Consumer Choice Among Product Assortments in Virtual QR Code Stores

Completed Research Paper

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Abstract

Virtual QR Code Stores are currently expanding globally and it is commonplace in the market to put emphasis on purely hedonic product assortments. This practice reflects the widespread assumption that hedonic products should be more effective to stimulate purchases because they facilitate impulse buying behavior. Contrary to this argumentation, the results of our study demonstrate that purchasing related to Virtual QR Code Stores can better be explained by planned as opposed to impulse buying behavior. We show that more diverse product assortments consisting of utilitarian products in addition to hedonics are more effective to stimulate customers’ purchases in Virtual QR Code Stores. This is because utilitarian products cause improvements in customers’ utility perceptions of Virtual QR Code Stores resulting from enhanced shopping convenience. Based on this, we contribute by expanding the perspective on critical factors influencing customers in their purchase decision making process in Virtual QR Code Stores.

Keywords: Virtual QR Code Stores, product assortment, utility perception, convenience, computer-based experiments
Introduction

Starting in the subways of South Korea in 2011 (Tesco 2011) and supported by the increasing diffusion of smartphones (Chen and Tan 2004; Vrechopoulos et al. 2004), Quick Response (QR) codes for virtual store formats are currently expanding globally. Companies like Walmart, Proctor & Gamble, and Woolworth have already adopted such concepts (shop2mobi 2012), which come in the form of shopping walls set up in high traffic areas and displaying a range of products, each provided with a corresponding QR code to allow customers to purchase the products on the spot online and let them be delivered to their homes (Rigby 2011). The expansion of Virtual QR code stores is expected to continue. According to a recent survey in 60 countries (Nielsen 2015), more than 13 percent of global consumers have already used a Virtual Store and nearly 60 percent are willing to use them when they become available in their local area. However, given that only a small subset from the range of products can be presented in Virtual QR Code Stores, product assortment decisions are critical for their success. Two approaches have been used in daily management practice. The first is to put emphasis on hedonic products, for which consumption is associated with an affective and sensory experience of pleasure, fantasy, and fun (Kushwaha and Shankar 2013). An example is Walmart Virtual Toy Store, which offers only children’s toys out of the large regular assortment in their Virtual QR Code Stores. The second approach is to offer utilitarian products in addition to a smaller quantity of hedonics, for which consumption is mainly cognitively driven, instrumental, and goal oriented and accomplishes a functional or practical task (Kushwaha and Shankar 2013). The most prominent example is Tesco Homeplus, where products like toilet paper, tissues, and detergent are offered next to hedonic goods like chips, chocolate bars, and lemonade.

Despite the practical relevance, the concept of Virtual QR Code Stores has mostly traveled below the academic radar and thus research on the effectiveness of product assortment decisions is scarce. Conventional wisdom from related literature suggests that offering only hedonic products should be more effective than additionally offering utilitarian products. Typically, customers have no planned shopping intentions when being confronted with Virtual QR Code Stores. Thus, marginal need items, which generally tend to be bought on impulse (Stern 1962), seem to be most appropriate for display. That is why a positive link between hedonic browsing and impulse buying has been demonstrated in related virtual contexts (e.g. online shopping), but no such relationship has been found for utilitarian browsing (Park et al. 2012). Moreover, Virtual QR Code Stores are viewed as a marketing tool whose key purpose is to attract customers’ attention and convey a sense of fun and excitement rather than serving as a serious sales channel for retailers (Oh et al. 2009). This playfulness—the extent to which using an object is perceived as enjoyable in its own right apart from any performance consequence (Davis et al. 1992)—has been shown to play a significant role in explaining customer adoption of new technology (Hong and Tam 2006).

Our research challenges the assumption of a general superiority of purely hedonic product assortments in Virtual QR Code Stores and rather proposes displaying utilitarian products as well to stimulate customer product choice. An important aspect of virtual shopping is the lacking possibility of touching the desired product, which has been shown to play an important role in impulse buying behavior (Peck and Childers 2006). Moreover, the lack of immediate gratification due to the fact that all items purchased in Virtual QR Code Stores are not physically available right after the purchase has a mitigating effect on customers’ impulsiveness. When considering the purchased item as a reward for monetary expenditure, this delay in receiving the reward from the moment of choice causes a decline in customers’ impulsiveness according to a highly concave function of that delay (Ainslie 1975). In such contexts, where impulsive and affectively driven is less likely, the theory of time allocation (Becker 1965) suggests that customers’ decisions in Virtual QR Code Stores may primarily be cognitively driven and goal oriented (Strahilevitz and Myers 1998). These stores describe a concept that customers may perceive as making daily shopping easier, more time-efficient, and thus convenient. Unlike traditional retail concepts, such as supermarkets or liquid stores, Virtual QR Code Stores give customers the convenience to overcome traditional constraints such as time availability or scheduling. However, to comply with customers’ demand for convenience, the product assortment of Virtual QR Code Stores should correspond to those of traditional (retail) stores in order to fulfill their daily shopping needs. Those assortments typically comprise both hedonic and utilitarian products (Cachon and Kök 2007) because customers have preference for greater choice (Chernev 2006; Kahn and Lehman 1991) and for items from various product categories (Caprice and von
Schlippenbach 2013). Thus, we argue and empirically show that customers of Virtual QR Code Stores perceive higher utility when utilitarian products are offered than when the product assortment only comprises hedonic products.

