

Lack of Innovation in Sugar Packaging

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Abstract

The purpose of this study was to create a new package design for powdered sugar and to find a way to integrate a QR code into the innovative package design in such a way that it effectively communicated new information to the consumer, while still maintaining established brand identity and an aesthetically pleasing design.

A survey was given to over 200 people to determine how people currently buy powdered sugar and how they use it, as well as how people use and perceive QR codes that are integrated into package designs, even if they don't bake or use powdered sugar. A hands-on study was also conducted on 10 participants to determine how user friendly the new sugar package design was, and whether consumers would prefer this new package to the old design.

The results of this study showed that the innovative package design was generally preferred over the traditional package because it was cleaner, less wasteful, and easy to use. The results also showed that, contrary to previous research found on QR codes, people are more likely to scan traditional QR codes or ones that look similar in shape or color.

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Chapter 1: Introduction

The purpose of this study was to design a new package and label for powdered sugar. Within the sugar market there are many ways in which each type of sugar is packaged, ranging from a simple paperboard box to more convenient options such as resealable bags. However, even with the easy pour and resealable options, the sugar packaging market is lacking innovation. The objective of this study was to not only to create an innovative package design, but also to find a way to integrate a QR code into the design in order to communicate information to the consumer without using too much space, and without impairing brand identity or an aesthetically pleasing design.

Currently powdered sugar comes in either a paperboard box with a non-resealable bag inside, or in a non-resealable plastic bag. The most common uses of powdered sugar are to make frosting, and to dust on top of pastries and cakes. To get a delicate dusting of powdered sugar it needs to be poured through a sifter, and this often wastes sugar and dirties another kitchen utensil. Incorporating a convenient resealable sifter lid into the packaging itself would make the product more user friendly.

When designing a new package it is important that consumers understand how the product works and how using it will benefit their lives. It can be difficult to include all this information on the label; so one convenient option is to use a QR code. QR codes can hold several thousand characters, however they are not very attractive and they often look like they do not belong in the package design. Finding a way to incorporate the QR code seamlessly into the package design could influence more people to actually scan the code, which in turn could then lead to a greater acceptance of the new product.

My interest in this problem stems from my love for baking. I love to bake and decorate desserts, but I hate the clean up process after I am done. I'm always looking for new ways to do things that make clean up easier, like disposable frosting bags for example. I am interested to see if a convenience package like this one would interest other consumers as much as it interests me. I am also curious to see if finding a way to incorporate a QR code into the design, instead of just placing it in after the design is complete, would entice more people to actually scan the code. If this idea of integrating a QR code with an innovative package design works, it could be used for all types of new products, not just sugar.

Chapter 2: Literature Review

When a new product package is designed there are many things to consider; the pros and cons of different packaging material, different packaging forms, special design features, and how to ensure the labeling on the new package contains all necessary information while still remaining aesthetically pleasing.

There are four main materials used when it comes to the packaging of food. They include paper, glass, metal and plastic. “Each material has unique properties which help protect the food in the various environments and facilitate other package functions” (Khalil, FSN 354 lecture, 2013). Since each type of material used for food packaging has its positive and negative qualities, “often a typical food package is made from two or more of the above material for optimum performance” (Khalil, FSN 354 lecture, 2013).

According to Hany Khalil, Ph.D. (2013), Food Science & Nutrition professor at California Polytechnic State University, paper has some good qualities for food packaging such as low cost, strength, and the ability to print directly on the substrate. However, paper does not act as a good barrier to moisture, air, or odors.

Khalil (2013) states that some good qualities of glass include the fact that items packed in glass are perceived to be higher quality products by consumers, glass can be colored, it acts as a strong barrier to all but light and temperature, and it can withstand high temperatures. However, some negative qualities of glass are that it breaks easily, it is heavy, which can increase shipping costs, and it does not react well to thermal shock.

Khalil (2013) mentions that some of the good qualities of metal are its barrier properties that block everything except temperature, its strength, and its weight, which helps keep shipping costs low. The worst property of metal is that it corrodes.

The final material used in food packaging is plastic, and according to Khalil (2013) it is becoming more prominent in the food packaging world. "Plastics (molded or films) have been replacing the other three packaging materials in many food packaging applications" (Khalil, FSN 354 lecture, 2013). In the Dupont 2012 Survey of Future Packaging Trends (2012) it is also mentioned that, "Plastics will continue to replace glass and metals" (p. 4). This is due to the fact that plastic is easy to mold, which means it can be made into any shape or thickness, it is inexpensive and lightweight, and it does not corrode or shatter. One downfall to plastic is that it is not a complete barrier to oxygen or light.

When the above materials are used alone or combined to make packaging for food there are three main categories of containers these packages can fall into. First are rigid containers, which include "glass jars and bottles, steel cans, steel drums, etc." (Khalil, FSN 354 lecture, 2013). Next are the semi-rigid containers. "Examples are aluminum beverage can, plastic tubs, aseptic beverage boxes, paperboard boxes, milk jugs, composite cans, egg cartons, etc." (Khalil, FSN 354 lecture, 2013). Last are flexible containers. Examples include "wraps for butter sticks, gum sticks, plastic or laminate pouches and bag, heat shrink film, absorbent pads, etc." (Khalil, FSN 354 lecture, 2013).

Different packages are used for different types of food and there are many reasons to pick one package over another. The primary goals of a food package are to contain the food within, to communicate nutrition and other important information to the consumers, and to protect the food from the environment and spoilage (Marsh & Bugusu, 2007, p. 39). These goals are paramount when choosing packaging for specific foods. According to Khalil, "Knowledge of the deteriorative reactions in food is essential in order to develop processes to inhibit, or at least minimize, those reactions" (2013). The major causes of food spoilage

include microbial, enzymatic, chemical, insects and rodents, and other factors that cause more of an economic spoilage such as “environmental factors like moisture loss/gain, temperature fluctuation, and odor migration [and] mechanical factors like vibration during transportation and crushing due to stacking and or dropping” (Khalil, FSN 354 lecture, 2013).

While spoilage is a main concern for most products, packaging for sugar does not need to focus on spoilage. “Sugar, properly stored (tightly closed and in a dry place), has an indefinite shelf life because it does not support microbial growth” (Domino Sugar, 2013). Instead, the focus of the design for sugar packaging can be based more upon containment and communication.



Figure 1. Granulated sugar package options

Currently granulated sugar is packaged in the traditional paper bag, paperboard boxes, paperboard cartons with a carton style pour spout, and plastic canisters with resealable lids (Domino Sugar, 2013; C&H Sugar, 2013). Even though sugar has an indefinite shelf life, there are suggested ways to store it so it remains as fresh as the day it is purchased. According to the C&H Sugar Companies website (2013), “To avoid clumping and help retain freshness, store granulated sugar in a covered container in a dry

environment. Do not refrigerate. Due to the fine crystal size, some small lumps may occur, but should separate easily". The package types listed above keep sugar covered and as long as the consumer keeps the containers in a dry place, their sugar should stay fresh. Using mostly paper products for this packaging helps to keep costs and weight down.



