Meet your food: Empowering the user by redesigning nutritional standards and guidelines

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Abstract
According to the World Health Organization more than one billion adults are now obese or overweight (WHO.2012). The main reason for this is the consumption of more energy-dense, nutrient-poor food with high levels of sugar and saturated fats. This correlates to a lack of knowledge of nutritional information about the food and drinks consumed. Lack of awareness leads to poor product choice, which in turn can have devastating side-effects on the person's health and can also result in unwanted weight gain. Nutrition facts on product labels are the main information interface between consumers and food products. These information guidelines are currently misleading and produce a dizzy analysis of energy, nutrients and daily amount needs of a person's dietary intake.

Nutritional standards and labelling systems rely on a number of different stakeholders and policy makers. In order to fully comprehend all of the factors contributing to the poor nutritional information labelling in supermarkets the world over, this paper provides an overview of existing literature. A case study analysis is conducted of existing systems in the United States, Asia, Australia and different systems in Europe are included in order to make a more accurate and detailed study of the problem and explore appropriate potential solutions.

The paper will explore how using the methods of Design-Thinking can contribute in collecting information about consumer's experiences and behaviours during shopping. Based on the outcomes of the research analysis this paper provides a detailed view of a proposal for an alternative design solution. While the proposed design solution is still in a testing phase, it is a representation of a much-needed shift in the nutritional information design paradigm.

Key Words
Supermarket, Nutritional Standards, Portion Guidelines, Nutritional Information, Empowering the User, Design Thinking

Introduction
According to the World Health Organization more than one billion adults are now obese or overweight (WHO.2012). The main reasons are the consumption of more energy-dense, nutrient-poor food with high levels of sugar and saturated fats. The health consequences range from increased risk of premature death, to serious chronic conditions that reduce quality of life. Some of these conditions include diabetes and heart disease, two of the highest known causes of death in the developed world. The EU's nutrition information is not mandatory, the regulation was made by the EU Council Directive 90/496/EEC. "For the benefit of the consumer on the one hand, and to avoid any possible technical barriers to trade on the other, nutrition labeling should be

In developed countries worldwide more and more people are struggling to maintain a healthy diet and weight. Whether people need to adjust their meals for a health condition, loose weight or just want to be healthy, it is imperative to know all the nutritional information about the food and drinks consumed. Lack of meaningful information can lead to poor product choice, which in turn can have devastating side-effects on the person’s health and can also result in unwanted weight gain.

The shopping experience provides visual stimulants for customers through images, colours, claims and values. This phenomenon, often referred to as the Gruen Effect (The Gruen Transfer, 2011), confuses and distracts the consumer from their intended task. The already distracted customer should then also cipher through a complex structure of Nutritional Information in order to understand the contents of their desired products.

“Nutrition labeling’ means any information appearing on labeling and relating to: energy value; protein, carbohydrate, fat, fiber, sodium, vitamins and minerals” (Council Directive 90/496/EEC., 1990)

The food industry uses this information to mislead people into buying the more expensive or branded options on the supermarket shelves. “As soon as you enter a supermarket, you are being manipulated” (Lee et al. 2002). The user is manipulated into buying such products as a result of cunning advertising that uses inaccurate portion measures and vague nutritional information.

Nutritional labels provide information according to company growth concerns and not according to peoples nutritional needs. The structure of information in this way confuses the consumer, disorientates them and leads them into make the wrong choices for themselves and their families. “Information shall be expressed per 100 g or per 100 ml. In addition, this information may be given per serving as quantified on the label or per portion, provided that the number of portions contained in the package is stated.” (Council Directive 90/496/EEC., 1990)

From this the following questions arise:

• With the aim of empowering the user, what are the alternative solutions for nutrition information and portion guidelines?
• How to empower consumers with more transparent, comprehensive and useful information?
• How to help users be more aware of the motives behind their shopping decisions?