Our research contributes to the existing literature by enhancing knowledge on the effectiveness of Virtual QR Code Stores. Specifically, our results provide managers with a justification for rethinking their beliefs regarding management of Virtual QR Code Stores. We show that Virtual QR Code Stores are a convenient shopping opportunity for customers rather than just a marketing gadget to attract people's attention. They are likely to induce customers to utilize them for daily retail shopping instead of driving their impulse buying behavior. Given this, our results call for utilitarian goods in Virtual QR Code Stores' product assortments. Compared to assortments with purely hedonic products, those consisting at least partly of utilitarian products significantly better stimulated customer purchase. The remainder of the article proceeds as follows: We begin by developing a conceptual framework and then present our experimental study. This research concludes with a detailed discussion of research findings, managerial implications, and limitations of the research.

Conceptual Framework

We develop our conceptual framework in two steps. First, we elaborate on Virtual QR Code Stores to provide an understanding of the context that is central to this research. Then, we introduce the theory of time allocation (Becker 1965) from which we derive our predictions regarding the effectiveness of product assortment to stimulate customer purchases.

Virtual QR Code Stores

Virtual QR Code Stores represent shops of retailers without a fixed showroom and face-to-face contact, but instead utilizing information technology and the media to communicate with customers in order to achieve favorable customer outcomes (Lee 2007). They generally have the form of shopping walls set up by retailers in public spaces such as subways, bus shelters, or recreation centers (Bergen 2011; Ryu 2013). These walls are plastered with posters that resemble the aisles and shelves of a retail store. They are lined from top to bottom with a small excerpt from the range of products usually offered in the (physical) nonexistent virtual stores of the retailer. Each pictured product is displayed with an own QR code. By scanning these codes with their smartphone camera, customers add the desired products to a virtual shopping cart, followed by the opportunity to purchase these items in the cart via an online store on their smartphone. The ordered products are often delivered to the customers' homes on the same day if the order is placed before a certain time. In other words, Virtual QR Code Stores combine mobile commerce (Clarke III 2008) and self-service technology (Meuter et al. 2000) as customers are encouraged to engage with these stores as a form of self-service technology through scanning the products’ QR codes with their smartphones, which subsequently triggers a mobile commerce process where customers are redirected to the retailer's online store with an extended product assortment to additionally choose from.

The most prominent example of Virtual QR Code Stores and a story of success is Tesco Homeplus. In 2011, the company opened the world's first virtual store in the Seoul subway with the intention to “help time-pressed commuters shop on the go using their smartphones”, as DW Seol, Executive Vice President of Corporate Affairs at Tesco Homeplus, testified (Tesco 2011). Specifically, 500 of the most popular products were shown on virtual displays, provided with QR codes that customers could scan with an app on their smartphones. The product assortment ranged from milk and apples to pet food and stationery. After scanning the QR codes, the items were delivered directly to the customer's doorstep at a time of their choosing. As a consequence of this innovative Virtual QR Code Store concept, online sales of Homeplus increased by 130 percent within three months of the introduction (Ryu 2013). Moreover, the shopping app had become the number one shopping app in the country. This success let other retailers such as Walmart and Woolworth rethink their selling strategy and they started to place QR codes on bus shelters and trucks to encourage on-the-go customers to scan and instantly buy their products (shop2mobi 2012). Consequently, in 2012 more than 300 Virtual QR Code Stores were created all around the world and another 2000 followed in 2013.
**Allocation of Time and Purchase Behavior**

According to the theory of time allocation (Becker 1965), customers face the optimization problem to maximize utility for minimum input of resources when deciding where to buy products. In this understanding, shopping time reduces a consumer’s utility because it requires effort and reduces the amount of leisure time available (Marmorstein et al. 1992). Common sense is the view that both time and effort are either non-monetary investments or costs. Time is a limited and scarce resource, which is why customers for instance sell time on the labor market or buy it with time-saving services (Feldman and Hornik 1981). Effort is the amount of physical, cognitive, and emotional energy put into a certain behavior (Mohr and Bitner 1995). Due to both costs, customers seek convenient solutions helping them to accomplish a purchase task in the shortest time and with least human energy expenditure (Morganosky 1986). Therefore, they value products and services with inherent time- or effort-saving characteristics.

In this research, we argue that customers value Virtual QR Code Stores due to their advantages in access and transaction convenience (Berry et al. 2002) and therefore perceive a higher utility for product assortments that comply with the demand for both types of convenience. Access convenience relates to the time and effort expenditures that customers perceive when initiating a service delivery (in person and/or remotely). In contrast, transaction convenience is the time and effort expenditures that customers perceive when securing the right to use the service—usually the exchange of money for the promise of service delivery. An important aspect of this exchange is the time that customers have to wait to pay (Tom and Lucey 1997). Shopping abandonments and reduction in satisfaction have been shown to be more likely when customers have to wait too long (Tom and Lucey, 1997).

In Virtual QR Code Stores, customers benefit from bringing together mobile commerce and self-service technology as mentioned previously. They provide customers with the opportunity to buy products and services and access vital information at any time, thus vastly increasing mobility (Jih 2007). Another fact enhancing customers’ perceived transaction convenience is the emergence of new tools to support mobile payment and micropayments, thus facilitating customers’ online payment process via mobile devices (Frolick and Chen 2004). However, compared to conventional mobile commerce solutions, Virtual QR Code Stores not just benefit from the possibility to buy mobile and online, but combine this with the display advantages of a physical store. Whereas the screen display of mobile devices limits the number of products that can be displayed, physical posters can display a large amount of products at a time (Hill 2013). Due to the size, such posters catch consumer attention and help them find items quickly, avoiding keyword searching in online stores which can be hit or miss. The virtual stores also capitalize on prior shopping experiences by including products on shelves, which encourages an immersive shopping experience that is absent from mobile online stores. Moreover, the fact that Virtual QR Code Stores are usually set up in areas such as subway or bus shelters allows for a high potential to reach customers as those areas are typically busy and crowded spots where customers have time to perform additional activities such as shopping. Furthermore, given the fact that all items purchased will be delivered to the customer’s home, the physical effort of carrying crammed shopping bags is no longer required. Together with the fact that Virtual QR Code Stores offer benefits in terms of opening hours, no parking requirements, and facility location, access convenience is improved (Lee 2007). Therefore, Virtual QR Code Stores are capable of enhancing shopping convenience.