Figure 2. Brown sugar package options

Brown sugar is “a natural combination of sugar and molasses,” (C&H Sugar, 2013) and therefore contains more moisture than granulated sugar so its packaging options are slightly different. The packages currently used to store brown sugar include the traditional paperboard boxes with a non-resealable bag inside, and plastic bags with or without a resealable zipper (Domino Sugar, 2013; C&H Sugar, 2013). As C&H companies website (2013) explains, “To retain moistness, brown sugar is best kept stored away from light and heat in an airtight container. Occasionally, brown sugar will lose its natural moistness and become hard. Even though the shelf life of brown sugar is indefinite, it’s best to use within six months of purchase for maximum flavor” (C&H Sugar, 2013). The packages currently used are lightweight and cheap options, but because this sugar can lose moisture so easily many people store their brown sugar packages in a secondary zippered storage bag.



Figure 3. Powdered sugar package options

Confectioners sugar, also known as powdered sugar, is “granulated sugar that has been crushed into a fine powder with about 3% cornstarch added to prevent clumping” (Food.com, 2013). “Simply because of its physical makeup, powdered sugar is susceptible to odor pickup. It should be stored in a sealed container, away from moisture and strong odors” (C&H Sugar, 2013). Powdered sugar, like brown sugar, is currently packaged in either a paperboard box with a non-resealable bag inside, or in a non-resealable plastic bag (Domino Sugar, 2013; C&H Sugar, 2013).

Of the four main packaging materials, sugar packaging uses only paper and plastic. Paper is used in two main forms in sugar packaging: plain paper and paperboard. When plain paper is in contact with the food being packaged, “paper is almost always treated, coated, laminated, or impregnated with materials such as waxes, resins, or lacquers to improve functional and protective properties” (Marsh & Bugusu, 2007, p. 43). Kraft paper is commonly used to make the traditional bags of granulated sugar. Kraft paper is the strongest form of treated paper and it is made by adding sulfates. Sulfite paper is similar to kraft paper but it is weaker and more lightweight. “Sulfite paper is glazed to improve its appearance and to increase its wet strength and oil resistance. It can be coated for higher print quality and is also used in laminates with plastic or foil” (Marsh & Bugusu, 2007, p.

44). Glazed sulfite paper is used to create the small bag inside the paperboard boxes that hold brown sugar and powdered sugar. Paperboard is a thicker version of plain paper and it can come in many forms. The form used for sugar packaging is called chipboard.

Chipboard is made from recycled paper products and it often contains some small impurities. Because of these impurities, chipboard is often lined or coated with white board to improve the look, quality, and printability of the material. White board is made of chemically bleached pulp and is usually used for lining on the inside of a carton made from chipboard because chipboard is not supposed to come in contact with food because of its impurities. The sugar carton, however, is lined with white board on the outside only. This is allowed since granulated sugar contains no moisture and is not susceptible to microorganisms or spoilage. The white board on the outside is used to increase strength and to create a better canvas for printing the label. Chipboard is also a good material used for the packaging of sugar because it is the least expensive type of paperboard and it is a lightweight option (Marsh & Bugusu, 2007, p. 44).

Plastic packaging for sugar comes in two forms: semi-rigid and flexible. The resealable canisters are the semi-rigid option, and all of the plastic bags are the flexible forms. Plastic is a relatively inexpensive option for food packaging because it is lightweight, and it keeps shipping costs low. Plastic is also easy to print on, so extra material for labels is not needed. Plastic is heat sealable and “can be integrated into production processes where the package is formed, filled, and sealed in the same production line” (Marsh & Bugusu, 2007, p. 42). This quick and easy production line process is useful for the plastic bags used in sugar packaging.

When shoppers walk into a store to buy a product, the first point of physical interaction with that product is its packaging. Packaging is what the consumer sees, feels, reads and handles. Whether the consumer realizes it or whether the impact is simply subconscious, packaging makes a difference in determining what gets noticed on the shelf and ultimately purchased. The package becomes an extension of the product itself. (Retail Customer Experience, 2011, para. 1)

Therefore, the packaging of a food product must not only protect and contain the product within; it must also convey a message to the consumer. "It's only a matter of seconds to hold a customer's attention to your product. Your packaging design should clearly highlight the unique selling points of the products within the few seconds you are able to hold the customer's attention" (Business Marketing Press, 2013).

There are many design features of a package that help to influence purchase decisions. Based on Table 1, some features that consumers find to be most important when buying a product are reusability, how well the package maintains freshness, how eco friendly it is, and whether or not the package can be resealed (Doyle, 2008).

Consumers who purchase a product that is hard to store or not easy to manage will tend to look for a different product next time they go shopping. On the other hand, functional packaging and "products with packaging that enhance the usability and storage of the product will make the consumers return to the store to make another purchase" (Business Marketing Press, 2013). According to Hogan (2007), these types of packaging provide consumers with some sort of convenience, help influence customers to buy a product in the first place, and then continue to purchase that same

product. This increases brand loyalty and will encourage a good relationship between the consumers and the company.

One of the challenges of introducing a new product or package design is gaining consumer acceptance. This can be a challenging task because consumers become attached to the packaging they have always known. According to Mora (2010), our brain quickly gets used to the packages we constantly see while shopping, and we become so accustomed to these colors and shapes that when a new product is introduced to the shelves we may not even notice it unless the package design is compelling enough to make us pay attention. The challenge is that the new package design needs to be different enough to gain attention, but similar enough so that brand identity is not lost (Mora, 2010).

Another factor that discourages consumers from buying a new product is if

they cannot easily figure out how to use it (Veryzer, 2003, p. 145). Instructions on how to

HOW MANY WILL PAY MORE FOR WHAT

ATTRIBUTE	TOTAL SELECTING
Base	1,017
Made in U.S.	41%
Reusable	38%
Stays fresh longer	34%
More eco friendly	30%
Resealable	30%
More recyclable	24%
Refillable	20%
Easier to open	20%
Easily microwavable	19%
Less plastic	18%
Time saving	17%
Easier to store	17%
Slide zipper	13%
Fit in fridge or freezer door	13%
Multi-packs	11%
Press-to-close zipper	10%
Easier to pour	10%
Made for on-the-go	10%
Lighter weight	9%
Handle to carry and pour	9%
Clearer labeling	9%
More spill proof	8%
Made of glass	7%
One-handed use	7%
Fit in cup holder	7%
Easy-grip cap	6%
Fit in purse or briefcase	6%
Made of paperboard	6%
Made of metal	3%
Designer colors or shapes	2%
Will not pay more for any	23%

Table 1. Important package features

use the new innovative package design could help consumers, however, instructions would take up a lot of room on the labeling, detracting from the overall design. One way to include a lot of information into the labeling of a package is to include a QR code. QR codes, or Quick Response codes, were developed in the early 1990s and have recently become very popular because of how much data can be stored in them and how quickly and easily smart phones can scan them. When a QR code is scanned it can provide the consumer with text information or take them to any specific website (Twomey, 2012, pg. 33-34). "QR codes can hold much more information than a bar code. Bar codes typically can hold 20 digits worth, while QR codes can hold more than 7,000 character bits of information" (Twomey, 2012, pg. 34). This means companies that use QR codes on their packaging can deliver a great deal more information to consumers without using up too much design space. Another benefit QR codes have over traditional barcodes is that the pattern allows for 360-degree placement. "That means that there is no specific way a QR code needs to be positioned on a package. This is unlike a barcode, which traditionally requires either a ladder or picket fence alignment (Twomey, 2012, pg. 34). Another major benefit of a QR code is that they have "up to 30 percent error correction" (Twomey, 2012, pg. 34). This means the consumers are generally still able to get an accurate scan of the code even if the code is damaged in some way, such as wrinkled or torn.

