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USING A TECHNOLOGICAL APPROACH TO IMPROVE FRESH FOOD SAFETY STANDARDS

CASE STUDY: GS1 FINLAND

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ABSTRACT

Consumer Safety in the fresh food industry is facing multiple threats with few measures being taken in assuring a complete eradication on hazardous materials and particles contaminating our foods. Many international and locally administered organizations have been put in place to check the safety of the fresh foods being sold to consumers.

This thesis goes into underlining what type of measures have been set up in the role of Safety Standards for fresh foods by these organizations. The findings are meant to indicate that tighter safety standards should be implemented and monitored at certain levels such as the basic level of food production and at different parts of the supply chain.

The research was undertaken using a deductive approach using real life case examples were gathered. Qualitative method also was used in the understanding of the scale of the threats facing the consumers and the environment. By having a deductive approach to the cases found in previous studies in electronic journals, press releases, a documentary film and published books that handled mostly the basis of Consumer Safety, the most outpouring issues were those that are centered around the ethics of a business trading environment, and how moral value and social responsibility seem to have lost their power in place of technological advancements in gene-engineering and profit making. These bring out superior food products yet that are low in safety.

The findings in this thesis point out deep concerns in the fresh food industry that have the capability to affecting human health at various levels in the long-term, also on climate change which has a direct effect on the farming industry. The author believes efforts to retain a safer environment by way of safety standards is key to be able to provide fresh foods to the consumers, to balance human activities and the surrounding environment.

Keywords: Safety Standards, GoScan Application, health hazards, organic foods, GS1, Evira, genetically engineered foods/seeds, engineered nano particles.

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LIST OF ABBREVIATIONS AND DEFINATIONS

ADHD: Attention Deficit Hyperactivity Disorder

EFSA: European Food Safety Authority

ENP: Engineered Nano Particle

FAO: Food and Agriculture Organization of the United Nations

FFSA: Finnish Food Safety Authority (EVIRA)

GDP: Gross Domestic Product

GMO: Genetically Modified Organism

GS1: GS1 Organization

GS1 AUS: GS1 Australia

GTIN: Global Trade Item Number

ISO: International Standards Organization

K GROUP: Kesko Group Finland

NP: Nano Particle

S GROUP: S Group (S-ryhmä) Finland

SME: Solar Magnetic Eruption

SSD: Standard Sample Description

SSRF: Spiritual Science Research Foundation

SPS: Sanity & Phytosanitary Measures

1 INTRODUCTION

1.1 Background

In our globe, past records of the Assyrian tablets reveal methods in the determining the correct weights and measures for food grains, and Egyptian scrolls reveal that they had prescribed the labeling for certain foods, In ancient Athens, beer and wines had to be cross-checked for purity and soundness, the Romans also had a state food control systems to protect consumers from fraud or bad produce. (Fishel 1963.) In respect to ancient way of life, we find out that safety on consumer products was a thing of great importance, but in our present day, this issue has been clouded sectors unknown to the public that shall be furthure discussed in this thesis.

To top it on safety from ancient records, the Levites who had religious and a close political responsibility for the Israel nation, received divine instructions and warning concerning the mingling of seeds on farms and mixing diverse breeds of animals with another. (Leviticus 19:19, KJV 1611). Such instruction should not be handled lightly, as they pertain to the safety issues that standards in our modern day society are. This instruction was not only for the Jewish tribe but for the rest of humanity.

Standards in general have been applied into logistics and also in shaping parts of the business operations, from how it manufactures goods to how it packages it, leading to improving its marketing capability.

According to the Codex Alimentarius, evidence from the earliest historical writings indicates that governing authorities were concerned with standardization rules to protect consumers from dishonest practices in the sales of food. (Fishel 1963.)

In our global society today, food safety can be secured by being able to identify different products by certain codes from their production stage where it is located in a given store. This intricate information is becoming of great advantage for

easy logistics, marketing and in this thesis topic the author shall discuss the importance of advancements in this type of technology such as the GoScan Application as a transparency tool for customers to be able to know and trust the food product that they are purchasing.

Over the years, companies have taken into account the importance for such actions, which inspire innovation and high quality, in what they sell to global customers by using global safety standards.

These key companies are the standard bodies and the group of industries who are upholding the safety of customer products. The absence of such bodies would result to a limited market with a small economy that wouldn't be effective for companies that are looking for a global expansion and where customers want to receive goods from different ends of the earth.

Safety standards can be of help to businesses, customers and the natural environment. In this research, we will concentrate more on the importance of the technological tool in assuring safety for the consumers

1.2 Thesis Objective, Research Questions, Limitations

This topic has been chosen to help in the upholding the factor of food safety, in favour of consumers having the availability of transparency on their products, through implementing the GoScan mobile Application to improve the awareness in purchasing healthy products, and how it can be of great value in assuring safety standards are met.

Therefore the main research question is: Can the GoScan application be useful for Finland's consumers?

The sub-questions that follow under this research are as below

I. How do standards influence our economy?

II. How can the traceability model used in GS1 GoScan be of value to consumer awareness and safety

III. What areas can be stressed, in the traceability model used in GS1 GoScan application to improve consumer awareness and safety?

IV. What are the present dangers facing the fresh food market? And can they be contained?

1.3 Theoretical Framework

The best approach to bring out the issues facing consumer safety and why safety standards are a way to go can start by first building a framework that can help us reach the set goals. By using a pragmatic strategy that involves handling cases in a sensible and realistic way, is innovative, ethical and effective. Strategy is about moral standing, sound judgment, implementation skill and learning capability (Ikujiro & Zhichang 2012, 15.)

Modern day solutions in analyzing harmful substances in consumer products have been brought up through the advancement of technologies. Now we can be able to trace and identify harmful products, and learn what effects it has to the customer if they are unknowingly come into contact with a harmful product.

This research is done to give us a view of how safety standards is related in the advancement and development of many products and services, that the masses of people use in their daily lives, by offering consumers' quality and laying a common language between trading partners.

1.4 Research Methods & Data Collection

Research Approach

For a successful gathering of data for this topic, options had to be weighed on which methodology to follow. In the research world there are two common approaches to begin a research, there is an inductive approach and deductive. (Saunders et al. 2009.)

The author used a qualitative approach through having an interview with GS1 Finland and a quantitative approach in the form of a survey with a variety of consumers.

In view of (Saunders et al. 2009). Below is a table set for understanding different research approaches used t in this thesis, through deductive method which is more fit for a better progression and find a market.

