2	3	4	5	6	7
d.	An QR code on the package will change my behaviour about the food product.	1	2	3	4	5	6	7

* possible explanation about the QR code

A QR code (Quick Response code) is a square with a white background and black boxes in a specific pattern. By a smartphone with an appropriate app this code can be read. Thereafter, the smartphone will show the 'content' of the code. For example the data about an event, contact information of a person or a website of a company.
Below, a QR code is presented. Scanning this code results in the name of the composer of this questionnaire.

Question 6. In this questionnaire you saw some images of different food packages. Which kind of information sources did you see on the different pictures?

Picture 1: Ready-to-eat meal
a. QR code
b. URL
c. QR code and URL
d. No QR code and no URL

Picture 2: Bread
a. QR code
b. URL
c. QR code and URL
d. No QR code and no URL

Picture 3: Tomato paste
a. QR code
b. URL
c. QR code and URL
d. No QR code and no URL

Picture 4: Bonbons
a. QR code
b. URL
c. QR code and URL
d. No QR code and no URL

Question 7. What is your age?

Question 8. What is your gender?
a. Male
b. Female

Question 9. What is your highest level of education?
a. Elementary school
b. MAVO
c. VMBO
d. HAVO
e. VWO
f. LBO
g. MBO
h. HBO
i. WO
j. Otherwise, namely:…….

Question 10. Do you have any comments on QR codes in general?
a. No
b. Yes, namely: ……

- Respondents without a smartphone → end
- Respondents with a smartphone → Question 11

Question 11. Do you have a QR code reader app on your smart phone?
a. Yes → Question 12
b. No → Why not? …… → end

Question 12. How often do you use this QR code reader app?
a. Every day
b. Several times a week
c. Several times a month
d. Several times a year
e. Never → Why not? ……. → end

Question 13. In which situations do you use the QR code reader app if you see a QR code?
…….

Question 14. Do you use the QR code reader app if you see a QR code on a food product?
a. Yes → Why? …….
b. No → Why not? …….

Appendix 3 – Possible vignette options

I. Cheap product

II. Expensive product

III. Utilitarian product

IV. Hedonistic product

Appendix 4 – Questionnaire pre-study

Question 1. Indicate to what extent you experience the following products as expensive or cheap:

			1	**2**	**3**	**4**	**5**	**6**	**7**	
a.	Potatoes	Expensive	1	2	3	4	5	6	7	Cheap
b.	Orange juice	Expensive	1	2	3	4	5	6	7	Cheap
c.	Tomato paste	Expensive	1	2	3	4	5	6	7	Cheap
d.	Ready-to-eat meal	Expensive	1	2	3	4	5	6	7	Cheap
e.	Coffee	Expensive	1	2	3	4	5	6	7	Cheap
f.	Wine	Expensive	1	2	3	4	5	6	7	Cheap
g.	Rice	Expensive	1	2	3	4	5	6	7	Cheap
h.	Bottle water	Expensive	1	2	3	4	5	6	7	Cheap
i.	Ice cream	Expensive	1	2	3	4	5	6	7	Cheap
j.	Yogurt	Expensive	1	2	3	4	5	6	7	Cheap

Question 2. Indicate to what extent you experience the following products as hedonistic or an utilitarian product:

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			1	**2**	**3**	**4**	**5**	**6**	**7**	
a.	Steak	Hedonistic	1	2	3	4	5	6	7	Utilitarian
b.	Milk	Hedonistic	1	2	3	4	5	6	7	Utilitarian
c.	Bananas	Hedonistic	1	2	3	4	5	6	7	Utilitarian
d.	Eggs	Hedonistic	1	2	3	4	5	6	7	Utilitarian
e.	Onion	Hedonistic	1	2	3	4	5	6	7	Utilitarian
f.	Bonbon	Hedonistic	1	2	3	4	5	6	7	Utilitarian
g.	Tuna	Hedonistic	1	2	3	4	5	6	7	Utilitarian
h.	Bread	Hedonistic	1	2	3	4	5	6	7	Utilitarian
i.	Pie	Hedonistic	1	2	3	4	5	6	7	Utilitarian
j.	World cuisine box	Hedonistic	1	2	3	4	5	6	7	Utilitarian

Question 3. What is your gender?

a. Male
b. Female

Question 4. What is your age? ……..