"From a print reproduction standpoint...there are certain parameters that must be met to ensure a good QR code scan" (Twomey, 2012, pg. 34). First, most QR codes are black on a white background. QR codes do not need to be black and white; however, they do need significant contrast to ensure an accurate scan. Second, QR codes should not be printed as a knockout, meaning they should not be printed white on a black background. "Third, there

needs to be significant white space surrounding the QR code. The purpose of this is to ensure that no surrounding copy interferes with the ability of the code to be scanned” (Twomey, 2012, pg. 34-35). Finally, it is recommended that the QR code be no smaller than 1.5 inches x 1.5 inches. All of these guidelines are a good place to start when designing QR codes; however, it is important not to just assume the code will always scan if these parameters are followed. There are many different QR code readers and many apps for mobile devices. “At the end of the day, the code should be tested on a variety of apps and readers to ensure positive scans” (Twomey, 2012, pg. 35).

When designing a new package you want to make sure the consumer knows how the package works and why this new package is a good option for them. This can take up a lot of room on the label, so QR codes can be a great way to incorporate this information without using much space. “One

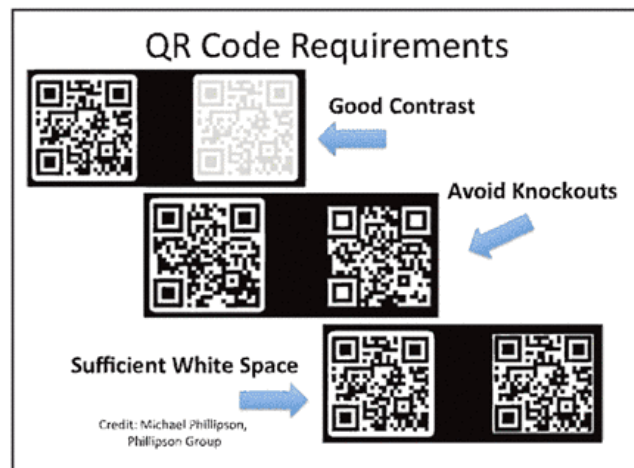


Figure 4. QR code parameters

challenge that we have in graphic communication is that many feel the QR code is ugly” (Twomey, 2012, pg. 35). That means QR codes save space on a label; however they can be distracting from the overall design. The challenge in graphic communication is to alter and incorporate the QR code into the package design in such a way that the code looks and feels like it is part of the design and that it is there for a reason.

There are many ways to package food products such as sugar. While many companies design their packaging with a focus on the factors that consumers find most

important, sugar companies have stuck with traditional packaging that uses minimal amounts of material. Redesigning a more convenient innovative package for sugar to meet consumers' wants and needs could help increase sales, but more than just a structural redesign needs to be done. The label of a new package such as this needs to communicate to the consumer why and how this product is right for them. Finding a visually pleasing way to include a QR code into the package design will provide information to the consumer without taking away from the design of the package.

Chapter 3: Methodology

The objective of this research was to find a way to integrate a QR code into an innovative package design in such a way that it effectively communicated new information to the consumer, while still maintaining established brand identity and an aesthetically pleasing design. Two types of research were conducted: a preliminary survey, and an in-depth hands-on survey.

The preliminary survey was used to determine how people currently buy powdered sugar and how they use it. The preliminary survey was also used to gain information about how people use and perceive QR codes that are integrated into package designs, even if they don't bake or use powdered sugar. Participants were asked about the kind of information they would like to receive when scanning a QR code, as well as the types of QR codes they were more likely to scan. Approximately 230 people participated in the preliminary survey. (Appendix)

Those who agreed on the preliminary survey to participate in further research were asked to come in in-person to test out the new package design. Ten participants completed this section individually so that other people in the room would not influence their actions. Participants were each given two cookies. They were then asked to sprinkle powdered sugar onto the first cookie however they normally would at home. Participants were given tools to work with, such as a box of sugar, a bag of sugar, a spoon, and a sifter. Next the participants were asked to sprinkle some sugar onto the second cookie using the new package design. Once they were finished, participants were asked to explain their experience. This in-depth hands-on survey was conducted to gain information on how user

friendly the innovative package design was and whether consumers would prefer this new package to the old design.

The results of the preliminary survey were analyzed using graphs and charts. During the in-depth survey the actions of the participants were observed while they were testing the new package to note the usability of the package based on how many utensils were needed, how clean the area was after use, and the reaction of the user based on body language and/or statements made during and after the use. Finally, any novel responses were recorded.

Chapter 4: Results

Two hundred and twenty-eight people participated in the preliminary survey that was sent out online. Of those participants 28.2% were male and 71.8% were female. Figure 5 shows the breakdown of ages among the participants.

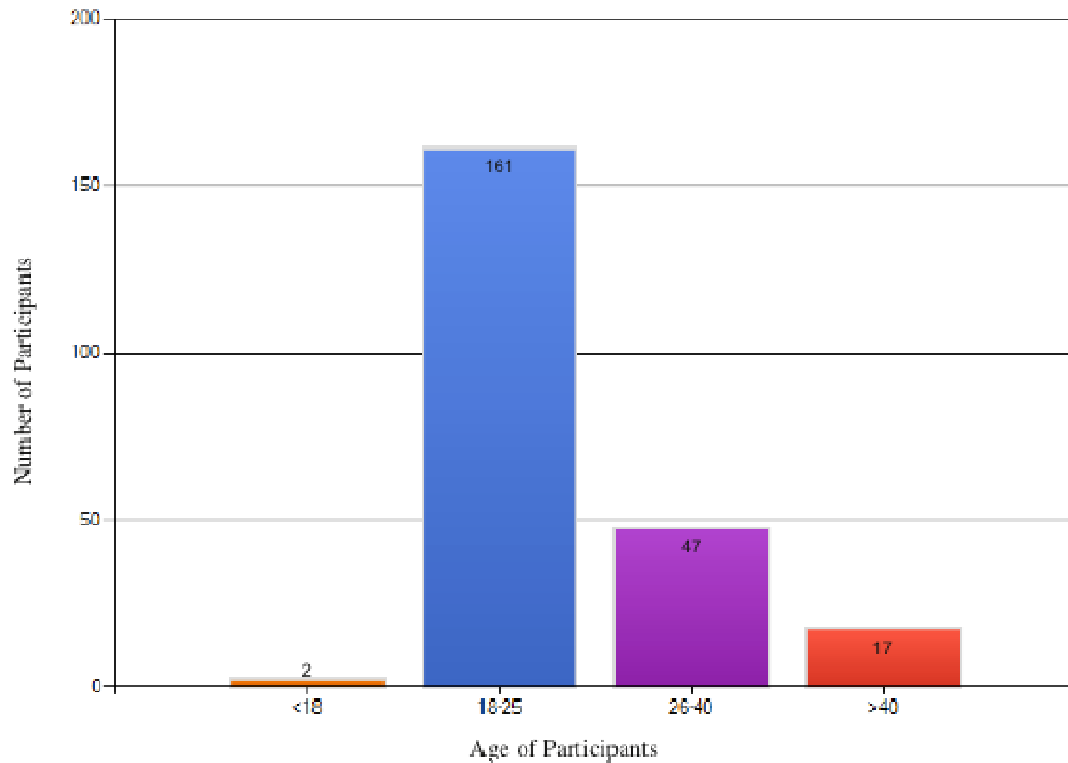


Figure 5. Age of participants

The survey was focused on two main topics: sugar usage and QR codes. The first half of the survey was focused on sugar. Out of the 228 people who took the survey, 64.8% said they use powdered sugar when baking. Those who said they did use powdered sugar were asked to report what kind of packaging they usually buy their powdered sugar in. Figure 6 shows that breakdown. Four people selected “other.”