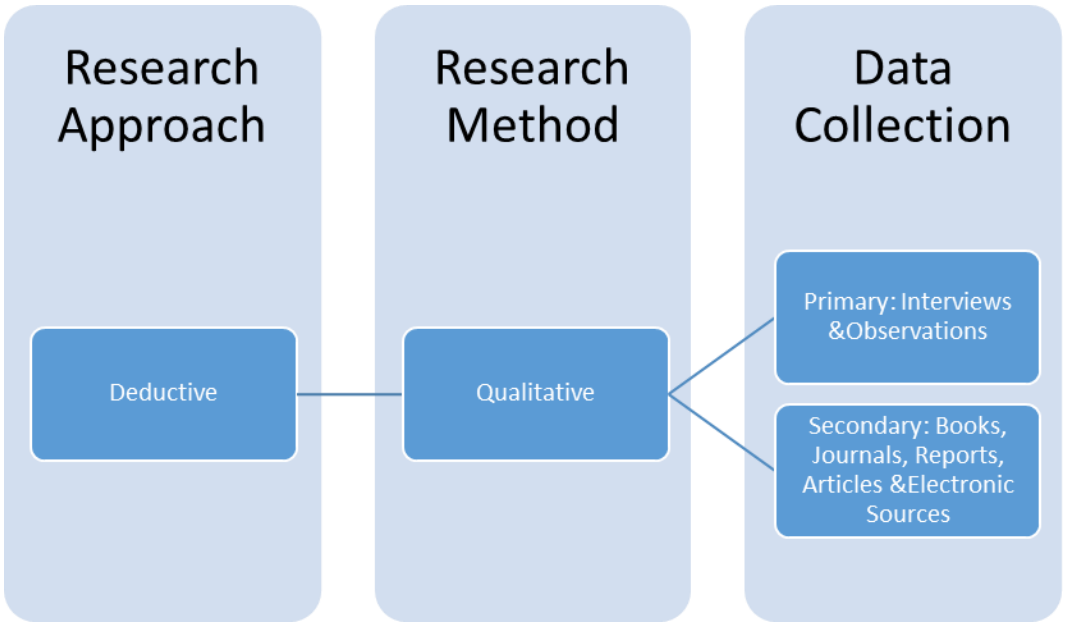


FIGURE 1: Research Methodology

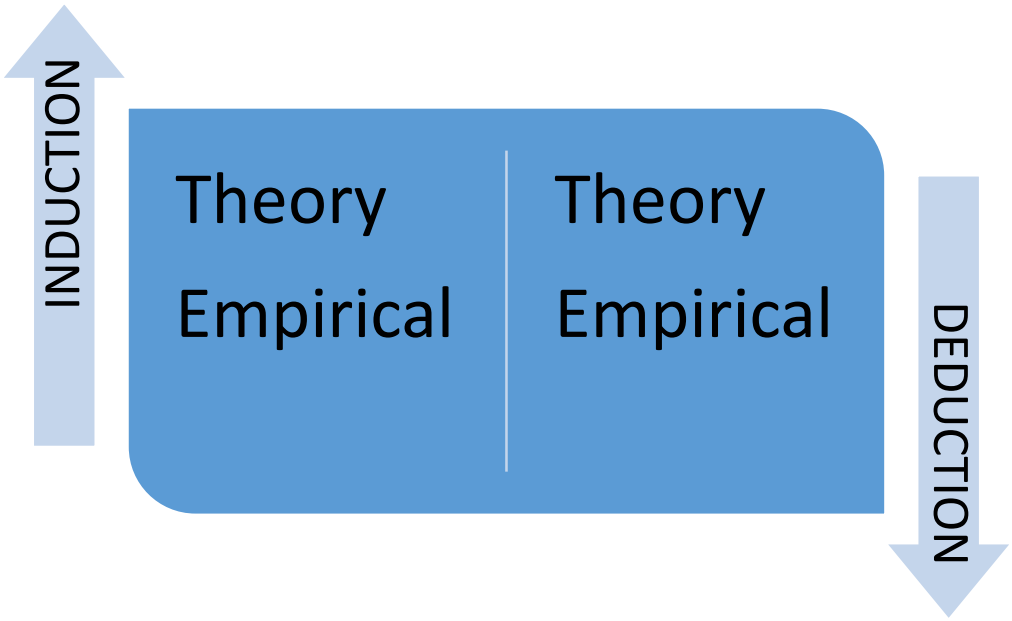


FIGURE 2. Inductive vs Deductive Approach (Saunders et al. 2009)

Research Method

For this thesis, the data that was gathered is mainly categorized under Qualitative approach in respect for understanding the context involved in safety standards. In the 6th chapter the quantitatie results from the survey on food safety and labelling have been clearly described. Below is another diagram that brings into understanding the difference between these two methods described by (Roberts 2012.)

TABLE 1 Qualitative vs Quantitative Data Analysis (Cayuga Community, 2012)

Qualitative Data	**Quantitative Data**
1. Deals with descriptions	1. Deals with numbers
2. Data can be observed but not measured	2. Data which can be measured
3. Colours, textures, smells, tastes, appearance, beauty etc.	3. Length, height, area, volume, weight, speed, time, temperature, humidity, sound levels, cost, members, ages etc.
4. Qualitative = Quality	4. Quantitative = Quantity

Evidently is the use of qualitative data analysis method, even though there are examples given in measuring the scale of food borne illnesses where quantitative analysis was used. According to Bryman & Bell (2009) qualitative method offers the prospect of flexibility, a detailed account or a descriptive evaluation and an emphasis on the context of the situation.

Data Collection

Data collection involved the gathering of first-hand information. That is categorized as primary data and that data which comes from other sources is classified as secondary data (Eriksson & Kovalainen 2008, 77-80). For this thesis, both sets of primary and secondary data were used to be able to give a clear

perspective towards the need to cover the needed areas in safety standards for consumers.

In the first round of collecting of data, questionnaires were carried out with a representative from the S group market chain so as to know what types of measures that they have taken in measuring hazardous food stuffs that can slip into their retail stores. This information will be discussed further in the ***fourth chapter***. And also with the GS1 Company in Helsinki, Finland, interview was held so as to know the value that transparency in the supply chain and how effective it can be in controlling hazardous foods.

First hand data was exchanged that were successfully compared by using standards measures. In Finland for example, organizations exist that built a bridge between consumer safety and what is being sold the market, In this case the research has identified a company that deals with labeling and traceability of products in a global standards, GS1. But in this thesis we shall look into what more can be done using the GS1 standards example, to input more precaution in ensuring consumers truly understand what they are buying.

In questioning consumer opinion on issues impacting heavily on food safety, through the survey done, many pointed out the concern of chemicals on food. And with the introduction of a technical support through a mobile app, having the ability to know the amount of chemicals in the food that you are buying, and the level of harmfulness in the chemicals, can be useful to consumers in getting forknowledge before buying the product.

Consumer and logistics chain transparency from other online analysis were also used as a set for secondary sources of data.

1.5 Thesis Structure

In this section, the writier will describe shortly what is contained in the different chapters in this thesis in order for the reader can easily connect all chapters and see how they build up to consumer safety standards.