Appendix 5 – Other analyses

Familiarity with a food product and intention to seek information

An independent samples t-test was conducted. The intention to seek information appears to be significantly higher (*t* (806.55)= -9.72, p< .0005) for consumers who are high familiar with the product (M= 17.53, SD= 7.46) compared to consumers who are low familiar (M= 13.00, SD= 6.06). About 10.03 per cent of the variance in intention to seek information is explained by the familiarity, which is a moderate to large effect (eta squared= .1003).

An one-way analysis of covariance (ANCOVA) indicates that familiarity with a food product has no significant influence on the effect of the presence of the different internet sources (QR code and URL, QR code, URL, no QR code and no URL) on the intention to seek information (F(3,851)= 1.127, p= .337). In this case, the independent variable was the internet source, the dependent variable was the intention to seek information while the familiarity was the covariate. Only .04 per cent (ω^2= .0004) of the total variance in intention to seek information is accounted for by the presence of the different internet sources affected by the familiarity with the product.

	F-value	***p-value***
Expensive product	1.846	.140
Utilitarian product	1.559	.200
Cheap product	1.212	.306
Hedonistic product	1.098	.351
All products	1.127	.337

Table 17 Analysis of Co-Variance for intention to seek information by internet source

Familiarity with a food product and purchase intention

The purchase intention of consumers who are high familiar with a product (M= 15.91, SD= 5.98) is significantly higher (*t* (854)= -11.24, p< .0005) compared to consumers who are low familiar (M= 11.51, SD= 5.47). This is apparent from an independent samples t-test. A moderating to large effect (eta squared= .1289) can be observed, so 12.89 per cent of the variance in purchase intention can be explained by familiarity.

Again an one-way analysis of covariance (ANCOVA) is used to test whether there is an effect of the extent to which someone is familiar with a food product, on the effect of the presence of one of the internet sources on the purchase intention. The independent variable, internet source, consists of four categories, QR code, URL, QR code and URL and no QR code and no URL. In this case the dependent variable is the purchase intention, the familiarity is the covariate. The ANCOVA was not significant (F(3,851)= 1.058, p= .366), so there is no significant effect. Only .02 per cent (ω^2= .0002) of the total variance in purchase intention is accounted for by the presence of the different internet sources affected by the familiarity with the product.

	F-value	***p-value***
Expensive product	1.156	.327
Utilitarian product	.175	.913
Cheap product	1.780	.152
Hedonistic product	.307	.821
All products	1.058	.366

Table 18 Analysis of Co-Variance for purchase intention by internet source

Interest in nutrition information and intention to seek information

The intention to seek information appears to be higher for consumers who are high interested in nutrition information (M= 16.91, SD= 7.69), compared to consumers who are low interested in nutrition information (M= 13.33, SD= 5.95). These differences are

significant (*t* (837.31)= -7.67, p< .0005), while there is a moderate effect (eta squared= .0644) since 6.44 per cent of the variance in intention to seek information is explained by nutrition information interest.

An one-way analysis of covariance (ANCOVA) is conducted, with the internet source as independent-, the intention to seek information as dependent- and the interest in nutrition information as covariate variable. Also this ANCOVA was not significant (F(3,851)= 1.674, p= .171). About .2 per cent (ω^2= .0020) of the variance in intention to seek information is explained by the presence of the different internet sources affected by the interest in nutrition information.