In order to effectively answer these questions, a fully comprehensive understanding of all the factors contributing to the poor nutritional information labelling in supermarkets needs to be explored.

Nutritional information is subject to influence from a number of different stakeholders. Large food corporations rely on nutritional information to sell their products, and hold the power to change placement of their products within the supermarket, more importantly they have the power and financial possibility to work with governments to change nutritional standards for the economic benefit of both parties.

“Our food system has changed tremendously in the past 50 years, keeping in step with the pace of technological “progress.” These changes, for the most part, have been made without our approval or even our awareness. Yet they can significantly affect our health,
our environment and our values.” (Lee et al. 2002)

The paper *The Supermarket Tour* provides an extensive analysis of all the factors contributing to misleading information in the supermarket including nutritional information, ingredients and branding. It indicates which areas have potential for change, for example we can see that perhaps it is not possible to change the ingredients of a product but it is possible to show the information with more transparency so that it is more comprehensive for the user.

The use of Design-Thinking methods can contribute in achieving a user centred nutritional information approach. These methods include collating literary resources by desk research, quantitative data by alternative survey methodology and quantitative data through video, personal and photographic interviews. Analysing case studies and their use of information design and delivery inside market places ensures accurate data on consumer behaviour and makes user-centred research relevant. The case study research considers nutrition labelling the world over so as to make a more precise and detailed study of the problem and explore appropriate potential solutions.

Providing process, user observation and nutrition standards evaluations allows for a more in depth discussion of how an integrated design thinking process can create valuable solutions to empower the user. Delving into the analysis of information design inside supermarkets including colour use, contrast, position, proportion, legibility and typography in a variety of packaging available in supermarkets. Based on the outcomes of the research analysis a detailed view of a proposal for an alternative design solution is provided.

The proposal for an alternative design solution includes the re-design of the nutritional standards information layout on both front and back of packaging, a re-design of the portion guideline system, and the addition of calorie input and output amounts in relation to physical exercise.

**Problem Statement**

In order for people to maintain a healthy weight and eating habits it is imperative to know all the nutritional information about the food and drinks consumed. Nutrition facts on product labels are the main information interface between consumers and products. The current system is far too open to manipulation by the food and beverage companies.

“The food label is an inherently complex piece of information that assumes that all users are literate, familiar with the metric system of measure, understand nutrients and their relative value. For example, what’s the difference between fat and saturated fat? Why are complex carbohydrates and sugars subsets of carbohydrates and why should I care?” (Belser, B., 1994)

The information the companies provide encourages people into buying the newest, more expensive or branded options on the supermarket shelves. Unfortunately these options happen to be the unhealthy and less nutritious choices.

Current nutritional information and guidelines produce a confusing analysis of energy, nutrients and recommended daily dietary intake. The labels provide information according to company growth concerns and not according to peoples nutritional needs. The structure of information in this way confuses the consumer, disorients them and leads them into make the wrong choices for themselves and their families.
Methodology
The Design Thinking method is essentially a human-centred point of view methodology. It emphasizes observation, interviews and multidisciplinary collaboration with the intention of deeply understanding the user. This approach creates a source of inspiration to reach the users’ insights and undiscovered needs. It also allows us to contextualize the problem and therefore use creativity in order to come up with possible solutions.

The process used by the group was divided into the following six steps:

1. **Understanding the Context of the Problem**
   During this step the research group found content about obesity, comparisons and analysis of existing nutrition standards, health and different life styles. The desk research was necessary to understand the problem at a deeper level and to aid the development of strategies for acquiring user information in the further steps. It is important to notice that the analysis of the existing nutrition standards creates a background of positive and negative usage of the product content, daily amount intakes and nutrition information on product packages. This led into the first level of analysis where the group observed what is lacking, what should be avoided and what could be included.