From the **second** chapter of this thesis, we will look at how the present global economic paradigm supports the need for tighter safety standards for the existence of an *engineered environment* and how the power of the financial systems affect the scale of risk that is spreading through the intentional engineering of the earth's natural systems and the bio atmosphere. The **third** part consists of the factors that we human beings have incorporated such as *geo-engineering* and the creation of *gene-altered* farm products to support the current altered natural course of the planet. This chapter is critical because it leads to understand why we need tighter or safer standards we should be able to learn about where the risks originates from. The **fourth** part of the thesis we shall look at various factors that have been implemented to help reduce the risk that might be present in harmful food products, through laws from organizations such as ***GS1 & Evira***. The **fifth** chapter will bring out the recommended solution that can help increase consumer safety that involved a technological approach that can be used to detect certain hazardous material in a given product. The ***sixth chapter*** cover the empirical research and analysis where it explore what consumers have in mind for using the technological approach. The **seventh** part of the thesis retreats to a conclusion on the importance of standards to consumer behavior and how to we as a community can support safer ways to produce our food.

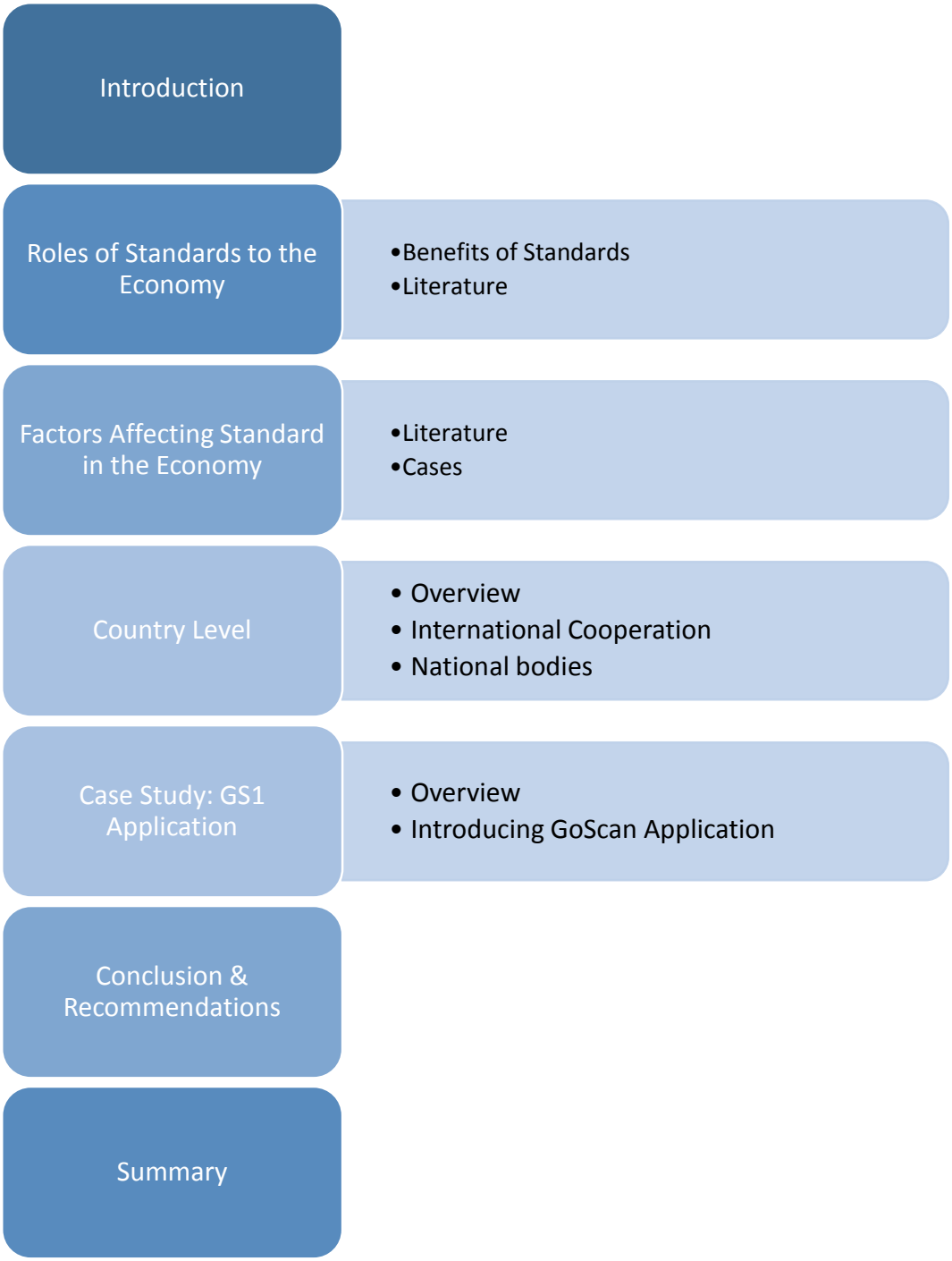


FIGURE 3: Thesis Structure and Chapters

2 ROLES OF STANDARDS TO THE ECONOMY

It's important to start this thesis by introducing the subject of standards and how they have helped propel our current business community. Standards to the reader can be looked at as set rules for the best outcome for a situation. Compliance to these standards, lead to a smooth trading environment. In the Third chapter we will look into what plays in affecting the standards that are there especially on consumer safety in the fresh food industry.

2.1 Safety Standards

A standard is a document that sets guidelines and good practice for organizations to follow, Standards matter to everyone, they protect us and give us the information that we need to make informed choices. Standards help to make products and services safer, with better quality and easier to use (BSI 2014.)

Even at first glance, it is rational to implement safety standards especially on consumer based products such as food, due to the high probability of eating harmful processed foods that is presently brought to their dinner table. This type of concern is critical in today's world due to the increasing number of foodborne illnesses. One of the priority areas in Safety Standards is ***Wellbeing*** (BSI 2014). which ensures that products and services available to consumers have a respect call to the health of the individuals.

2.1.1 Safety Standards benefit to Consumers

To understand the importance as to why safety standards have a major role to play in our society, it would be necessary to look into some figures across the world. Acording to (GS1 2013). around the world, more than 1 billion people will get food-borne illnesses every year, in the USA 48 million people will be contract food related illnesses, by the end of 2013 more than 130,000 people were hospitalized and 300 of them couldn't make it, in Finland from 1,000 to 2,000 illnesses are recorded every year, but the real amount is between 10,000 to 20,000

and around 400,000 people will get food-borne illnesses yearly, according to Finnish Food Safety Authority Survey done in 1998.