	F-value	***p-value***
Expensive product	1.144	.332
Utilitarian product	1.214	.305
Cheap product	.297	.828
Hedonistic product	2.585	.054
All products	1.674	.171

Table 19 Analysis of Co-Variance for intention to seek information by internet source

Interest in nutrition information and purchase intention

The purchase intention difference between consumers with a low interest in nutrition information (M= 13.25, SD= 5.83) and consumers with a high interest in nutrition information (M= 14.04, SD= 6.38) is not significant (*t* (853.57)= -1.90, p= .058). There is a very small effect since 0.42 per cent of the variance in purchase intention is explained by interest in nutrition information (eta squared= .0042).

In the ANCOVA test ((F(3,851)= .899, p= .441), the internet source was the independent variable, the purchase intention the dependent variable and the interest in nutrition information the covariate.

	F-value	*p-value*
Expensive product	.255	.858
Utilitarian product	.182	.909
Cheap product	1.259	.290
Hedonistic product	.596	.619
All products	.899	.441

Table 20 Analysis of Co-Variance for purchase intention by internet source

Added value of a QR code on a food package

By the use of an one-way analysis of covariance (ANCOVA), it is substantiated that the extent to which a consumer sees the added value of a QR code on a food package plays no significant role on the effect of the presence of a QR code on the intention to seek information (F(1,853)= .522, p= .470).

	F-value	*p-value*
Expensive product	2.084	.150
Utilitarian product	.039	.844
Cheap product	.418	.519
Hedonistic product	1.033	.311
All products	.522	.470

Table 21 Analysis of Co-Variance for intention to seek information by QR code presence

There is no effect of seeing the added value of QR codes on food packages on the effect of the presence of a QR code on the purchase intention, since the conducted ANCOVA test was not significant (F(1,853)= 1.08, p= .300).

	F-value	*p-value*
Expensive product	.573	.450
Utilitarian product	.502	.479
Cheap product	1.419	.235
Hedonistic product	.381	.538
All products	1.075	.300

Table 22 Analysis of Co-Variance for purchase intention by QR code presence

Appendix 6 – Hierarchical multiple regression analyses

Intention to seek - Cheap products		R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.002	.552	.034	.648	.518
	Familiarity with product	.338	.000	.442	7.104	.000
	Nutrition information interest	.049	.000	.270	4.308	.000
	Added value QR code	.031	.001	.188	3.507	.001
	Age	.002	.367	-.051	-.941	.348
	Gender	.003	.305	.051	.936	.351
	Education level	.004	.229	-.066	-1.206	.229
QR	***Source***	.000	.908	-.027	-.514	.608
	Familiarity with product	.340	.000	.446	7.161	.000
	Nutrition information interest	.049	.000	.269	4.292	.000
	Added value QR code	.031	.001	.187	3.489	.001
	Age	.002	.348	-.053	-.979	.329
	Gender	.003	.327	.049	.890	.375
	Education level	.004	.230	-.066	-1.204	.230
URL	***Source***	.002	.562	-.070	-1.327	.186
	Familiarity with product	.343	.000	.447	7.209	.000
	Nutrition information interest	.048	.000	.264	4.234	.000
	Added value QR code	.031	.001	.189	3.531	.001
	Age	.002	.419	-.045	-.827	.409
	Gender	.004	.251	.058	1.061	.290
	Education level	.004	.260	-.061	-1.130	.260
no QR+URL	***Source***	.000	.902	.065	1.213	.227
	Familiarity with product	.346	.000	.456	7.264	.000
	Nutrition information interest	.047	.000	.263	4.201	.000
	Added value QR code	.031	.001	.187	3.492	.001
	Age	.002	.385	-.049	-.904	.367
	Gender	.003	.303	.052	.948	.344
	Education level	.004	.258	-.062	-1.135	.258