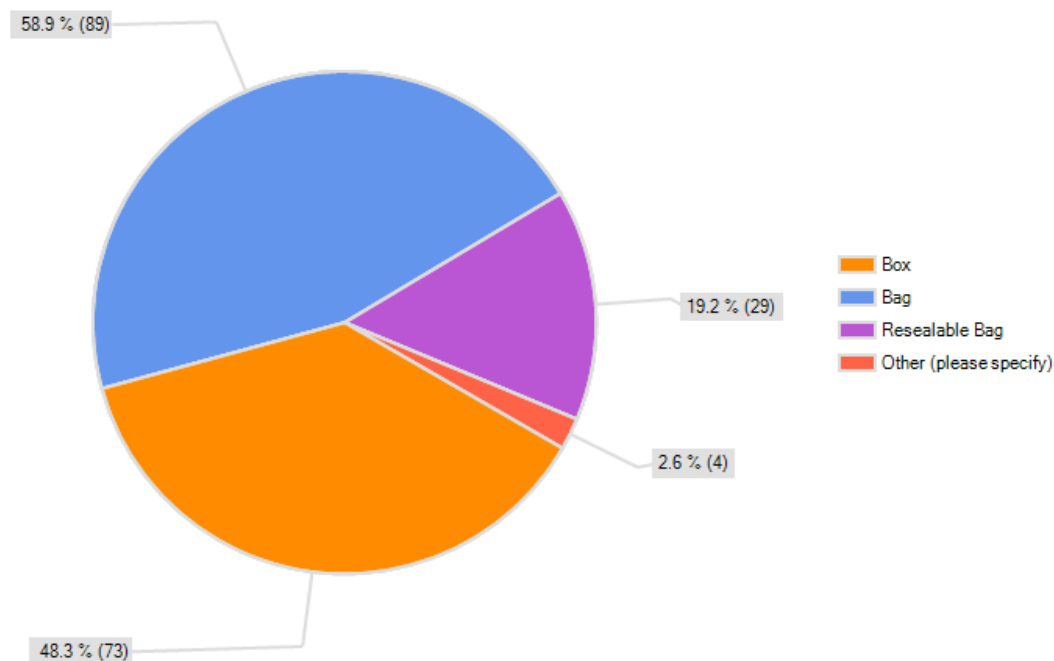


Figure 6. Package styles. This figure illustrates the different types of packaging in which participants currently buy their sugar.

Participants were asked if they dusted powdered sugar on any food and 61.7% said they did. Those 140 people who said yes were then asked how they currently dust their powdered sugar. Figure 7 shows the responses to this question. The reason the numbers don't add up is because some people reported that they use two or more different methods. Fourteen people chose "other" as their response to this question. Three people said they use a secondary container with a sifter lid. Three people said they use a sieve. Six people said they just use their hand. One person said "I scoop the sugar into a loose-tea-bag-spoon and shake it" and one person said they pour the powdered sugar into a bowl and then roll the food item around in it.

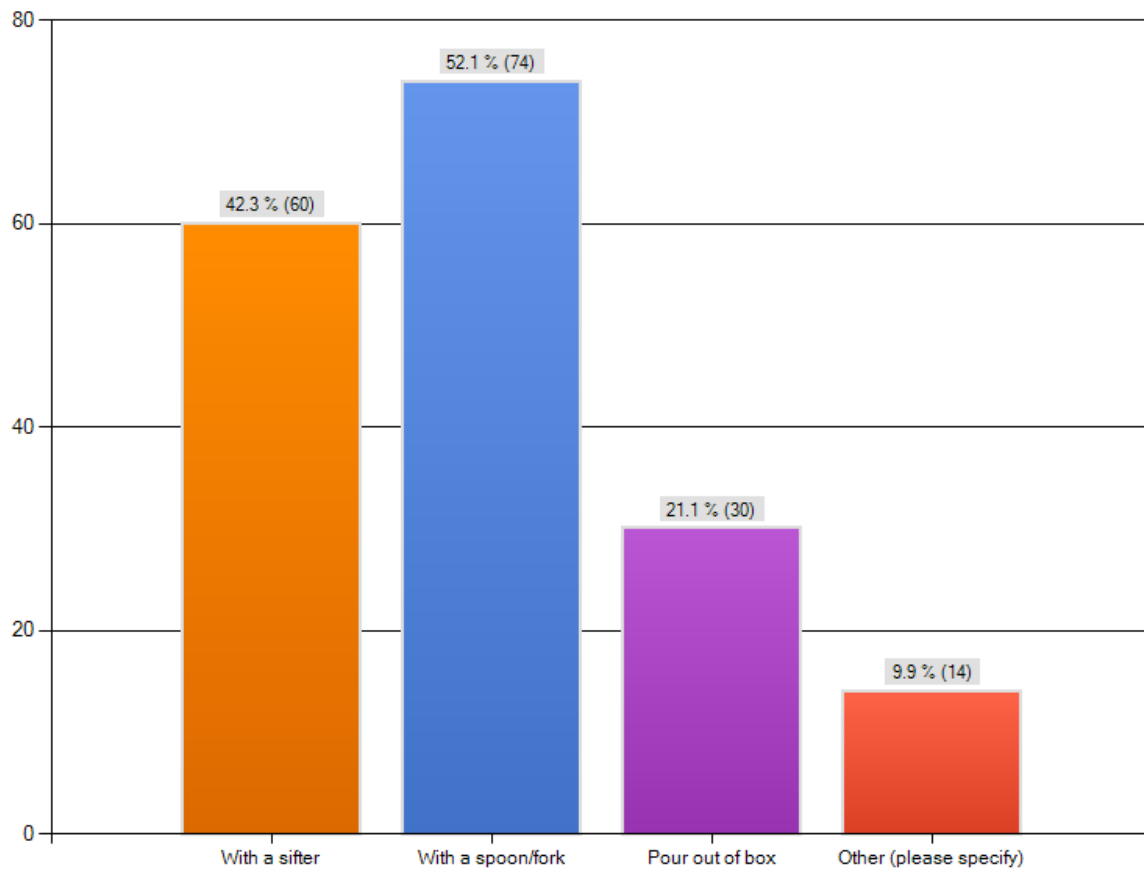


Figure 7. How participants currently dust powdered sugar. This figure illustrates the different ways in which participants currently dust their sugar.