Since 1996, the Centers for Disease Control and Prevention (CDC) has been using the PulseNet & Foodborne Disease Outbreak Detection System with DNA "fingerprinting" to detect bacteria that makes the people sick to and define outbreaks (CDC 2013). Below is a table that shows the number of cases that PulseNet has detected since 2012 alone in the United States of America. Isolates included in the table are Salmonella, Shiga toxin-producing E.coli 0157 and non-0157, Shigella, Listeria, and Campylobacter databases

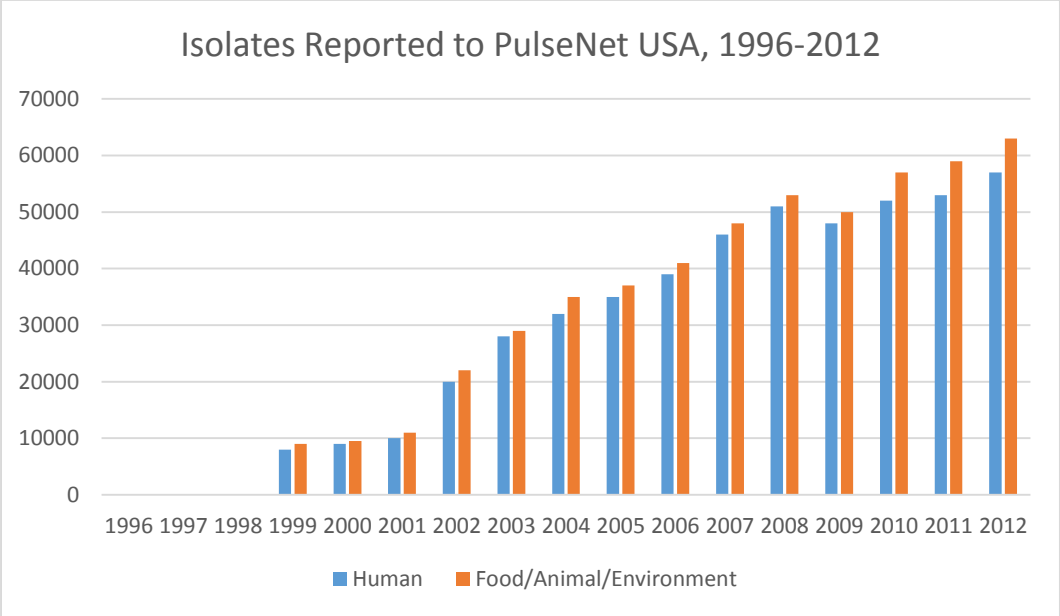


FIGURE 4. Isolates Reported to PulseNet USA (CDC 2013)

From the above data and figures, it is quite evident why we need to amp safety standards for consumers, every year the number of risks of illnesses being exposed to consumers keeps on rising. Not only is this risk a danger to the consumers but also to the environment, this is why the author has taken time to include safety measures needed for the environment further on this thesis.

It may not be possible to reduce this number to a complete zero but it will be a major step if it's possible to screen and identify certain hazards before they reach the hands of the consumer, thereby reducing the number of infected people, one of

the ways is through governmental initiatives to alert the public that the author will bring out in this second chapter.

From an international standpoint, consumer safety is important as they desire the BEST goods and services, for BEST value and available for most people (IS0 1962.) Safety Standards create perimeters which govern the performance level of the given product, measurements of the product for safety, detailed product information, packaging information, ways to dispose and/or recycle the product, testing of the product for the user and the material used to create or manufacture the product.

These perimeter are in our everyday products but as of yet the number of cases incidents seem to be on rise and that is why it also important for businesses to know why safety standards are important

2.1.2 Safety Standards to businesses

There are organizations such as ISO, WHO and GS1, which are doing their best to cover all edges on consumer safety in order to protect against all products and services that can pose a threat even to the environment.

Corporate businesses and companies that ensure that standards are part of what controls their core initiative find many benefits such as efficiency in design, development and material acquisition (American National Standards Institute 2013) these three benefits go hand in hand with what is integral into what constitutes for consumer safety. All elements of a product play an important role because in the end the product ends up into the hands of the consumer.

- The design of the product has to be in line with levels of safety, as standards ensure manufactures pay more attention to products that aren't defective but will perform in accordance to the expectation.
- Development in one way ensures the elements placed in a products help in conserving money, manpower and time.
- Material acquisition is an important part because it covers the safety level of the product, its resource availability and supply the final cost of the product.

(American National Standards Institute 2013.)

2.2 International Bodies: WHO, ISO & GS1

2.2.1 Purpose of Codex Alimentarius

The bringing out of the case of contaminated milk in chapter two which happened in 2008, this event was the largest food safety incidents as the Codex history records. Looking into such a case and analyzing how it was handled, its gives consumers the assurance that governing bodies are doing the best they can to stop the spread of any contamination through food products.

Codex Alimentarius which stands for food code in Latin has been in service for more than 50 years, it has members in the EU and others through the UN organization. According to Dr. Kazuaki Miyagishima, director of WHO.

Such statements, given even by the director is what is pushing the author to seek tighter safety standards and reconsider such motives as genetic engineering of foods and geo engineering. (WHO 2004.)

2.2.2 WHO: World Health Organization: European Region

As discussed earlier in chapter 2, one of the major reasons for the main reasons to deal with consumer safety standards was to reduce the number of food borne illnesses and deaths. According to the mission statement by the WHO in EU. The region can also have an economic implication and have a significant burden for public health (WHO 2014.)

Food safety standards through the WHO in the current day perspective one of the most challenging things they are facing is the resistance of treatment from bacteria agents which develops essential consumer foods. Antimicrobial agents are the antibiotics used for treatment for both humans and animals and the Antimicrobial resistance (AMR) is the development and spread of resistance to these agents following their use and misuse (WHO 2014). WHO/Europe organizes training workshops to strengthen EU countries' ability to handle AMR from a food safety perspective.

The situation of AMR in Europe has now reached 50% (WHO 2014). And thus it has pushed 53 countries in the region to implement a strategic action plan with 7 objectives which are listed below

1. Strengthen intersectoral coordination
2. Strengthen surveillance of antibiotic resistance
3. Promote rational use and strengthen surveillance of antibiotic consumption
4. Strengthen infection control and surveillance in health care settings
5. Prevent emerging resistance in the veterinary and food sectors¨
6. Promote innovation and research on new drugs
7. improve awareness, patient safety, and partnership

(WHO 2014.)

Below are five keys to safer food management that the WHO is employing and teaching to its audiences in order to stop microorganism from causing people to fall sick. They are also falling into personal safety standard measures that play a big role once the food falls into consumer hands.

1. Keep Clean: Washing of hands, sanitizing all surfaces and equipment used for food preparation, kitchen areas,
2. Separate raw and cooked: Separating raw meat, poultry and sea food from others, separating equipment and utensils, store food in containers to avoid contact between raw and prepared foods
3. Cook thoroughly: especially meat, poultry, eggs and seafood, boiling soups at about 70 degrees, meat and poultry that juices are clear not pink.
4. keep food at safe temperatures: not leaving cooked food at room temperature for more than two hours, refrigerate food under 5 degress, do not store food long even in the refrigerator
5. Use safe water and raw materials: or treated water, selecting fresh foods, washing of fruits and vegetables, not using food beyond its expiry date.