	Intention to seek - Expensive products	R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.000	.907	.011	.184	.854
	Familiarity with product	.200	.000	.406	6.764	.000
	Nutrition information interest	.061	.000	.223	3.520	.001
	Added value QR code	.035	.001	.180	3.068	.002
	Age	.016	.027	.132	2.209	.028
	Gender	.000	.747	.018	.303	.762
	Education level	.000	.791	-.016	-.265	.791
QR	***Source***	.010	.140	-.092	-1.597	.112
	Familiarity with product	.196	.000	.403	6.741	.000
	Nutrition information interest	.061	.000	.222	3.535	.001
	Added value QR code	.035	.001	.182	3.134	.002
	Age	.017	.022	.136	2.291	.023
	Gender	.001	.653	.026	.425	.671
	Education level	.000	.732	-.020	-.343	.732
URL	***Source***	.000	.933	-.060	-1.022	.308
	Familiarity with product	.203	.000	.414	6.856	.000
	Nutrition information interest	.061	.000	.225	3.560	.000
	Added value QR code	.035	.001	.180	3.083	.002
	Age	.016	.027	.131	2.209	.028
	Gender	.000	.809	.013	.219	.827
	Education level	.000	.764	-.018	-.301	.764
no QR+URL	***Source***	.008	.190	.146	2.527	.012
	Familiarity with product	.210	.000	.420	7.069	.000
	Nutrition information interest	.060	.000	.225	3.610	.000
	Added value QR code	.039	.001	.192	3.324	.001
	Age	.015	.032	.125	2.125	.035
	Gender	.000	.697	.021	.349	.727
	Education level	.001	.568	-.034	-.571	.568

	Intention to seek - Utilitarian products	R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.005	.302	.054	.856	.393
	Familiarity with product	.014	.086	.000	-.001	1.000
	Nutrition information interest	.095	.000	.335	4.754	.000
	Added value QR code	.074	.000	.278	4.387	.000
	Age	.000	.995	-.003	-.052	.959
	Gender	.000	.737	.017	.263	.793
	Education level	.004	.300	-.067	-1.038	.300
QR	***Source***	.003	.442	-.014	-.223	.824
	Familiarity with product	.014	.082	.003	.043	.966
	Nutrition information interest	.093	.000	.333	4.696	.000
	Added value QR code	.076	.000	.281	4.425	.000
	Age	.000	.987	-.005	-.070	.944
	Gender	.001	.708	.019	.299	.765
	Education level	.004	.330	-.064	-.976	.330
URL	***Source***	.009	.162	.053	.842	.401
	Familiarity with product	.015	.073	.005	.080	.936
	Nutrition information interest	.089	.000	.326	4.591	.000
	Added value QR code	.075	.000	.280	4.424	.000
	Age	.000	.977	-.005	-.074	.941
	Gender	.001	.692	.021	.328	.743
	Education level	.003	.363	-.060	-.912	.363
no QR+URL	***Source***	.013	.092	-.093	-1.492	.137
	Familiarity with product	.015	.075	.005	.078	.938
	Nutrition information interest	.091	.000	.331	4.714	.000
	Added value QR code	.074	.000	.277	4.395	.000
	Age	.000	.995	-.004	-.070	.944
	Gender	.000	.771	.014	.215	.830
	Education level	.005	.283	-.070	-1.077	.283