To comply with access and transaction convenience requests in daily shopping behavior, the theory of time allocation suggests that product assortments should consist of utilitarian products. Customers increasingly prefer to concentrate their purchases with a single trip to one retailer to fulfill daily shopping requirements (Caprice and von Schlippenbach 2013; Messinger and Narasimhan 1997). Accordingly, they need access to items from utilitarian product categories which satisfy basic consumption needs (Caprice and von Schlippenbach 2013) and thus increase access convenience. Following the one-stop-shopping logic, a single location concept also reduces overall waiting time of customers (Messinger and Narasimhan 1997), which in turn should facilitate transaction convenience. However, we argue that not just utilitarian products but also a mix of hedonic and utilitarian products should be advantageous for customers. In addition to concentration of shopping, customers also have preference for greater choice available from larger assortments (Chernev 2006; Kahn and Lehman 1991) and obtain utility from pleasure of shopping (Reardon and McCorkle 2002). Assuming that—based on the theory of time allocation—consumption in Virtual QR Code Stores is more cognitively driven, instrumental, and goal oriented (Strahilevitz and Myers 1998) and that products are purchased in a deliberate and efficient manner (Babin et al. 1994), a
more diverse product assortment may better cater towards customers' wish for such convenience. This line of reasoning suggests that, due to the improvement in customers' utility perceptions, product assortments consisting of utilitarian products or even of both hedonics and utilitarian products should be effective to stimulate customers' purchases in Virtual QR Code Stores (i.e., number of items purchased). We therefore hypothesize:

**HYPOTHESIS 1:** The quantity of purchases made in Virtual QR Code Stores will be lower for a product assortment comprising only hedonic products as compared to an assortment that comprises a) utilitarian products or b) both utilitarian and hedonic products, holding the number of items offered constant.

**HYPOTHESIS 2:** The quantity of purchases made in Virtual QR Code Stores will be lower for a product assortment comprising only utilitarian products as compared to an assortment that comprises both hedonic and utilitarian products, holding the number of items offered constant.

**Method**

**Design**

We tested our basic hypothesis on product assortment composition and its impact on customers’ purchase quantity through a computer-based experiment in which participants viewed experimental stimuli on a computer screen and completed a set of questions. The experiment relied on a between-subjects design, in which we manipulated the product assortment being displayed in a Virtual QR Code Store. Participants were randomly assigned to one of three conditions: purely hedonic product assortment, purely utilitarian product assortment, or mixed (utilitarian and hedonic) product assortment.

**Stimuli Development**

For ease of manipulation of the independent variable, we employed a scenario-based experiment. Participants were given a scenario description which asked them to imagine being on their daily commute to work using the subway, when they notice the existence of a Virtual QR Code Store inside the subway station. The context of a subway station was selected due to its prominence as Virtual QR Code Store location (e.g., Tesco 2011) and thus to provide a realistic setting. Together with the request to imagine the situation, a picture from a subway store was shown to give participants a better impression of how the scenario looks like in reality. Moreover, a short explanation of the store's functionality was provided. We pointed out that each product offered is provided with an own QR code. By scanning these codes with their smartphone camera, participants added the desired products to a virtual shopping cart, followed by the opportunity to purchase these items in the cart via an online store on their smartphone. Moreover, participants were told that all products would be delivered to their homes on the same evening.

Our manipulations were embedded in the scenario. Specifically, we manipulated the product assortment of the Virtual QR Code Store by systematically varying the products on display. We decided to use six different products for each condition to ensure an appropriate product selection to choose from. To be suited for presentation, the products in each product assortment condition had to meet different criteria. For the hedonic product assortment condition, all products offered had to be perceived as emotionally appealing, likely to be bought on impulse, and suitable for obtaining immediate gratification (Kacen et al. 2012; O’Donoghue and Rabin 2000; Rook 1987). In the case of groceries, previous findings indicate that candy, crackers, and biscuits are the products most frequently purchased on impulse and thus are most likely to convey a hedonically-charged experience (Hultén and Vanyushyn 2011). Beer, chips, chocolate bars, lemonade, cookies, and chewing gum met these criteria for purely hedonic products. In the utilitarian product assortment condition, the products offered had to be perceived as primarily useful and able to serve their intended purpose (Holbrook and Hirschman 1982; Strahilevitz and Myers 1998). Typically, products offered as basic goods tend to be higher in utilitarian value by themselves. Therefore, we considered products that have a high tendency to be (re)bought at regular intervals. Based on these premises, we opted for coffee, milk, detergent, toilet paper, corn flakes, and cheese. In the mixed assortment condition, the three hedonic products beer, lemonade, and chips together with the three utilitarian products milk, toilet paper, and corn flakes were shown.
We used real-world products for stimuli presentation. To provide a realistic shopping scenario, in all three conditions pictures of the products offered along with a tag including product name, price, and a corresponding QR code were placed on a background picture of a supermarket shelf. We followed common practice in Virtual QR Code Stores and placed the six products together with the respective label in the same positions; three products on the upper and the other three products on the lower shelf. The order of products was randomized and was randomly varied across participants. The pictures of the products as well as the supermarket shelf were collected from web pictures of real Virtual QR Code Stores. Moreover, the price for every product available was set to €1.00 (for the chosen products and the offered quantities, this was a reasonable price reflecting marketplace reality), because this variable should not influence participants' buying decision. We had a check on realism of this price setting for the products offered to avoid distortions of price acceptability perceptions. We did not photo edit the pictures of the products by any means, which is why the respective product's brand was indicated. We were careful in brand selection and ruled out confounding branding effects between product assortments in our pretest which we present in the next section.