Seventy-nine participants reported that they have children under the age of sixteen in their household and thirty-three of them stated that their children like to dust powdered sugar on certain food items. Those thirty-four people were then asked how their children dust powdered sugar. Figure 8 shows their responses. Nine people reported “other” as their answer. Two people said their children use a sieve, two said they use their hands, two said they use a canister with a sifter lid, and the remaining three reported forms of n/a or that they dust the sugar for their children. The reason the numbers don’t add up is because of

the three people who responded forms of n/a and because some people reported that they use two or more different methods.

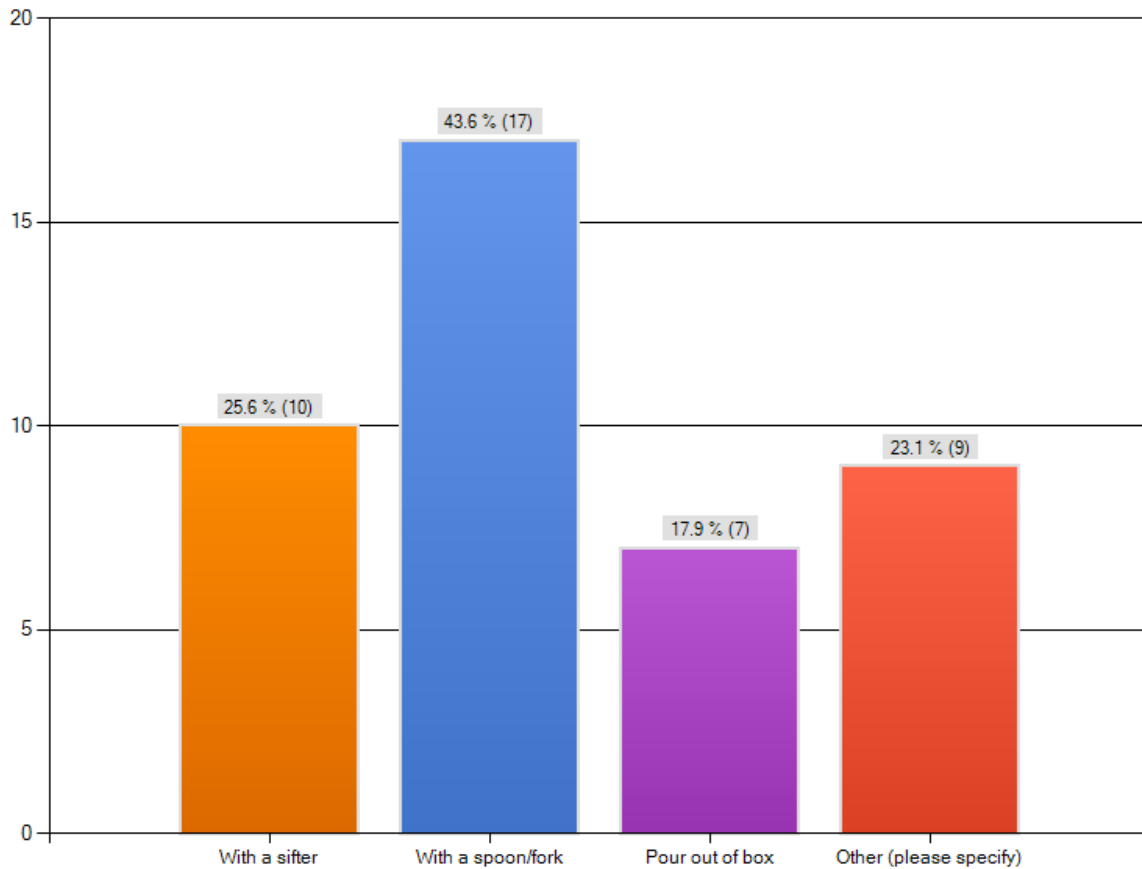


Figure 8. How children currently dust powdered sugar. This figure illustrates the different ways in which the participants' children currently dust their sugar.

The participants who reported that they or their children use powdered sugar were then asked if they created messes or wasted any sugar while using it. Figure 9 and 10 show the results.

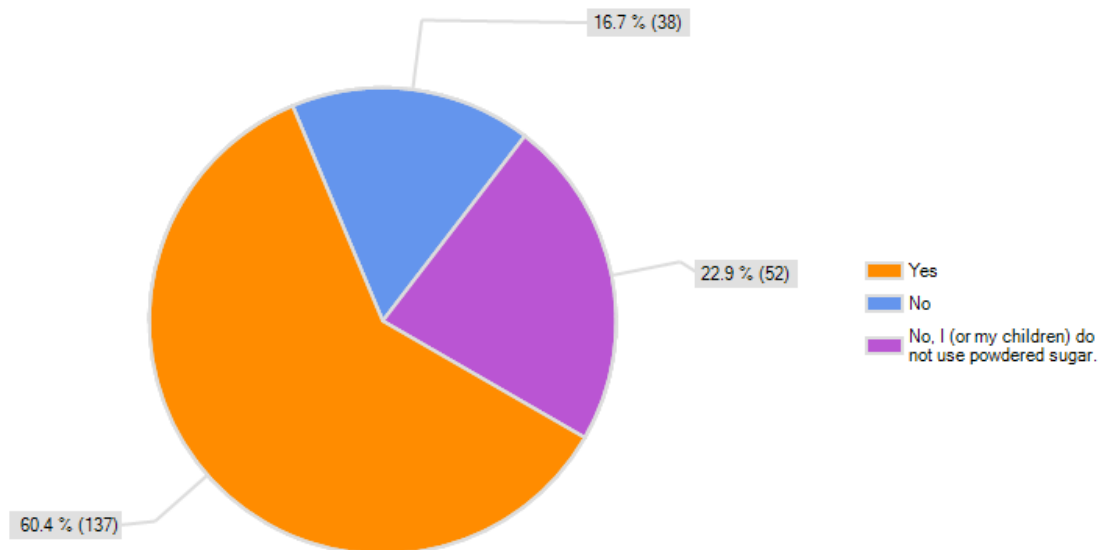


Figure 9. Mess created while dusting powdered sugar. This figure illustrates how many people reported making a mess while using powdered sugar.

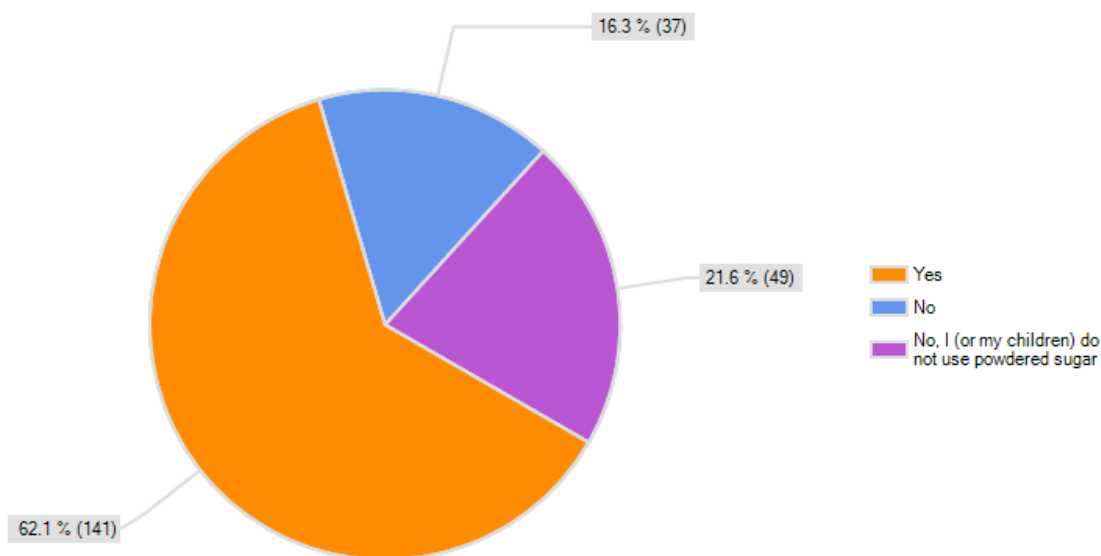


Figure 10. Waste generated while dusting powdered sugar. This figure illustrates how many people reported wasting some sugar while dusting it.