2. **Data Analysis: Quantitative Research**
   For the Analysis, the group obtained information through Field Research. The field research was divided in two types: quantitative and qualitative. Two types of quantitative research were used; the first was done by using surveys mounted on street poles and walls located next to or near supermarkets in different city areas. Face to face surveys were also done through an observe & answer method by asking people in the vicinity of supermarkets to observe images and answer questions by choosing from the given options on questionnaire boards.

3. **Data Analysis: Qualitative Research**
   The qualitative research was based on private personal interviews with five user groups from different countries, ages, health conditions and behaviours, which were referred to as user profiles. It was important to consider the most common extreme users. Interviewees were chosen according to this.

   The five user groups or target demographics that were interviewed fell into the following categories:

   1. Health Conscious Single
   2. Pensioner Couple
   3. Young Low Income Single
   4. Working Single
   5. Average Family of Four
Interviews were conducted in person and by videoconference. The interview outputs were recorded in order to observe the actions and behaviours in the most detail possible. Following the interviews, pictures of their refrigerators were taken in order to gather a rich visual image of the products they consume and therefore provide a more accurate consumer profile concerning their diet and product preferences. After the data analysis, the research group noticed some behavioural patterns and homogeneous issues during the shopping process across the range of interviewees.

4. Observation Analysis
In order to obtain a deeper analysis of behaviours and instinctive actions of shoppers in the supermarket the group observed the shopping process and experience. The supermarket product locations and way finding systems were also studied meticulously in order to gain a deeper understanding of shopping behavioural patterns and orientations. A deep analysis of observation, survey and interview results was done, which led the group to a clear direction of where design solutions can be found.

5. Point of View
In this step, the research group started to identify needs, define possible solutions, brainstorm and cluster information. As a result, the researchers combined all the user groups into one unique character persona and developed a scenario in order to discover where the user fits as a food consumer. This persona was used in order to identify which aspects need to be solved, which triggers need to be avoided and which elements already existing can be left untouched.

6. Ideation
Using the existing nutrition guidelines as an example of good and bad practices helped to develop the Ideate step. This plus the field research and observation summed up into a clear direction for the project solution design proposals. These steps enabled the researchers to be creative and have valuable innovative ideas about the research topic. This process took several sections and had many revisions. During the revisions, many other problems arose, leading the team into better problem solving proposals and results.

Problem background
At least 2.8 million adults die each year as a result of being overweight or obese. In addition, 44% of diabetes, 23% of ischemic heart disease and between 7% and 41% of certain cancers are attributable to being overweight and obese. (WHO, 2011)
In adults, being overweight or obese increases the risk of cardiovascular disease,
diabetes and several types of cancer, as well as of non-fatal diseases as arthritis. (WHO, 2011).

*How can being overweight and/or obese be reduced?*

To avoid being overweight it is necessary to limit energy intake from total fats and sugars and increase consumption of vegetables, whole grains and nuts. This means that the main driver in keeping people healthy is shaped by people’s food choices. The food industry has the responsibility to show the product’s content with an ethically correct approach.

*Why are consumers struggling to make the right food choices?*

Currently, food brands are increasing the usage of aggressive front-of-package labels that confuse, mislead and compromise the healthy consumption of food. The existing nutritional standards are far too open to providing misleading information to the consumer. The measurement method is neither precise enough nor comprehensive enough for the consumers around the world and it produces an inaccurate amount of energy and fat intake per portion.

*What are Nutritional Standards?*

A Nutritional Standard Guideline is a table reference of how much energy, sugar, protein, salt and others nutrients and minerals are present in a portion of food or drink. This table also shows the percentage of energy and nutrients of a person’s recommended daily nutritional requirements. This table should allow consumers to analyze the nutrition content and choose between products for personal daily diet. The tables can be used by different kinds of users to adapt the food consumption for their individual needs and wishes.

**Information Issues**

The existing system of nutrition guidelines misleads the customer due to unclear information. The nutrition requirements of an individual are actually different depending on age, weight, gender and physical activities whereas the energy requirements used on current nutrition labelling are catered to adults (1800 to 2500 Calories per day). This value is used as an average for the population majority needs by the nutrition labelling standards.