(WHO 2014.)

2.2.3 ISO 22000 – Food Safety Management

The International Organization for Standardization (ISO) which is made up of 165 member countries around the world in giving world-class specifications for

products and services and systems to ensure quality, safety and efficiency which is critical in driving international drive. (ISO 2014.)

ISO has dedicated 1000 specification to food and deal with subjects as agriculture machinery, logistics, transportation, manufacturing, labelling, packaging and storage. There are cases where private standards were brought before ISO for implementation but it makes an increase to costs that would burden many organizations and due to this Food Safety Management in the future will approach with method whereby also consumers are allowed to contribute in its management. (ISO 2014.)

Below is a list of the requirements that ISO has put out for Food Safety Management for any organization in the food chain using the specification ISO 22000:2005 (ISO 2009.)

1. Plan, implement, operate, maintain and update a food safety management for providing products that, intended for their correct use and are safer for the consumer
2. To demonstrate compliance with applicable statutory and regulatory food safety requirements.
3. Evaluate and assess customer requirements and demonstrate conformity with these mutually agreed customer requirements that relate to food safety, in order to enhance customer satisfaction
4. effectively communicate food safety issues to theirs suppliers, customers and relevant interested parties in the food chain
5. Ensuring the organization conforms to its stated food safety policy
6. Demonstrating such conformity to relevant interested parties
7. To seek certification or registration of its food safety management system by an external organization, or make self-assessment or self-declaration of conformity to ISO 22000:2005

ISO has lengthened their standardization on food safety from primary production to food safety, but the concerns seems even to have escaped these mighty organization due to the fact that even safety itself has a standard, for what is safe one consumer could be a great danger to another consumer. So how do we measure a safety standard for an individual consumer? The Author believes that in the following 5th Chapter in this thesis will attempt to cover this issue.

2.3 Effect of Standards on Buyers and Sellers' Purchasing power

By agreeing to implement these standards on basic food products, we are giving the consumer the upper hand to decide what is it that they truly desire and companies from there can pick up and improve on the specific item.

Enhanced customer satisfaction through ISO standards, help improve quality, enhance customer satisfaction and increased sales (ISO 2013). The shift of getting who will choose first and produce it is on the line, both ends of consumers and manufactures are on the edge on the exact product they want, for consumers it is very well indicated on detail what they want from a certain product, but for Manufactures in many cases, they are producing similar products to competitors and trying to pull in buyers from an outward understanding that whatever it is that they sell, the consumers will buy into it.

Requirements such as quality and safety are either set by a regulator or are demanded by lead users and early adopters (World Standards Cooperation 2009). With the mind of global economics at hand, many companies will have to extended their consumer needs list by way of innovation, one way could be extending the *lifetime* of certain products, with a less obsolete approach, this will for one give consumers confidence on certain products, this can also raise up technical standards on how a certain product may be manufactured, thereby creating a fair market, even if the price of such product is higher but due to its functionality and quality the consumers will give it a first choice, but what about the other consumers who cannot afford such a product, here the company may have to look into other *price level options* that are suitable for that group of consumers. Not all consumers may have the power to purchase a product but most of the consumers would want to acquire and gain from such a product.

The beauty of a product or service to many consumers it's the functionality as opposed to the image, for there are consumers who buy a product due to its image and this is mostly done by the companies where its value is replaced with appearance, but with laws on standardization these type of approach done for

consumer “retention” will make either companies to pay more attention to level image and quality or on the other side of it will stand as a fraud to other companies and consumers. For example in 2008, ISO and the International Dairy Federation prepared technical specification ISO/TS 15495 due to cases of child illnesses and deaths caused by milk contaminated by melamine, (ISO 2012.)

Companies on the other hand can improve on their consumer relation by opening up sessions where they invite consumers to bring in their ideas for a certain product as well as innovative proposals that they can bring forward. There is a dire need for companies to work closely with different ranges of consumers, consumers from different locality, and consumers from different work backgrounds. All this is done in a way to know which type of standards will fall into a given product for its success.

2.4 Economic Pull between SME and Large Enterprise

It’s is important that all business have a role to play in the growth of a nation’s GDP, whereby increase in production is noted or is stable and is in balance with the increase in demand of those products, as this plays a role in how inflation is regulated. The economic feed given by the Small and Medium enterprises versus the large enterprise differs though due to their sizes.

The growth of SMEs around where there are large enterprises according to (Idson, 1996). The environment isn’t usually suitable either for growth or competition, one of the reasons that is recorded is that the access to capital is less as compared to large firms due to that SMEs lack the mortgage capacity as an instrument for its growth, limiting financial growth only to SMEs.

In the event of consumers demanding quality products and or non-engineered farm produce, both SMEs and Large firm will have to deploy their experts into the field in ensuring that this demand in met, but their level of commitment to such a goal will vary (Evans & Leighton 1989, 299.)

By the acquiring of enough financial strength for the research and development and which company will have a fast response in offering their customers healthy products.

Among the many factors that can be compared between SMEs and Large Firms, I wish to discuss two important point that can easily be measured by looking at the both groups in relation to the goods produced to the consumers with hidden underlying forces (Bakan 2003.)

A distribution of interest between profit making versus health issues - SMEs have a more dedicated approach in looking into how their products and services are received and the long term effects and other ways to improve their product efficiency either by selling it with a supplementary product or by offering it at fairer prices.

SMEs are more dedicated yet less appreciated due to the somewhat strong marketing and promotional effects that is shown by large enterprises. These Large enterprises which have already a large customer number that came with a trusted brand(s) which the company produces seems to have a loose on quality due to the economies of scale whereby their need to produce for the masses had to be met by acquiring of cheaper items and of less quality to be able to meet a fast response to their consumers as they are aiming on keeping a steady growth in profits. (Bakan 2003.)

The acquiring of these cheaper items for a more effective production doesn't necessary mean there is a loss in quality but the important issue is the acquiring of items that might pose a health risk once sold to consumers. (Bakan 2003.)

Conflict of interest versus academic needs - Companies on their hands have varied interest that they want to be on their consumers way of daily life, some of these interests include the general consumer reception of genetically altered foods, while others are producing these foods to study the biological effects towards the human body. Here also is where we find pharmaceutical and companies involved

in composing of chemicals used for agricultural farming and geo engineering companies finding an area to exploit as they measure the effect on their products and services to the unknowing public majority and the natural environment around us.

This events though hard to comprehend are without doubt happening to many societies around the world. This type of exploration done on consumers can be well maintained and restricted by the standards set on achieving a certain quality of a product as it must have a positive effect to the human population and the ecosystem. (Bakan 2003.)