This completed the first part of the survey. The next portion was focused on QR codes. Participants were asked if they own a smart phone and those who said they did not

have a smart phone were asked to stop the survey. Therefore only people who own smart phones completed the next set of questions. One hundred and eighty-two people reported that they do own start phones while 14 said they do not. The remaining participants were then shown a picture of a QR code and were asked if they knew what QR codes are or what they do. One hundred and sixty-one people said yes and 24 said no. The 24 that said no were asked to stop the survey. The now remaining participants were asked how often they scan QR codes. Figure 11 shows the breakdown of their responses.

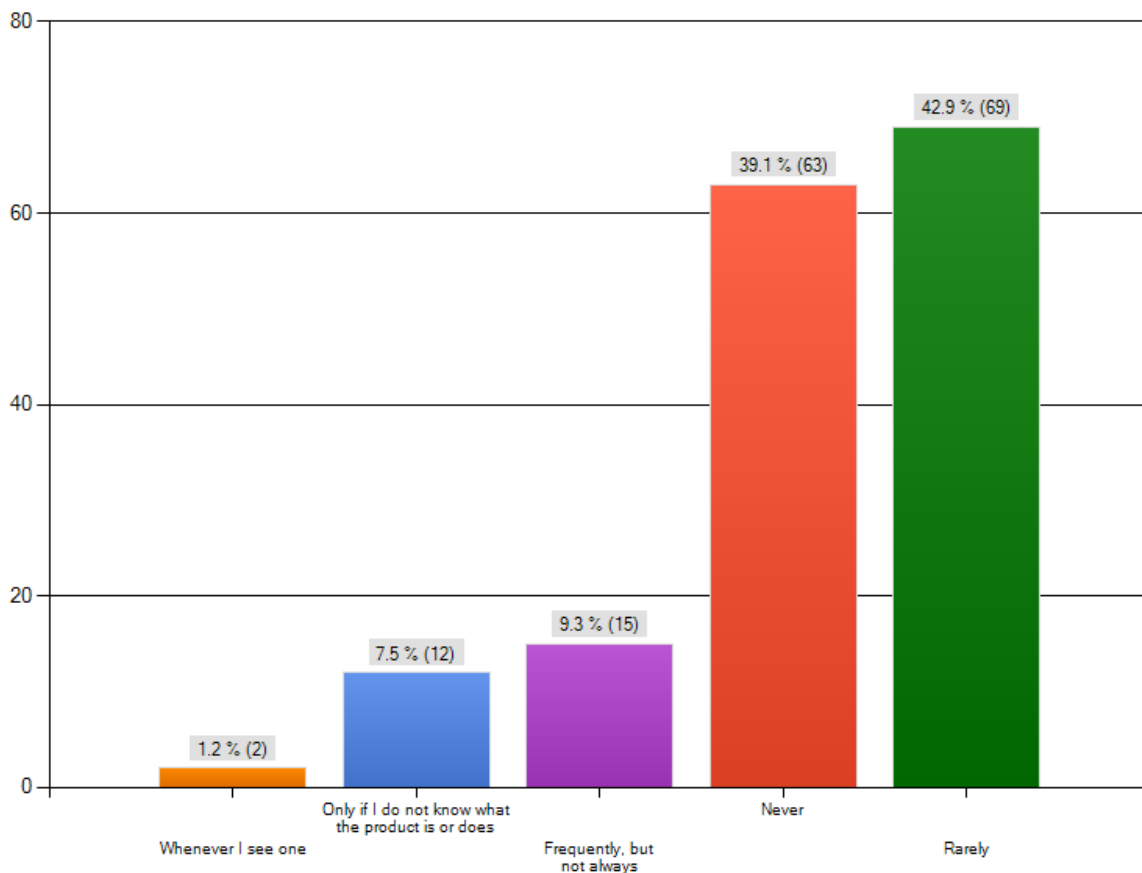


Figure 11. How often QR codes are scanned. This figure illustrates how often people tend to scan QR codes.

Participants were then asked to report when they typically scan QR codes; in the store before purchasing, after purchasing, or both. Figure 12 shows a visual representation of when participants typically scan QR codes.

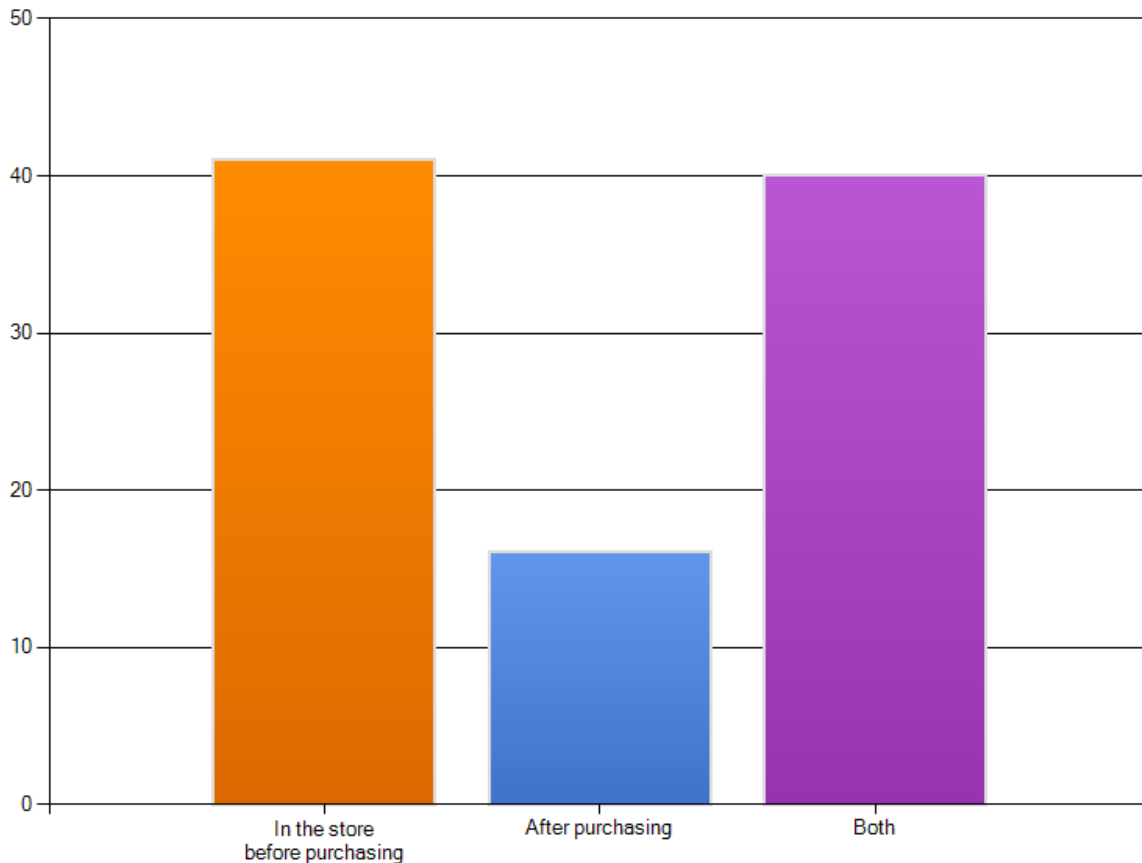


Figure 12. When QR codes are scanned. This figure illustrates when people tend to scan QR codes.