![GDA recommended values for women, men and children.](image)

*Figure 1. GDA recommended values for women, men and children.*

*Case of study 1: GDA – Guideline Daily Amounts*

The GDA system was created in collaboration between the UK Government, the food industry and consumer organisations and it is used in most of the European countries. "It started life in 1996 as Daily Guideline Intakes (DGI) for use by the UK Ministry of Agriculture Fisheries and Food (MAFF), now the Food Standards Agency (FSA). Initially they were set for fat, saturates (saturated fat), sodium, sugar and fibre in grams per day for men and women. “ (GDA label, 2011)
The system is based on rules of measurement. The first reference is providing nutrition information of energy and nutrients based on 100g for solid products and 250ml for liquid products. The weight measurement is not clear because it is difficult to realize the amount volume.

During the observational research phase, the researchers realized that this type of measurement does not work for all the existing products. Furthermore, companies choose the portion size of the measurement. Sometimes, this portion does not represent the average consumption. (Figure 2)

![Figure 2. An example of recommended portion size of a food that would normally be consumed as ¼, ½ or whole package.](image)

It was observed that companies use the system to mislead the consumer and provide inaccurate portion information. (Figure 3)

![Figure 3. Image on the front of packaging shows a portion much larger than recommended.](image)

**Case of study 2: UK Traffic light labelling system**

The traffic light labelling system uses three colours to differentiate the amount of energy and nutrients in products. Traffic lights scheme uses a colour based system to show the nutrients on high, medium or low level per portion. Low values are represented in green, medium in orange and high nutrition values are red.

This system is useful for consumers to see high levels of components in colour. However the pie chart is confusing as the components shown on the front do not add up to 100%
particularly as calories use a different unit of measure compared to others which may use grams or milligrams.

Figure 4. UK traffic light system pie chart.

Case of study 3: USA facts up front proposal

Facts Up Front is a nutrient-based labelling system that summarizes important information from the Nutrition Facts Panel in a simple and easy-to-use format on the front of food and beverage packages. Facts Up Front is a voluntary initiative aligned with the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) guidelines and regulations.

The Facts Up Front icon is designed to allow consumers to quickly see, understand and use key nutrient information. The basic Facts Up Front label lists calories per serving and information about saturated fat, sodium and sugar – nutrients the Dietary Guidelines for Americans recommend limiting. This system uses a cup as measurement.

During the observational research phase the researches discovered some key problems with this system. It offers far too many pieces of information on the front of package. Some of this information is often not important for individuals, this can be confusing as they are uncertain what to pay attention to causing them to choose a product for the wrong reasons.

Figure 5. Typical Fact up front label.

Proposed Problem Solutions

Through the analysis of the research outcomes the team was able to observe some clear design opportunities. The research led to the redesigning of the current nutritional labelling system in order to provide a comprehensive solution to the overload of information found in supermarkets. One of the purposes of changing the label system was to provide an easier way of understanding the portion sizes and guidelines that were used to measure the nutritional values of a product. It was necessary to provide people with a system of measurement that they were more familiar and comfortable with unlike the current systems, which use 100g portions as well as percentages further confusing the user. According to Antonuk, when exposed to a full package nutrition value, the amount consumed by non dieters more closely matched the amount consumed by dieters. “Only when non dieters were made aware of the number of
servings did they monitor their eating behaviour." (Antonuk et al. 2006)

**Volume Measurement System**
The proposed solution to this problem was to use the cup and spoon measures which are currently used in cooking and baking recipes. The group then expanded on this by also using other measurements that might be easily recognizable to the user such as by glass and also per unit and package.

![Volume Measurement System Diagram]

**Information Hierarchy**
The second problem that needed to be addressed was the levels of information offered on the packages. The proposed solution to this was to first divide the levels of information according to importance from front of package information to back of packaging information.