	Intention to seek - Hedonistic products	R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.001	.698	.051	.885	.377
	Familiarity with product	.275	.000	.464	8.053	.000
	Nutrition information interest	.049	.000	.250	4.071	.000
	Added value QR code	.026	.004	.171	3.012	.003
	Age	.011	.055	-.110	-1.924	.056
	Gender	.000	.883	.007	.123	.902
	Education level	.000	.748	-.019	-.322	.748
QR	***Source***	.004	.343	-.049	-.876	.382
	Familiarity with product	.274	.000	.461	7.992	.000
	Nutrition information interest	.048	.000	.243	4.014	.000
	Added value QR code	.025	.005	.168	2.956	.003
	Age	.010	.068	-.104	-1.831	.068
	Gender	.000	.847	.010	.169	.866
	Education level	.000	.760	-.018	-.305	.760
URL	***Source***	.002	.475	-.098	-1.741	.083
	Familiarity with product	.276	.000	.460	8.020	.000
	Nutrition information interest	.052	.000	.258	4.229	.000
	Added value QR code	.027	.003	.174	3.093	.002
	Age	.012	.052	-.110	-1.950	.053
	Gender	.000	.935	.003	.060	.952
	Education level	.000	.775	-.016	-.286	.775
no QR+URL	***Source***	.020	.040	.097	1.738	.084
	Familiarity with product	.265	.000	.453	7.868	.000
	Nutrition information interest	.049	.000	.244	4.052	.000
	Added value QR code	.026	.004	.169	2.999	.003
	Age	.009	.080	-.099	-1.751	.081
	Gender	.000	.862	.009	.154	.878
	Education level	.000	.800	-.014	-.253	.800

	Purchase intention - Cheap products	R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.013	.096	.090	1.770	.078
	Familiarity with product	.423	.000	.628	10.477	.000
	Nutrition information interest	.007	.115	.112	1.863	.064
	Added value QR code	.002	.369	.060	1.167	.245
	Age	.015	.016	-.132	-2.505	.013
	Gender	.003	.295	.049	.925	.356
	Education level	.007	.092	-.089	-1.693	.092
QR	***Source***	.000	.763	-.058	-1.120	.264
	Familiarity with product	.431	.000	.638	10.582	.000
	Nutrition information interest	.006	.135	.109	1.805	.072
	Added value QR code	.002	.401	.058	1.111	.268
	Age	.017	.012	-.138	-2.605	.010
	Gender	.003	.328	.046	.856	.393
	Education level	.007	.095	-.089	-1.679	.095
URL	***Source***	.000	.777	-.044	-.845	.399
	Familiarity with product	.429	.000	.635	10.539	.000
	Nutrition information interest	.006	.137	.106	1.745	.082
	Added value QR code	.002	.404	.058	1.125	.262
	Age	.016	.015	-.134	-2.508	.013
	Gender	.004	.227	.058	1.087	.278
	Education level	.007	.107	-.086	-1.617	.107
no QR+URL	***Source***	.005	.284	.011	.203	.839
	Familiarity with product	.422	.000	.635	10.409	.000
	Nutrition information interest	.006	.141	.107	1.764	.079
	Added value QR code	.002	.419	.057	1.103	.271
	Age	.017	.012	-.138	-2.604	.010
	Gender	.003	.252	.055	1.031	.304
	Education level	.007	.101	-.087	-1.649	.101

	Purchase intention - Expensive products	R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.001	.644	.007	.110	.913
	Familiarity with product	.258	.000	.493	8.060	.000
	Nutrition information interest	.002	.484	-.036	-.553	.581
	Added value QR code	.006	.205	.088	1.472	.142
	Age	.019	.020	-.136	-2.239	.026
	Gender	.001	.670	.030	.484	.629
	Education level	.002	.398	.051	.847	.398
QR	***Source***	.001	.599	.071	1.201	.231
	Familiarity with product	.261	.000	.496	8.128	.000
	Nutrition information interest	.002	.463	-.036	-.555	.579
	Added value QR code	.006	.200	.087	1.472	.143
	Age	.020	.016	-.141	-2.324	.021
	Gender	.000	.733	.025	.400	.689
	Education level	.003	.371	.054	.896	.371
URL	***Source***	.001	.612	-.102	-1.726	.086
	Familiarity with product	.268	.000	.506	8.268	.000
	Nutrition information interest	.002	.484	-.032	-.498	.619
	Added value QR code	.006	.198	.087	1.470	.143
	Age	.019	.019	-.137	-2.272	.024
	Gender	.000	.779	.021	.339	.735
	Education level	.002	.422	.048	.805	.422
no QR+URL	***Source***	.001	.626	.023	.391	.697
	Familiarity with product	.257	.000	.495	8.066	.000
	Nutrition information interest	.002	.472	-.035	-.549	.583
	Added value QR code	.006	.190	.090	1.511	.132
	Age	.020	.018	-.138	-2.275	.024
	Gender	.001	.660	.030	.493	.623
	Education level	.002	.429	.048	.792	.429