To place the product in the virtual shopping cart, participants had to click on the QR code below the respective product. Thereby, the mouse cursor looked like a smartphone display to simulate a realistic shopping experience in a Virtual QR Code Store. Participants had the opportunity to place multiple items of a product in the cart by clicking on the respective QR code as many times as they wished to purchase the product. Thereby, participants had no budget constraints but were explicitly asked to make a reasonable purchase decision. In the robustness section, we provide an additional study to rule out confounding effects that may stem from unrestricted budget. Moreover, a maximum of five units of each product could be purchased, consequently limiting the entire purchase to a total of 30 products. Also, participants had the opportunity to buy no item and leave a blank shopping cart.

**Pretest**

We pretested our stimuli among 15 graduates (mean age = 27.81 years; 62.5% male) to ensure realistic scenarios and to verify the effectiveness of the manipulations. Specifically, we focused on two important aspects of the manipulation. First, as our dependent variable is product quantity and we intend to study the adequacy of the product assortments for Virtual QR Code Stores, purchase quantity should not differ between the chosen products per se but only in the specific virtual store context. To verify this, we tested our manipulations in a traditional daily shopping context and let participants “Imagine that you are doing your regular grocery shopping in a supermarket”. We applied a between-subjects design, where respondents were randomly assigned to one of the three product assortment conditions and were given the opportunity to make decisions on purchase quantity similar to those in our scenarios. The results of this pretest revealed that purchase quantity did not significantly differ across the three assortment conditions ($M_{\text{hedonic}} = 3.60$, $M_{\text{utilitarian}} = 3.67$, $M_{\text{mixed}} = 2.80$, $F(2, 13) = .24, p > .10$). This finding let us also conclude that confounding effects resulting from brand or product labeling can be ruled out.

Second, we had to verify that participants perceived the products as being indeed either hedonic, utilitarian, or both. For that reason, we asked participants to judge the extent to which they perceived the displayed product combinations as primarily pleasure-giving (“The products displayed give me pleasure”) or primarily useful (“The products displayed are primarily useful”); each captured on a single seven-point “strongly disagree–strongly agree” scale. The results of the pretest revealed that our manipulation was successful. Considering the pleasure-giving item, the hedonic product assortment was rated significantly higher than the utilitarian ($M_{\text{pleasure; hedonic}} = 6.00$, $M_{\text{pleasure; utilitarian}} = 3.17$, $F(2, 13) = 7.80, p < .01$). The mixed assortment scored between both conditions ($M_{\text{pleasure; mixed}} = 4.00$). In contrast, on the scale capturing the perceived usefulness of the assortment, the utilitarian product assortments were rated significantly higher than the hedonic products ($M_{\text{useful; hedonic}} = 2.60$, $M_{\text{useful; utilitarian}} = 6.67$, $F(2, 13) = 31.76, p < .01$). Again, the mixed assortment scored between both other conditions ($M_{\text{useful; mixed}} = 5.20$), confirming that our manipulation was successful.

**Procedure**

The presentation of stimuli was embedded in a collection of survey responses. Participants of the experiment were told that they were taking part in a study analyzing usage behavior of Virtual QR Code Stores. After reading a short welcome text and followed by instructions, participants answered two sets of
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items on individual innovativeness and (grocery) shopping enjoyment. Individual innovativeness has frequently been documented as one of the most important psychological characteristics explaining customer adoption of new technologies (Aldás-Manzano et al. 2009; Bauer et al. 2005; Kim et al. 2008). Moreover, shopping enjoyment influences customers' product choice (Dawson et al. 1990).

In a next step, participants were given the scenario description. We emphasized the importance of having read and understood the subway station scenario by asking them not to answer a question about their common use of transport, but to simply click on the “Continue” button instead (Oppenheimer et al. 2009). This first manipulation check served to assure that the participants' answers were made based on a thorough comprehension of the scenario.

Then, participants were randomly assigned to one of the three experimental conditions—hedonic, utilitarian, or mixed product assortment—accompanied by a remark about the products on display only being a subset of the whole product range offered. Subsequently, participants were asked to click as many times on the respective QR Code as they desired to buy the product.

Afterwards, participants indicated their virtual purchase experience and how realistic they thought the scenario was. Importantly, they also had to rate perceived utility of the Virtual QR Code Store and we assessed their impulse purchase intent to test for the two potential mechanisms underlying the product assortment-purchase quantity link. Moreover, participants had to indicate their attitude towards shopping in a Virtual QR Code Store accompanied by perceptions of whether the products on display were primarily pleasure-giving or primarily useful, again captured on two separate scales. This served as a second manipulation check. We also asked for product category involvement to rule out confounding effects (Bloch and Richins 1983). Along with the scale questions following the stimuli presentation, a small picture of the stimulus was shown to always remind participants of the products displayed throughout the set of items following their virtual purchase. At the end, participants answered a standard set of socio-demographic questions and they completed an open-ended suspicion probe question on the purpose of the study (Hattula et al. 2015).

**Measures**

Whenever possible, we used existing measures of the constructs and adapted them to the Virtual QR Code Store context. Confirmatory factor analysis and Cronbach’s alpha provide evidence for measurement reliability and validity of the variables. Specifically, we measured purchase quantity by the sum of items desired by the customer across all products of the respective product assortment (Wansink et al. 1998). In addition, perceived utility of the Virtual QR Code Store was captured by averaging two 7-point bipolar scales (useless to me/useful to me, not beneficial to me/beneficial to me) (α = .736) adapted from Hill et al. (1996) and the impulse purchase intent was captured by averaging five items (α = .837) taken from previous research by Rook and Fisher (1995).