<table>
<thead>
<tr>
<th>1st level</th>
<th>2nd level</th>
<th>3rd level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>Magnesium</td>
<td>vitamin A</td>
</tr>
<tr>
<td>Carbohydrats</td>
<td>Fibre</td>
<td>vitamin B1</td>
</tr>
<tr>
<td>Sugar</td>
<td>Potassium</td>
<td>vitamin C</td>
</tr>
<tr>
<td>Sodium</td>
<td>Calcium</td>
<td>vitamin D</td>
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<tr>
<td>Fat</td>
<td>Iron</td>
<td>vitamin E</td>
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<tr>
<td>Saturated fat</td>
<td>Iodine</td>
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<td>vitamin K</td>
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<td>vitamin B12</td>
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To make the calorie intake information even more transparent the group proposed using a physical activity comparison. A meticulous study about sports and physical activities were conducted and developed by consulting a Physical Education teacher. Every label was designed with different sports or physical activities in order to fit into a
calorie amount = calorie burn activity. The labels describe the time, distance and activity required to burn the calorie amount that a product contains. The sports or physical activities used in the label categories are: walking, running, cycling, kickboxing and wrestling.

**Front of Packaging**

For the front of packaging information the group outlined the main information that was necessary for first level of user interaction. This part of the package needs less information, larger, more eye-catching, clearer and more decisive form of information presentation. The proposed label shows percentage of daily intake of calories, sugars, salt, fat and saturated fat per different kinds of measures such as a cup, tablespoon, teaspoon, glass, unit or package.

**Label: Calorie Intake and Calorie burn Relations**

The team proposed a new way of showing nutritional information on the front of package. The intention behind this proposal was to provide a label that would grab the attention of the user and would encourage the understanding of nutritional information through a fun comparison of physical activities to calories consumed, as exercise was found to be of utmost importance in maintaining a healthy weight and lifestyle.

“Good health, wellness, fitness, and healthy lifestyles are important for all people”.

(Corbin et al. 2006)

The team focused on; How can we incorporate fitness with eating healthy in hopes of leading people into a healthier lifestyle? And how can we provide this through information design on food packaging?

According to (Corbin et al. 2006), the dimensions of health and wellness are: Physical, Emotional (mental), Intellectual, Social and Spiritual. The team intended to implement a system that would involve all of these areas and came up with the following proposal.

**The Proposal**

To show the relationship between Calorie Intake and Calorie Burn using an easily comprehensive visual method. The purpose is to show these relations only in products that are more than 100 calories per portion. A meticulous study about sports and
physical activities were held and developed by consulting a middle school Physical Education teacher Christian Sauermann (Meerbusch, Germany).

Every label was designed with different sports or physical activities which fit into a calorie amount = calorie burn activity. A range of sports or physical activities was used in order to provide a more varied and therefore a more interesting approach to exercise. The labels are customized to the calorie contents of the product they are displayed on. They describe the time, distance and activity required to burn the calories consumed in a standard portion.

The body weight used for the calorie burn calculations was that of a person of 70 kilograms (the average weight between a man and a woman). Each exercise was chosen specifically based on the amount of calories contained in a product and the ideal physical activity to burn said amount. For example the 300 calorie physical activity category can be used for products that range in the 300-399 calorie content. The next category with a different sport from 400-500 calories and so on. (Corbin et al. 2006), (AIQUM, 2009), (Diaet Rechner -).

The sports and physical activities used in the label categories are: walking, running, cycling, kickboxing and wrestling. They were chosen from the list of the most popular participation activities according to the National Sporting Goods Association. (Corbin et al. 2006)

“It is important to choose sports and activities that would be most familiar to people and sports that they can see themselves achieving” (Sauermann, 2011), however, it was decided that to emphasize the amount of effort needed to burn off high calorie food, the inclusion of difficult sports would be best. Sports such as kickboxing and wrestling were therefore attributed to the highest calorie content product category.