3 EMERGING FACTORS AFFECTING SAFETY STANDARDS IN THE FRESH FOOD SECTOR

For this chapter, fully understanding why safety standards are needed pushes the research in the areas where the risks and hazards are coming from, and to also see if in these ***areas*** tighter measures can be implemented.

Among these areas is what's happening to the ***natural environment, through human influence,*** in trying to maintain earth's climate on cooler levels through methods such as ***Geo-engineering,*** have an effect to the fresh food industry which shall be further explained in this chapter.

Another area, are the effects that comes from the different stages of an ***economic system,*** such as the stage of ***recession***, indicating a decline in economic activity from peak to trough (National Bureau of Economic Research 2007.)

During this period, mass production companies that depend on consumers to buy their goods, begin to realize that demand on high quality goods begins to drop, there by leaving room for low quality goods with low prices to dominate the market.

In the event of a consumer becoming a victim of consumer safety neglect, we can be able to connect the incidents to the way how the global economy comes into play, in way of solving the problem or experiencing its effect, since we are moving towards the direction of the world being globalized (Scholte, 2000, 103.) with the ability of importation and exportation, all the factors that affect trade in one area will also be rippled across the world.

3.1 Economic System: Currency Based

By looking at the Rostow's Model (Figure 5), the economic development model we can begin to understand the necessity of placing safety standards on the first stage of a given country's economic development model: ***Stage 1 being the one that supports agricultural development*** and where the ***birth of many economies*** around the world start from.

Not many centuries past, ***majority of people***, lived in farms and mostly planted their own food in the best suitable and favorable conditions. In today's society, a shift can be noticed ***in the place of*** trusted farmers now are big food cooperation's that do their own farming with methods that include gene manipulation.

Hypothetically (using FIGURE 5) if a country has achieved **Stage 5** in their economic growth, but face risks in the fresh food consumer products, this type of concern should be easy to handle since they are innovative to be able to lower the risk thereof. If safety standard are employed in the beginning stages of an economic development we can assured that that given country will have a health and a society full of vigor to be able to propel them faster through the next stages of the economic development.

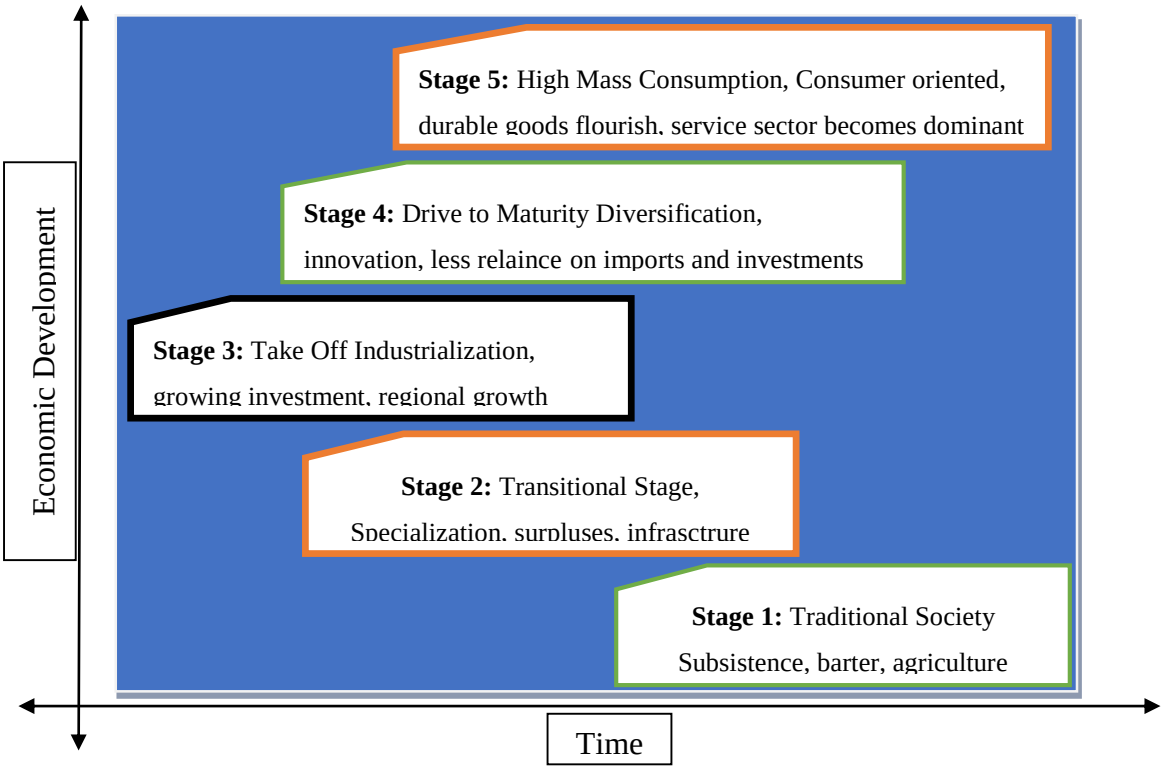


FIGURE 5. Rostow's Model of Development (Lewish Historical Society)

In our current business environment, where demand and supply of goods and services have been the backbone of the economy, we can easily be able to realize certain adjustment during the times of an economic collapse, not just how prices are affected but also how some products are being altered to meet certain needs

such as **shelf-life** (prolonging the expiration date of a product) this could be due that companies are producing foods with a lack of certain accessibility to natural resources but being valued at certain prices to be able to improve the economic growth of a certain region. (Tuser, 2010.)

Safety standards face less implementation rules during an economic collapse where we see production companies avoiding product manufacturing safety guidelines such as genetically altered foods just to get their product out into the market to be sold and bring back profits to keep the economy running.

The above model is based on how economies around the world have started, which even though it is criticized, it's very much agreeable that if not all but most economies of the world have a root on social factors such as life expectancy, literacy rates, child mortality rates, distribution of wealth, which is the premise of this thesis as we look into the things that affect the same market today. This therefore affects all economies in way that its most basic industry should always be looked after and not intruded even in way of innovation to try and affects the output and that no other external force can affect its production that was initial in the first stages of the growth of that economy (Tuser, 2010).

3.2 Earth preservation through geoengineering

Geo-engineering has been accepted by many as a clear way to handle the global warming scare that is happening to our planet. By use of ***aerosol injection*** for particles such as aluminum, barium and strontium nanoparticles, which are used to deflect the heat back into space as a preservation method but also this changes have placed high risk on health issues among people posing greater risks. (DeonVsEarth 2014.)

Geo-engineering has a way of affecting safety standards because it brings into the market foods that are grown under a certain condition that are not worthy to be sold or even placed under any rules. If these contaminated crops are sold alongside normally grown food it will distort the consumer choices and going along way of affecting their health.