With regard to control variables, we measured participants’ innovativeness by averaging five items (α = .819) taken from Hurt et al. (1977). Grocery shopping enjoyment was assessed by averaging four items (α = .915) adapted from Taylor and Neslin (2005). The respondents’ attitude towards the Virtual QR Code Store and their related shopping enjoyment was captured by averaging four items (α = .901) taken from Nyvseen et al. (2005). We averaged three items (α = .687) adapted from Coulter et al. (2003) to assess participants’ product category involvement. All variables were assessed through 7-point Likert scales anchored “strongly disagree” and “strongly agree”. Thus, higher values indicate stronger agreement to the respective statements. Finally, biological sex was dummy-coded with 1 = men and 2 = women, and age was measured as a continuous variable. Table 1 summarizes our variables and descriptive statistics, and a list of all measures along with their reliability measures (if applicable) appears in the Appendix.
Table 1. Means, Standard Deviations, and Correlations Among Variables

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<td>1. Perceived utility of the store</td>
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<td>2. Impulse purchase intent</td>
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<td>3. Purchase quantity</td>
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<td>4. Innovativeness</td>
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<td>-.02</td>
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<td>5. Grocery shopping enjoyment</td>
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<td>.19*</td>
<td>1.00</td>
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<td>6. Attitude toward the object (fun)</td>
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<td>.27*</td>
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<td>.12*</td>
<td>.12</td>
<td>1.00</td>
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<td>7. Product category involvement</td>
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<td>8. Age</td>
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M | 4.66 | 3.61 | 4.57 | 5.38 | 4.01 | 4.26 | 2.87 | 28.46 |
SD | 1.39 | 1.31 | 4.00 | .98 | .94 | 1.56 | .76 | 10.51 |

*p < .05 (two-tailed)
Notes: N = 269. Product assortment and biological sex are measured using nominal scales and therefore are not presented with means, standard deviations, and correlations with other variables

**Results**

**Preliminary Analysis**

Data collection (i.e., by posting the respective link in social media and online communities, web forums, and guestbook with audiences from different social classes, gender, and age categories) was completed over a three-week period between January and February 2015. Of the 350 questionnaires started, we gathered usable data from 299 participants yielding a response rate of 85.4%. Of those, 90% passed the first manipulation check by ignoring the use of transport question (thus having read and understood the described scenario). This yielded a final sample of 269 participants (mean age = 28.46 years; 51.3% male). The responses to the suspicion probe revealed that none of the participants was aware of the true purpose of the study. Also, 78% of the participants evaluated the subway scenario as being realistic to very realistic (t = 5.386, p < .01).

Moreover, the manipulation of product assortment worked as intended. Considering the pleasure-giving item, the second manipulation check revealed that the hedonic product assortment was rated significantly higher than the utilitarian (M<sub>pleasure; hedonic</sub> = 3.68, M<sub>pleasure; utilitarian</sub> = 3.01, F (2, 266) = 4.17, p < .05). The mixed assortment scored between both conditions (M<sub>pleasure; mixed</sub> = 3.50). In contrast, on the scale capturing the perceived usefulness of the assortment, utilitarian product assortments were rated significantly higher than the hedonic products (M<sub>useful; hedonic</sub> = 2.51, M<sub>useful; utilitarian</sub> = 5.25, F (2, 266) = 73.03, p < .01). Again, the mixed assortment scored between both other conditions (M<sub>useful; mixed</sub> = 3.88). We conclude that our manipulation worked as intended, which led us to proceed with the interpretation of the results.

**Hypotheses Testing**

Our hypotheses suggest that quantity of purchases made in Virtual QR Code Stores is contingent on the breadth of the product categories (utilitarian and hedonic) spanning the product assortment. Assortments consisting of both utilitarian and hedonic products should be superior to stimulate purchases, whereas

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1 A total of 51 surveys had to be eliminated from analysis due to incomplete questionnaires.
purely utilitarian assortments may be still more effective as compared to those comprising only hedonic products in the same number. We employed an ANCOVA to test our hypotheses.

Results reveal that purchase quantity was indeed significantly higher when participants were exposed to the mixed product assortment condition than when hedonic or utilitarian assortments only were provided; also, the utilitarian assortment led to higher purchase quantity than the hedonic assortment ($M_{hedonic} = 3.82$, $M_{utilitarian} = 4.58$, $M_{mixed} = 5.31$, $F (2, 259) = 3.463, p < .05$). As to the covariates, involvement with the product category, attitude towards the object, biological sex, and age significantly affected purchase quantity, while innovativeness and grocery shopping enjoyment did not exert significant effects.

In our hypothesizing, we argued that an explanation for these findings is that, compared to purely hedonics, product assortments offering utilitarian products as well should improve customers’ utility perceptions of Virtual QR Code Stores. In a second step of our analysis, we tested this proposition and focused on the possible underlying mechanism of perceived store utility. Moreover, to rule out suggestions from related literature that offering hedonic products only may be more effective to stimulate purchases since customers generally buy those products on impulse (Stern 1962), we additionally tested for impulse purchase intent as a potential alternative underlying mechanism.

To do so, mediation analysis using bootstrapping procedures was employed (Preacher and Hayes 2008; Zhao et al. 2010). In this model, product assortment served as independent variable, purchase volume as dependent variable, and utility perception as well as impulse purchase intent as mediator variables. Those mediator variables represent the mechanism through which the focal independent variable may influence the dependent variable of interest (Baron and Kenny 1986). Moreover, innovativeness, grocery shopping enjoyment, product category involvement, biological sex, and age served as covariates.