Next, participants were asked to rank how important different content was when scanning a QR code. Figure 13 shows the types of content QR codes could generate and how important the participants think each of them are. Later participants were asked what else they would like to see when scanning a QR code. Most people reiterated what was already

said in the previous question, such as coupons, and many responded that they don't scan the codes at all so they don't have a preference. The rest of the answers recorded were things like consumer ratings, any sort of cool information about the product, recipes, contests, allergens, where the product is made, whether the product is organic and games. Several people recorded that they would like to know why they should scan the code before they actually scan it. Such as, "Scan here for instant coupons!"

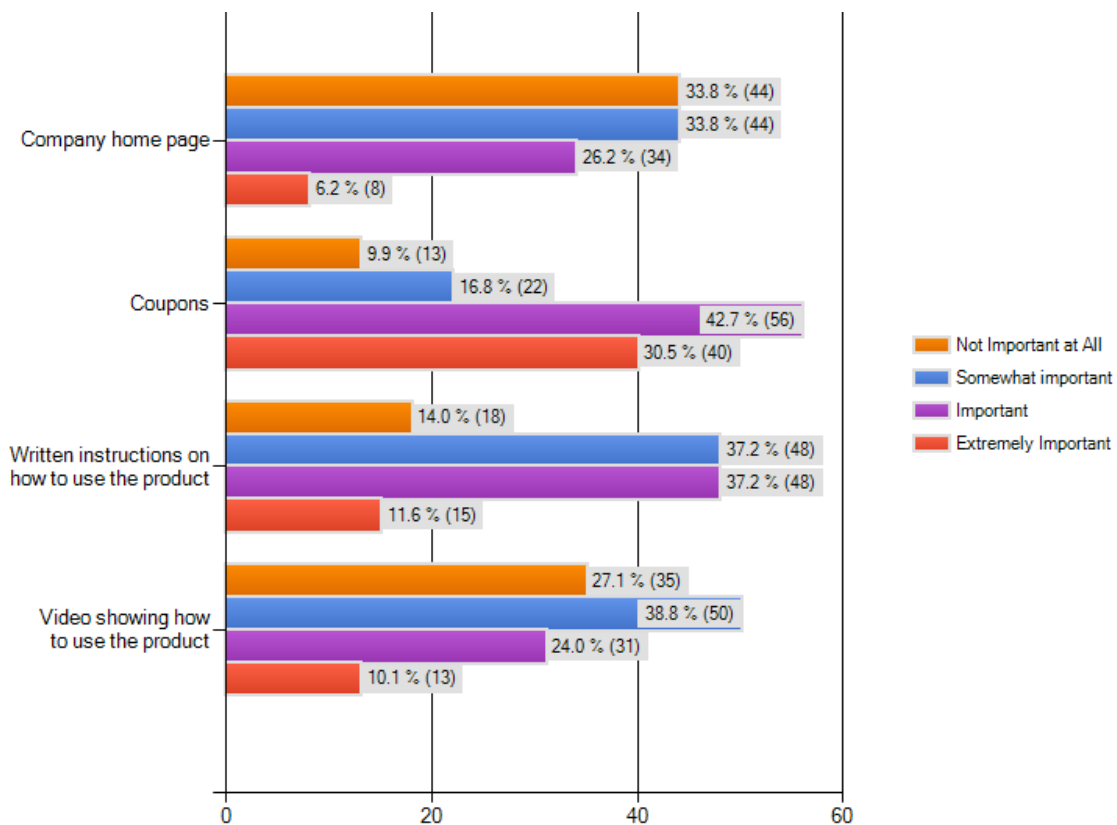


Figure 13. QR code content. This figure illustrates what people think is important content for QR codes to generate.

Participants were then showed 8 different QR codes and were asked to rank them on how likely they were to scan the codes. Figure 14 is the set of QR codes the participants were shown. They were asked to rank them on a scale of 1-4, 1 being most likely to scan and 4 being would never scan. They were also asked to explain why they chose the answers they

did. Responses are as follows:



Figure 14. QR codes. This is the set of QR codes that participants were shown and then asked to rank in order of likeliness to scan.

	1	2	3	4
A.	28.6% (38)	18.8% (25)	15.0% (20)	37.6% (50)
B.	20.6% (27)	19.8% (26)	24.4% (32)	35.1% (46)
C.	30.2% (39)	18.6% (24)	17.8% (23)	33.3% (43)
D.	23.1% (30)	20.8% (27)	25.4% (33)	30.8% (40)
E.	17.6% (23)	25.2% (33)	32.1% (42)	25.2% (33)
F.	16.8% (22)	28.2% (37)	29.8% (39)	25.2% (33)
G.	26.3% (35)	30.1% (40)	21.1% (28)	22.6% (30)
H.	26.5% (35)	26.5% (35)	18.9% (25)	28.0% (37)

Table 2. Responses to ranking question based on Figure 14.

Of the 98 people who gave reasons for ranking the codes as they did, 31% said they were more likely to scan the non-traditional codes because they were more visually appealing, interesting, and unique. Some examples of these responses are:

“The added use of color adds personality and character.”

“More unique means more likely to scan.”

“A-C seem to spark more interest.”

“I like the creative integration of the QR codes in A, B, and C, and I would be more curious to know where they lead to than a normal QR code. I also like the integration of the logo in the QR code because it makes it more visually appealing and gives it more connection to the brand.”

Of the 98 responses, 18% said they were least likely to scan the creative designs because of reasons such as they were too distracting. Some examples of these responses are:

“D-H were simple and didn't have what seemed like a silly and hidden message with the QR code.”

“Most images have too much going on to tell that there is a QR code.”

“I think the top 3 are a bit overwhelming.”

Eight percent did not understand the question and reported only that they don't ever scan QR codes and the remaining 43% responded that they would most likely scan the more traditional looking codes because they were more familiar looking and fit within their view of how a QR code should look. Some examples of these responses are:

“D-H are more traditional looking so I'd be more likely to realize they are codes to scan.”

“I tend to navigate towards black codes.”

“It is just one I am most used to seeing or familiar with.”