	Purchase intention - Utilitarian products	R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.001	.627	.012	.175	.861
	Familiarity with product	.014	.087	.145	2.006	.046
	Nutrition information interest	.002	.525	-.039	-.521	.603
	Added value QR code	.005	.321	.092	1.364	.174
	Age	.047	.001	-.214	-3.123	.002
	Gender	.008	.177	.094	1.363	.174
	Education level	.000	.822	.016	.226	.822
QR	***Source***	.001	.735	.027	.401	.688
	Familiarity with product	.015	.078	.147	2.039	.043
	Nutrition information interest	.002	.534	-.037	-.491	.624
	Added value QR code	.005	.302	.094	1.392	.165
	Age	.047	.001	-.215	-3.141	.002
	Gender	.008	.186	.093	1.333	.184
	Education level	.000	.856	.013	.181	.856
URL	***Source***	.001	.583	-.028	-.408	.684
	Familiarity with product	.014	.083	.145	2.008	.046
	Nutrition information interest	.002	.556	-.036	-.469	.640
	Added value QR code	.005	.305	.094	1.386	.167
	Age	.047	.001	-.214	-3.132	.002
	Gender	.008	.183	.093	1.344	.181
	Education level	.000	.854	.013	.185	.854
no QR+URL	***Source***	.000	.779	-.011	-.171	.865
	Familiarity with product	.014	.083	.146	2.024	.044
	Nutrition information interest	.002	.513	-.040	-.529	.597
	Added value QR code	.005	.317	.093	1.368	.173
	Age	.047	.001	-.214	-3.129	.002
	Gender	.008	.179	.094	1.358	.176
	Education level	.000	.823	.016	.224	.823

	Purchase intention - Hedonistic products	R Square Change	Sig. F Change	Beta	t	Sig.
QR+URL	***Source***	.000	.914	.044	.740	.460
	Familiarity with product	.251	.000	.514	8.547	.000
	Nutrition information interest	.001	.599	.016	.256	.798
	Added value QR code	.001	.620	.048	.804	.422
	Age	.047	.000	-.224	-3.758	.000
	Gender	.001	.574	.029	.476	.634
	Education level	.004	.254	-.069	-1.144	.254
QR	***Source***	.002	.500	-.029	-.492	.623
	Familiarity with product	.249	.000	.512	8.498	.000
	Nutrition information interest	.001	.575	.009	.147	.883
	Added value QR code	.001	.646	.047	.790	.431
	Age	.045	.000	-.219	-3.693	.000
	Gender	.001	.560	.030	.497	.620
	Education level	.004	.258	-.068	-1.133	.258
URL	***Source***	.001	.693	-.037	-.626	.532
	Familiarity with product	.250	.000	.512	8.502	.000
	Nutrition information interest	.001	.603	.014	.225	.823
	Added value QR code	.001	.603	.050	.851	.396
	Age	.046	.000	-.222	-3.730	.000
	Gender	.001	.596	.027	.446	.656
	Education level	.004	.260	-.068	-1.130	.260
no QR+URL	***Source***	.007	.238	.023	.393	.694
	Familiarity with product	.245	.000	.510	8.441	.000
	Nutrition information interest	.001	.574	.009	.136	.892
	Added value QR code	.001	.624	.049	.828	.409
	Age	.045	.000	-.218	-3.670	.000
	Gender	.001	.576	.029	.474	.636
	Education level	.004	.261	-.068	-1.126	.261

Database results