It is important to note that such mediation models have difficulties to handle multycategorical independent variables such as product assortment, which has three mutually exclusive categories. “The difficulty stems from the fact that in order to fully represent the effect of a categorical variable with k mutually exclusive categories on some dependent variable, k-1 parameter estimates are needed” (Hayes and Preacher 2014, p. 455). To deal with that issue, researchers tend to aggregate groups or discard data to produce a dichotomous independent variable. However, this is not ideal because it is accompanied by a loss of information and thus a loss of interpretability. Instead, recent research suggests estimating a model with a multycategorical independent variable by running the model k-1 times. At each run, another of the different categories coded as dummy variable (1 if a case is in the category, 0 otherwise) is used as independent variable and the remaining as covariates, again each coded as dummy variable (Hayes and Preacher 2014). One category is not explicitly coded because it is the case where the dummy variables persisting to the other categories are set to 0. This leads to a set of k-1 parameter estimates, where each parameter quantifies the mean difference in the independent variable between each category and the respective reference group. Applying this procedure to our model, the first independent variable codes the hedonic product assortment ($IV_1$) and the second codes the mixed product assortment ($IV_2$).

Based on 5,000 bootstrap samples, the results revealed that hedonic product assortment had a significant effect on purchase quantity, which was mediated by customers’ utility perceptions of such stores since the 95% confidence interval (CI) for this indirect effect did not include zero ($y_1 = -.250$, $CI_{95} = -.6558$ to -.0330). Since this effect has a negative sign, purely hedonic product assortments caused lower purchase quantities in Virtual QR Code Stores as compared to those also comprising utilitarian products. To further support perceived store utility as the underlying mechanism, hedonic product assortment must have significant and parallel effects on the mediator variable. As Figure 1 shows, perceived utility was significantly lower (CI exclusive of zero) when customers were exposed to the hedonic product assortment condition than when utilitarian or mixed product assortments were provided ($\beta_1 = -.551$, $CI_{95} = -.9573$ to -.1438). The results support hypotheses 1a and 1b.

Considering the second independent variable (mixed product assortment), we did not find any significant effect on purchase quantity mediated by customers’ utility perceptions of such stores ($y_2 = -.080$, $CI_{95} = -.3472$ to .0763). This is due to the fact that utility perception did not differ significantly between purely

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$k$ is the number of categories of the independent variable.
utilitarian and mixed product assortments (M_{utilitarian} = 4.886, M_{mixed} = 4.728, F (1, 182) = .685, p > .10). Therefore, hypothesis 2 is not supported.

Moreover, the results did not provide support for impulse buying intent as an alternative underlying mechanism for the relationship between product assortment and purchase quantity. Neither hedonic product assortment (γ_3 = .075, CI_{95} = -.1982 to .4363) nor mixed product assortment (γ_4 = .106, CI_{95} = -.1461 to .4340) had a significant indirect effect on purchase quantity via customers’ impulse buying intent since the 95% confidence interval (CI) for this indirect effect includes zero. Similarly, both variables did not significantly affect the mediator variable (β_3 = .101, CI_{95} = -.2770 to .4796; β_4 = .143, CI_{95} = -.2306 to .5161).

Finally, we did not find a direct link between either the hedonic product assortment or the mixed assortment and purchase quantity (β_5 = .430, CI_{95} = -.1.561 to .4796; β_6 = .795, CI_{95} = -.3071 to 1.8972). Therefore, we can rule out other mechanisms than utility perception to underlie these relationships. Thus, the findings provide strong support for our reasoning regarding the beneficial leverage of a product assortment comprising also utilitarian products. As to the covariates, only biological sex significantly affected purchase quantity, while innovativeness, grocery shopping enjoyment, product category enjoyment, and age did not exert significant effects. The model explained 15.7% of the total variation in purchase quantity. Figure 1 summarizes the results of mediation analysis.

**Figure 1. Results of Mediation Analysis**

**Robustness test**

As mentioned previously, customers’ budget was not restricted in our experimental setting. However, one could argue that the budget available for shopping is an important factor for making a purchase decision,
which is why constraints should be considered when interpreting customers’ buying behavior. To address this concern, we conducted a second experiment, which employs the between-subjects design of our first experiment with one notable change. A 3x3 design was applied in which we not just manipulate the product assortment in our Virtual QR code store (i.e., purely hedonic product assortment, purely utilitarian product assortment, or mixed (utilitarian and hedonic) product assortment), but also the budget available for purchase. In this latter respect, participants were randomly assigned to one of three conditions: strong budget constraint (10€ available), medium budget constraint (20€ available), and no budget constraint (30€ available).

Data collection was completed over a two-week period in August 2015. We gathered usable data from 50 participants (mean age = 26.32 years; 60.0% male). The results of this second experiment provide evidence for the robustness of our effects. First, we replicate the findings of our first experiment; purchase quantity in Virtual QR Code Stores was significantly higher when participants were exposed to the mixed product assortment condition than when purely hedonic or utilitarian assortments were provided ($M_{hedonic} = 2.47$, $M_{utilitarian} = 3.10$, $M_{mixed} = 4.01$, $F(2, 35) = 3.499$, $p < .05$). Second, neither the direct effect of budget on purchase quantity ($F(2, 35) = 1.904$, $p > .10$) nor an effect of the interaction term between budget and product assortment ($F(4, 35) = .485$, $p > .10$) were significant. Thus, we conclude that budget restrictions do not affect customer preference for product assortments in Virtual QR Code Stores.