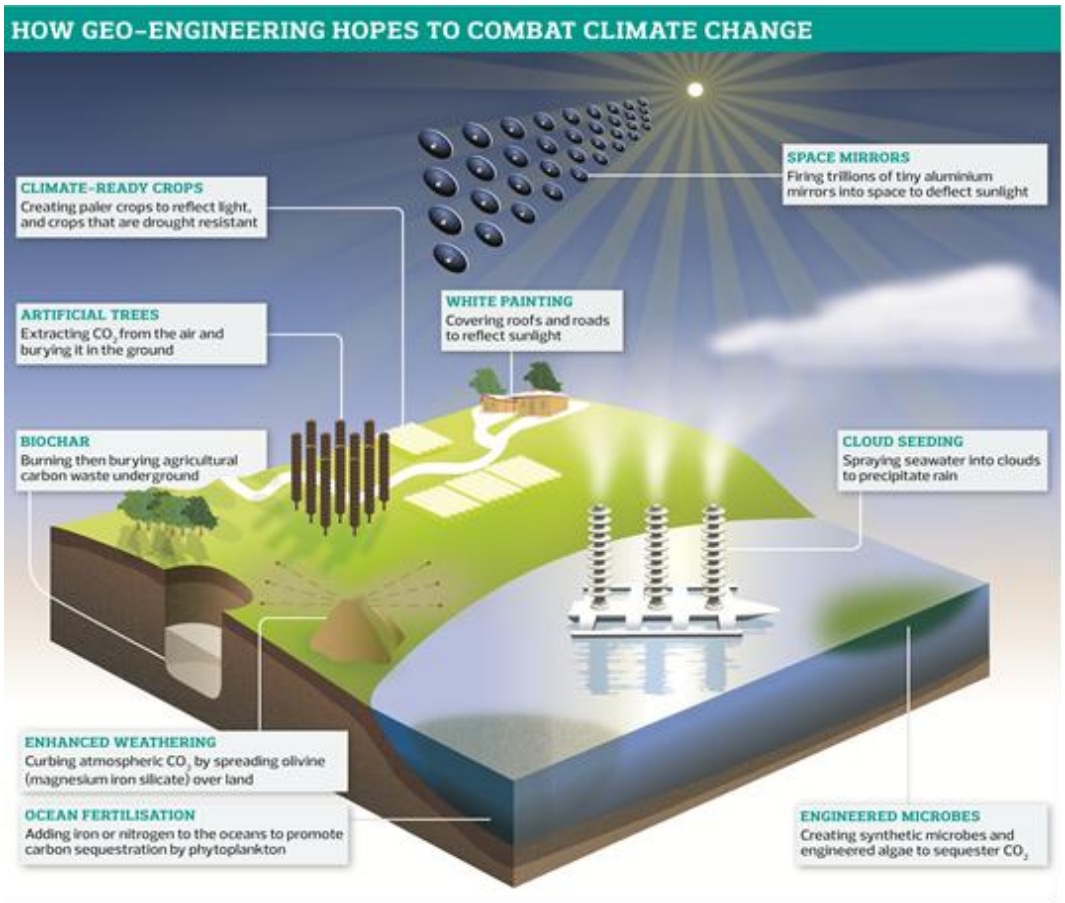


FIGURE 6. Current Geo-engineering Method (DeonVsEarth 2014)

The image above gives a systematic procedure that is employed throughout many countries in the world as a way to reflect back the heat of the sun back into space by the use of ***space mirrors.*** These ***space mirrors*** contain material that is harmful to the human body as later described in these chapter.

The current understanding is that the most drastic weather changes are due to large growth of the population and the carbon dioxide CO2 emissions from the large factories and vehicles. The world is pumping more and more carbon into an atmosphere that can't handle too much more of it (Grunwald 2014, 16) But in this thesis I would like to reveal other evidences that are important in understanding the changes that we see in our atmosphere as multinational companies try to change the current weather and how it affects growth of the economy.

The activity on the surface of the sun seems to give us a clear picture that in fact our planet is going through an expected change and that the earth's four seasons are also connected to the changes in our entire milky-way galaxy and that there is

very little intervention that we human can do such as geoengineering at this point. There is enough proof that the activity of the sun plays a large role than the amount of carbon dioxide (CO2) given in the atmosphere by human activity. There is a large effect of the sun comes from the Solar Magnetic Eruption (SME) which hit the surface of the earth thereby causing it heat up. (VETS 2002.)

What is presently being done in the atmosphere through geo-engineering techniques proves to an increase in the ***acidification of the oceans*** due to the different metals sprayed into the atmosphere which also accelerate the depletion of the Ozone layer and a reduced measured amount of the falling rain which on the current understanding has largely been blamed on civilian human activity.

There is also a rise of volcanic activity where the injection of stratospheric aerosols during the current eruptions happening around the world is also giving a cooling effect to the earth, an internal heating of the earth is what is making these volcanoes very active.

Geoengineering standards have been drafted but current state of the market gives evidence that certain ***engineered food crops*** fare well in these man-made preservation methods, these standards have a huge role to play in the way of shaping for future of the economy, the aerosol spraying also gets to play on how plants will grow, how the soil will respond and also how much rain will fall in a certain place, these basic will affect how much healthy food can be grown and the distribution thereof.

A recent study done by the department of environmental sciences of Rutgers University shows that if we inject S02 (Sulfur dioxide) either around the arctic circle or on the tropics atmosphere continuous use of these as a preservation method ends up disrupting the expected seasonal weather changes which can result to famine. The result of this study proved that trying to reduce solar radiation reduces also the precipitation thereby increasing the likely hood of more drying of the earth’s surface. (Rutgers 2008.)

3.2.1 Rise of harmful pesticides and geo-engineering gases

The distribution of pests on farm that either plants organic or engineered foods, pushes the farmer to desire more to get an increase in the crop production, thus pushing the farmers to look for alternative ways to curb this, one of the common method is the use of spraying pesticides which can repel the infection being put there by the pest. Organic farmers on the other hand use nature as their source to create these pesticides which are less harmful as the ones derived from a non-organic farm. (Toxicaction 2012.)

From these farms we also receiving information that some of these pests are very resistant to the chemicals being sprayed and this urges farmers to search for more toxic substances that can fight back these pests but in turn some of these chemical remain present even when a customer has bought a supposed organic fruit but the chemical substance still remains and as analyzed already some of these toxic elements can bring about cancer as some even pose a risk to endanger the nervous system. (Toxicaction 2012.)

As stated in the previous page that Geo-engineers use certain methods and chemical agents to try and reflect back the earth's heat but this process also supports the growth of certain plants that are non-organic and still meant to be passed as cash crops.