After the preliminary survey was completed 10 volunteers were asked to participate in a hands-on study where they were able to test out the new package design. Participants were asked to sprinkle powdered sugar onto to different cookies, one however they normally would, using the package they would normally buy, and one using the new package design. Of the ten participants, 5 used the box of sugar and 5 used the bag. Two sprinkled the sugar directly from the box onto the cookie, 6 used a sifter with a spoon, and 2 used just the spoon to sprinkle the sugar. One person reported that at home they have a special secondary container they put their powdered sugar in that has a lid with holes in it to sprinkle from, but for the study they just used the sifter with a spoon.

After participants tried out the new package they were asked to describe their experience and during the process their actions were recorded. Nine people liked the look of the cookie sprinkled with the new package design better and one person stated that both methods of sprinkling produced the same results. Three people reported that sprinkling from the new package was more controlled. Seven people made a mess on the table when using a traditional method of sprinkling. Seven people had extra sugar in the sifter or spoon that they either had to throw away or try to pour back into the primary container. When asked if the new package added any value, three people said it was easier to use, one said it was harder to use, two said it added value by not requiring any utensils, two said it was easier to open, one said it was more efficient time wise, and one said it was easier to store. When asked to describe their experience here are some of responses given:

“Just a few shakes [of the new package] distributed beautifully and easily and no mess!”

“[The new package is] easier just because there no mess involved. You can just pop it open, sprinkle it on, and then close it.”

Holding up the new package design, one participant said, “my assumption is that this would cost a little more, but depending in the price I probably *would*, without lying, *would* pay a little more for this because you aren’t going to waste as much, plus you can store this more easily.” After another participant used the new package she laughed and said, “that’s more about how much I wanted [on the cookie].”

Chapter 5: Conclusions & Recommendations for Improvements & Further Research

Conclusions

Based on the results recorded in the survey and study, using powdered sugar seems to be a messy and wasteful task, because more than 60% of the survey participants, and 7 of the 10 study participants reported that they make a mess and waste sugar when they currently dust powdered sugar. A product that eliminates the need for extra utensils reduces the mess and waste to almost none, if not any at all. The majority of people who took the survey stated that they currently buy their powdered sugar in a plastic bag. These bags are not resealable, which means to ensure no spillage during storage the bag needs to be tied up somehow or be placed in a secondary zippered bag. The new package design eliminates the need for any secondary container.

Contrary to the research found on QR codes stating that they are ugly and therefore may cause people to not want to scan them, 61% of the people who participated in the survey stated they would more likely scan a traditional looking code. Eighteen percent of those people did not like the creative codes because they were distracting and 43% wouldn't scan them because they were unfamiliar or did not look like QR codes to them. It was surprising not to see more people intrigued by the QR codes designed to be more aesthetically pleasing.

During the hands-on study one person reported that the new package design was harder to use because they were being very cautious and gentle and it took a lot of shaking to get the sugar out. A few other people mentioned that they were afraid to shake it too hard because they thought the sugar might come bursting out.

Recommendations for Improvements and Further Research

A study such as the one conducted for this project could have been improved in certain ways. First of all, a larger group of participants would produce a more accurate sample response for the general powdered sugar consumer. If this study were to be expanded upon, the hands-on study should also include sample labeling and experiments incorporating the QR codes in the label design. Many people who took the survey reported that they did not like the creative QR codes because the codes were not all square and they were not all aligned horizontally. In a further study it would be interesting to see if those people would give the same response after trying to scan the codes because the codes should all still scan.

Another area that would be good to do further research in would be if instructions on how to use the package would increase usability and customer satisfaction. One participant in the hands-on study stated that the new package was harder to use. They, and a few other participants, were afraid to give the container a substantial shake. One person compared it to drinking ice water out of a glass and being afraid to tip the glass too far in fear of all the ice crashing into their face. The new package design works best with a confident shake or two, so it would be interesting to see if instructions saying something along the lines of “give it a good shake” would improve the results.

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Appendix

***1. How old are you?**

- ☐ <18
☐ 18-25
☐ 26-40
☐ >40

***2. What gender are you?**

- ☐ Male
☐ Female

***3. How many children younger than 16 are in your household?**

- ☐ 0
☐ 1-2
☐ 3-4
☐ 5+

***4. Do you use powdered sugar when baking?**

- ☐ Yes
☐ No
☐ No, I do not bake

**5. If you answered yes to the previous question, what style package do you currently buy?
(check all that apply)**

- ☐ Box
☐ Bag
☐ Resealable Bag
☐ Other (please specify)

***6. Do you dust powdered sugar on any baked goods, breakfast, etc.?**

- ☐ Yes
☐ No

7. If you answered yes to the previous question, how do you currently dust it? (check all that apply)

- ☐ With a sifter
- ☐ With a spoon/fork
- ☐ Pour out of box
- ☐ Other (please specify)

***8. If you have children younger than 16 in your household, do they like to dust powdered sugar on baked goods, breakfast, etc.?**

- ☐ Yes
- ☐ No
- ☐ I do not have any children younger than 16 in my household

9. If you answered yes to the previous question, how do they currently dust it? (check all that apply)

- ☐ With a sifter
- ☐ With a spoon/fork
- ☐ Pour out of box
- ☐ Other (please specify)

***10. Do you (or your children) create messes while using powdered sugar?**

- ☐ Yes
- ☐ No
- ☐ No, I (or my children) do not use powdered sugar.

***11. Do you (or your children) waste any powdered sugar when using it?**

- ☐ Yes
- ☐ No
- ☐ No, I (or my children) do not use powdered sugar

***12. Do you own a smart phone?**

- ☐ Yes
- ☐ No (If no, please click finished at the bottom of the page and thank you for completing this survey!)

13. If you answered yes to the previous question, what platform does your smart phone use?

- ☐ iOS
- ☐ Android
- ☐ Other (please specify)

An example of a QR code**14. Are you aware of what QR codes are/what they do?**

- ☐ Yes
- ☐ No (If no, please click finished at the bottom of the page and thank you for completing this survey!)

15. If you answered yes to the previous question, how often do you scan QR codes?

- ☐ Whenever I see one
- ☐ Frequently, but not always
- ☐ Rarely
- ☐ Only if I do not know what the product is or does
- ☐ Never

Please explain why you chose the answer you did.

16. If you do scan QR codes on products, do you scan them in the store or after you have already purchased the item?

- ☐ In the store before purchasing
- ☐ After purchasing
- ☐ Both

17. What QR code reader app do you use most frequently?

18. Please rate how important each type of content is when scanning a QR code.

	Not Important at All	Somewhat important	Important	Extremely Important
Company home page	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coupons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Written instructions on how to use the product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Video showing how to use the product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Images for Question 19

A.



B.



C.



D.



E.



F.



G.



H.

19. Rank on a scale of 1-4 (1 being most likely to scan, 4 being would never scan) how likely you would be to scan the QR codes that are labeled above.

	A.	B.	C.	D.	E.	F.	G.	H.
Rating	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Please explain why you chose your above ratings.

20. What are some other types of content or other features you would like to see when scanning a QR code?

21. If you live in the San Luis Obispo area, would you be willing to participate in a hands-on study involving the use of a new package design? Studies will be conducted all next week (Oct. 13th-19th) and possibly into the following week if need be.

☐ Yes

☐ No

22. If yes, please provide your information below.

Name:

Email Address:

Phone Number:

Preferred date(s):