**Conclusion**

This study examined whether and how the product assortment offered in Virtual QR Code Stores influences the quantity purchased by customers. Given that only a small subset from the range of products can be presented in Virtual QR Code Stores, product assortment decisions are critical for their success. Related literature has stressed the benefits of displaying hedonic products with the purpose of stimulating customers’ desire to purchase by conveying a feeling of pleasure and fun (Oh et al. 2009), and many companies operating such stores have followed their advice. Contrary to this reasoning and based on the concept of convenience-oriented shopping, we theorize and empirically demonstrate that more diverse product assortments consisting of utilitarian products in addition to hedonics are more effective to stimulate customers’ purchases in Virtual QR Code Stores. In support of our argumentation, we show that it is not customers’ impulse buying intent that mediates the product assortment-purchase quantity relationship but rather the perceived utility of the store. These findings hold important implications for both researchers and managers.

**Implications for Researchers**

Although Virtual QR Code Stores have gained plenty of attendance in daily management practice, to the best of our knowledge, no attempt has yet been made to empirically test their effective management. Related research has referred to Virtual Stores, but in a different understanding of the characteristics and functionality. Specifically, they were previously recognized as online stores (Barkhi et al. 2008; Katerattanakul and Siau 2003; Oh et al. 2009), digital, three-dimensional shopping simulation programs (Kim et al. 2014), or even virtual hyperrealities (Haenlein and Kaplan 2009). Virtual QR Code Stores have to be differentiated from these other concepts. They have the form of shopping walls set up by retailers in public spaces such as subways, bus shelters, or recreation centers, and technology, more specifically a QR code, is just used to allow customers to purchase the products on the “offline” spot. This premise of treating Virtual QR Code Stores differently from Virtual Stores is supported by our results. For instance, while research on online stores suggests that hedonic products should stimulate customers’ purchases (Bui and Kemp 2013; Park et al. 2012), we cannot find such link in a Virtual QR Code Store context. Instead, this study empirically demonstrates the benefits of utilitarian products in Virtual QR Code Stores and thus challenges common beliefs of a general superiority of purely hedonic product assortments. We show that the purchase quantity made in Virtual QR Code Stores is larger if the product assortment also comprises utilitarian products as compared to when only hedonic products in the same number span the assortment.

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3 We thank an anonymous reviewer for this suggestion.
We provide an explanation for these findings based on the idea of the theory of time allocation (Becker 1965). Related literature on virtual stores has focused on aspects like fun and pleasure-seeking to explain customers’ motivation to use these services (Oh et al. 2009). According to them, the key purpose of such stores is to attract customers’ attention and induce impulsiveness (Lee 2007), which is best achieved by offering hedonic products. However, instead of facilitating impulse buying behavior, our results prove that customers’ decisions in Virtual QR Code Stores are primarily cognitively driven and goal oriented (Strahilevitz and Myers 1998). We show that, compared to purely hedonics, product assortments offering utilitarian products cause improvements in customers’ utility perceptions of Virtual QR Code Stores stemming from enhanced shopping convenience. That is, customers wish for a more diverse range of products to choose from so that the daily trip to the supermarket eventually becomes expendable. Thus, as with supermarkets (e.g., Cobb and Hoyer 1986), Virtual QR Code Stores are another area of management in which planed behavior can explain customer decisions better than impulse purchase behavior. Based on this, we contribute by expanding the perspective on critical factors influencing customers in their purchase decision making process in Virtual QR Code Stores and call for a change of emphasis regarding the compilation of product assortments offered.

Furthermore, our study contributes to research on m-commerce (Clarke III 2008; Frolick and Chen 2004) by introducing the concept of Virtual QR Code Stores as a supportive instrument in this regard. That is, customers are actively led to making purchases in the retailer’s online store via their mobile devices by presenting them a convenient shopping opportunity that stimulates their buying intention. Linked to this, we present valuable implications for research on self-service technologies (Meuter et al. 2000) as we outline the functionality of Virtual QR Code Stores. In particular, they add a new form of self-service encounter that marks itself off from common types by providing companies with a new interface (i.e. scanning QR codes) to reach out to customers.

**Implications for Practitioners**

As customers allocate less time to shopping, their desire for convenience has mounted and their attention has been frequently diverted to virtual shopping as an alternative medium. A crucial point of departure for retailers who wish to take steps designed to maximize the speed and ease of shopping is to develop an understanding of the salient dimensions of virtual shopping convenience (Jiang et al. 2013). In this research, we argue and empirically demonstrate that convenience-oriented customers value Virtual QR Code Stores due to their advantages in access and transaction convenience (Berry et al. 2002). Usually being set up in subway stations and bus stops, they create the opportunity for customers to efficiently use waiting time and thus enhance transaction convenience by turning it from perceived dead time into shopping time. Consequently, this eliminates the need for a trip to the local retail store to shop, thus eventually saving both time and effort. Together with the fact that Virtual QR Code Stores offer benefits in terms of opening hours, no parking need, and facility location, access convenience is improved.

Considering these customer convenience-enhancing features of Virtual QR Code Stores, retailers need to think about how to utilize this sales channel in an efficient manner. The example of Tesco Homeplus has successfully shown the opportunities associated with the introduction of Virtual QR Code Stores. By generating remarkable customer value, the company was able to increase online sales by 130 percent within three months after the store’s launch (Ryu 2013), indicating that the QR code can be an important tool for integrating multi-channel operations.

Nonetheless, retail decision makers need to consider that the use of QR codes at the customer interface is a relatively new element. Since particularly innovative consumers tend to adopt new technology-based services and try new experiences (Mort and Drennan 2005), they play an integral part in disseminating and promoting new services in the market. Therefore, retailers should utilize Virtual QR Code Stores as an effective outlet for reaching out to innovative customers and promote new merchandise through these customers using the QR code.