Some predictions of possible market reactions were made after results of early small scale testing were analyzed:

- Either this will motivate them to make wiser choices in food or be more conscious about the number of portions to consume from the product, or
- Motivate them to think about being more active and doing more exercise.

Physical Wellness according to Concepts of Physical Fitness is “pursuing behaviors that are conducive to good physical health (being physically active and maintaining a healthy diet)”. (Corbin et al. 2006) “Leading a healthy, active lifestyle is all about exercising and
making healthy choices. If we can use exercise warnings along, we can help people avoid choosing certain products or abusing portions”. (Sauermann, 2011)

With the front package labeling proposal the group is encouraging the behavior of pursuing a healthy lifestyle by applying emphasis to the two main factors; being active and maintaining a healthy diet.

This way of showing nutritional information has the intention and potential to change behaviors and lead people to make healthier choices and be more aware of the importance of physical activities in combination with a healthy diet. The icons will provide the consumer with valuable information at first point of contact, information that they would normally need to search for on the internet or pay a health professional for. It will allow quick comparison of healthy and unhealthy products.

Back of Packaging
For the back of packaging it was important to provide all the necessary information while also encouraging the user to be alerted to high levels of unhealthy contents. The proposed label solution provides a pie chart system to facilitate the understanding for rapid readers, but it also offers information in percentages by taking in account the GDA standards. To further emphasise high levels of unhealthy contents the group proposed a warning icon in an alarming orange colour.

Analysis of Data
Through the analysis of the design outcomes and post prototype testing it was found that the cup, spoon, glass, package and unit measurements work far better than the existing 100g portion guides. By using measures that the user can find in their own home, they able to better and more quickly understand the ideal portion consumption of a product.

The comparison of calorie intake amount to calorie burn activity was also found to be an effective way of providing the user with the much-needed translation of a products’ calorie content. Most users do not understand what energy and calories actually represent hence providing them with a physical comparison such as 30 minutes running to burn off 200 kcal means they can easily compare a real life example to the amount of food they are consuming. Associating sport activities with calorie intake directly on the packaging itself proved to motivate people to be more aware of their wellness and health lifestyle.

After testing of the back of packaging information it was found that the percentage amounts remained confusing to most users. It is important to note that these amounts continued to use the 2000kcal system of recommended daily calorie intake and whilst this is made more clear on the re-designed labels, users are not completely aware of what the 2000kcal diet actually means for them. The 2000kcal system is deeply flawed as it is not appropriate for children and is aimed at adults who do regular exercise. This means that unless the 2000kcal system is made inherently clear on every package, the user will still be mislead into thinking they are consuming the right amount of calories or nutrients when in fact they may well be consuming more than recommended for their own needs.

Conclusion
There are many factors, which contribute to the misleading information in supermarkets and to battle these issues, a more radical approach needs to be taken (Lee et al. 2002). However it is clear that there exists a possibility to make the main and most important
nutritional information more transparent to the user. By using the proposed cup, spoon, package and unit measure instead of the existing 100g and percentage the user is provided with a system of measurement that they are more familiar and comfortable with. The portion guidelines and the physical activity comparison can combine to encourage the user to see a real life association with their food and beverage intake and the amount of activity needed to use or burn the calories contained.

Consumers demand a system that is focused on the consumer interest instead of the food industry’s selling goals. The EU Council regulation does not specify in detail about shape, colour, size, legibility and portion measurements. The nutrition labelling should be mandatory and should be developed by information designers to provide functional labelling guidelines regulation that achieves the consumer interest without influences from the food industry. New research should be developed to focus on consumer behaviour, to prove the efficiency of new systems and improve the current nutrition labelling. Ultimately, the effectiveness of the regulation should be a legitimate balancing of the consumer information interest and the food industry showing the facts without misleading the consumer.

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