The results of our study further provide retail managers with important indications on the selection of products that are most suitable for display in Virtual QR Code Stores. Given the limited space for presenting products in these stores, product assortment decisions are critical for their success. A larger range of products to choose from, especially one including basic items like toilet paper, detergent, milk, and cereals, better meets customers’ daily shopping needs.
On a more general level, in order to profit from Virtual QR Code Stores, two basic requirements have to be guaranteed: firstly, a high diffusion of smartphones or comparable mobile devices is essential for the success of such stores since they are the only means by which these stores can be accessed. Although the growth rate of smartphones is rapidly increasing, their penetration rate in 2013 was just over 50 percent of the U.S. population (Jung et al. 2012). By comparison, the penetration rate for smartphones in South Korea was at 73 percent, partly explaining the success of Tesco Homeplus’ Virtual QR Code Stores. Secondly, the presence of fast and extensively available mobile internet needs to be ensured so that customers can make their online purchases on the spot. While in the Republic of Korea mobile-broadband penetration is 100 percent, at least 93 percent of the U.S. population had an active mobile-broadband subscription in 2013 (Broadband Commission 2014). Thus, if retail managers take these factors and requirements into account, the introduction of Virtual QR Code Stores can make a considerable contribution to the company’s success.

Avenues for Future Research

Our work provides several fruitful avenues for further research on Virtual QR Code Stores. First, we embedded our study in a subway context. We strongly believe that our findings are generalizable to other scenarios because important similarities exist between subway stations and other public spots where Virtual QR Code Stores are used. For instance, at bus shelters, individuals also spend their time waiting and Virtual QR Code Stores create the opportunity for customers to efficiently use waiting time and thus enhance transaction convenience. However, a replication of the model in other scenarios, where waiting time is not as important for individuals (e.g., recreation center) would provide cross-validation of the results.

Second, the product assortments in our Virtual QR Code Store scenario comprised products usually offered in supermarkets. For those products customers typically have a rather task-oriented shopping motivation. That is, customers engage “in shopping out of necessity to obtain needed products […] with little or no inherent satisfaction derived from the shopping activity itself” (Kaltcheva and Weitz 2006, p. 109). However, customers can also have recreational motivations, such as when shopping for product categories like clothes. In this case, the idea of effort and time efficient consumption may be short-handed because consumers engage “in shopping to derive inherent satisfaction from the shopping activity itself” (Kaltcheva and Weitz 2006, p. 109). Future studies might examine more extensively the possibilities of utilitarian product assortments under consideration of a broader set of shopping motivations.

Third, it would be useful to replicate the results of our computer-based experiment in a field setting. Although recent research has shown the equivalence of online survey results and data obtained offline (Shankar et al. 2003) and approved their accuracy, completeness, and response quality (Deutskens et al. 2006), still critics question the quality of responses. Online respondents cannot scan, preview, review, skip, or change items, which is why they may experience a different level of self-generated validity (Feldman and Lynch 1988). For instance, in our experiment, the cursor just looked like a smartphone display, but respondents were not using their phones physically. However, physical warmth or coldness induced by smartphone usage has been shown to impact purchase quantity of items (Zwebner et al. 2013). Moreover, purchase decisions in Virtual QR Code Stores are not made in private (as in online shopping), but in public which can be better captured in field experiments. In our scenarios, we intentionally did not consider the presence of other customers inspecting or utilizing the Virtual QR Code Store, nor were other people shown waiting for the subway. We did so to isolate the effect of product assortment on purchase volume. However, an individual’s behavior might change in a public setting, where he/she is confronted with social pressure. Such pressure has been shown to play an important role in the shopping process (Bearden and Etzel 1982). Importantly, identity might be expressed differently through products when shopping online than when shopping offline, which would imply a social situation or even interaction (Dittmar et al. 2004). Thus, the inclusion of non-interactive social situations where a social entity is physically present during consumption (Argo et al. 2005) could generate additional and more detailed information on customers’ buying behavior in Virtual QR Code Stores.

Finally, future research could place emphasis on other product classifications such as product number, size, weight, or shelf life to study the effective management of Virtual QR Code Stores. For instance, we held the price for every product available at a constant level, because this variable should not influence participants’ buying decision. An interesting investigation would be that of the impact of price variation
on customers’ buying decisions in Virtual QR Code Stores. Specifically, the use of price discounts via promo codes, which has been introduced by U.S. internet grocer Peapod (PR Newswire 2012), represents a worthwhile potential field of further research. Moreover, we limited the number of items in the Virtual QR Code Store to six. Companies place up to 500 products in their virtual shelves, which increases complexity of consumers’ purchase decisions. Such complexity, however, may make negative outcomes such as information overload more likely, reducing the willingness to purchase in Virtual QR Code Stores.
Appendix

<table>
<thead>
<tr>
<th>Measures and Reliabilities.</th>
<th>α</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived utility of the store</strong> (Hill et al. 1996) <strong>Impulse purchase intent</strong> (Rook and Fisher 1995) <strong>Purchase quantity</strong> (self-provided) <strong>Innovativeness</strong> (Hurt et al. 1977) <strong>Grocery Shopping Enjoyment</strong> (Taylor and Neslin 2005) <strong>Attitude toward the object (fun)</strong> (Nysveen et al. 2005) <strong>Product category involvement</strong> (Coulter et al. 2003) <strong>Biological sex</strong> <strong>Age</strong></td>
<td>.736</td>
<td>.837</td>
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</tr>
</tbody>
</table>

Notes: The --- indicates that data were not applicable; α = Cronbach’s alpha, CR = composite reliability, and AVE = average variance extracted.
References