The below table attempts to list some of the dangers of these toxic substances to the human body

TABLE 2 Chemicals and their effects. (Endgeoengineering 2014)

Geo-engineeing	Pesticides
•Aluminum Toxicity - damages to immune system, swelling of body part etc. •Barium Toxicity - Heart atttacks, immune system etc. •Strontium Toxicity - softens bones and increase bone-aluminuim uptake •Mercury Toxicity - Muscle weakness, impairment of speech, hearing and walking.	•Cancer •Alzheimer's •ADHD •Birth defects •Nervous System •Reproductive system •Endocrine system •water systems pollution

Placing standards on quality of fresh foods proves that the effect goes beyond one point of the supply chain but rather the whole supply chain needs to undergo strict transparency and visibility on their daily events. (Luokkamäki, 2013, 8) Closely examining even external forces to the supply chain gives us a better understanding on how we can create a better standard for securing the quality of a product and the assurance that consumer won't have to undergo long term side effects.

The regional conditions upon which farms use their chemicals does vary in accordance to the surrounding, some crops have been engineered to fight off the pests but that doesn't fully acknowledge its safety, these effects are not fatal on the point of one biting an apple but with time some of these effects end up becoming hereditary. This again points to the pharmaceutical drugs sold that there is a connection between such toxic compounds and the need for certain prescription, but these is a bit too wide to be covered in these thesis also.

3.3 GENE Modified Organisms

Our economy is on a verge of crucial transition whereby all organically produced produce are at a risk of being phased out of the marketing picture, as stated at the beginning of this thesis that one of the main causes for this is coming from a direct man made alteration through its DNA to be able to achieve superiority of

the organism in terms of altering the genetic structure of farm crops so that, they can be able to withstand long periods of drought, another reason connected to this is that farmers want to grow some crop that are resistant to pests. Many more plus this are done even in animals where the production say of a cup of milk is gotten from engineering the body part of a cow where the hormones of milk production are located and make it to produce more milk at an early age. (Genetically Engineered Food News 2014.)

Many of these steps are being done by industries due to various reasons,

a) The desire to reconstruct the human DNA to be able to fit their corporate needs, and that our demands may align to only what they have in the market.

b) To reduce the number of competitors whereby a company with its unmasked ability to produce certain products faster, will receive the demands of its consumers before other parties.

c) To be able to have products that can deliver on a new type of quality even in the most extreme atmospheric conditions or environmental changes.

This is done as a foreseeing whereby many researchers, scientists and geologists know that the earth will eventually undergo through a very difficult time whereby our normal daily living atmospheric and environmental conditions will support very little growth of organic products either on the sea, the cattle and the fruits of the earth. (Bakan 2003.)

3.3.1 Effects of Consumptions of Genetically Modified Foods

Below is listed a number of known effects that are carried through after the consumption of the GMOs, these tests and results were carried out by one of the first scientist in 1990s to ever scientifically prove the dangers of these foods and with an unexpected turn out the renowned scientist was disbanded (Global Research 2012.) From international research after warning the public on the below

results, giving us another clear picture that corporations and consumer interests are very far apart.

TABLE 3. GMO Safety Issues (Arpad Pusztai on the Risks of Genetic Engineering. Organic Consumers Association 2009)

Safety Issues	**Allergies** **Toxins** **New Diseases** **Nutritional Problems**
Lab Rats Test Results *(10 day result)*	Pre-cancerous cell growth Smaller Brains Livers & Testicles Affected Partial atrophy of the liver Damaged immune system
Dangers to Humans	Reproductive Problems Immune system problems Accelerated aging Organ damage gastro-intestinal damage Dysfunctional regulation of cholesterol & insulin Food allergies

The above results do not conclude that once we eat an GMO apple we end up with such biological problems but the human body has been created in such a way it can fight off in the first stages of exposure but if this exposure is continued then there is little resistance left in the body and the human body will succumb to start failing with long term effects.

3.4 Nano Particles

Nano Particles (NP) is another different form of engineered particles that are slowly about to endanger the normal development in humans and plant growth. According to the Nanoscale Science, Engineering, and Technology (NSET) Subcommittee of America, Nano technology comes about by being able to control matter such as gases, liquids and solids at the nanoscale where they show an unusual physical, chemical and biological properties for the purpose of achieving nanostructured materials that are stronger compared to other material. (NANOCAP 2014.)

Nanoparticles appear in two types, naturally occurring (volcanoes, forest fires) and engineered nanoparticles as described above have waved the current economy due to the various ways it can apply to different sectors of industries.

The advancement of Nano particles clearly give us the progression bond between the science of engineers and the world of business, both rely on each other hereby producing products some of very high quality thereby being able to place even new measurements on standardization or widening the field whereby different products can be used in the market and it's for the consumers to choose which one is it that they find more favorable to their needs.

But contrary to these groundbreaking technology, NP that are engineered can seriously pose a problem to the biological structure in a human or animal body. (NANOCAP 2014). Much like the effects that occur when modified seeds are introduced or when preservation measures are taken with geoengineering we find similar effects when a subject is exposed to these Nanoparticles.

With much appreciation on the value that ENP bring into the economy, its dangers cannot be overlooked and the need to create risk assessment is needed to be able to standardize the production involved and creating a protective hedge for the consumers who understand the capability of a product and not much of its buildup. It is a sure thing that companies want to produce what it better but with the cost of consumer lives at hand, through standardization these companies will have to look into other parts of their production lines where they can apply this technology.

In the following page risk analysis done by the European Nanocap Project

TABLE 4. Hazard assessment of Engineered Nanoparticles. (NANOCAP 2014)

Patterns of exposure	Patterns of Response
Acute or high dose	(clinically) manifest
Chronic low dose	Subtle/ and or Long term
Epidemiology Long term studies	Cancer Reproductive effects (endocrine disrupters) Neurodegenerative disease immunologic susceptibility

Merging engineered nanotechnology with food is something that the consumers aren't used to nor are many of them aware of the *"new trends"* brought into the food industry, these new substance can be used with existing ingredients and other chemical structures.

In current times record state that Nanoparticles are being used deliver vitamins or other nutrients in food and beverages without affecting the taste or appearance (understandingnano 2014). Many reasons are being given for us to see a practical and reasonable choice to allow the use of nanoparticles in the food sector. For example on reason is that Researchers have realized that nanoparticles can encapsulate a nutrient and carry them through the stomach thus such a delivery system gives the subject or consumer a higher percentage of the nutrient to the used by the body, thus saying that a non-nano capsulized nutrient particle will not deliver the needed effect to the body (Understandingnano 2014.)

Aside from allowing human to ingest engineered nanoparticles, the nano industry is also looking into the agriculture industry, where by pesticides encapsulated in nanoparticles will minimize the effect of dangers of the pesticides when it comes in contact with the plants.

3.4.1 Responsible Technology: Biotechnology

According to FAO of the United Nations, Biotechnology is defined as ***"any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use"*** (FAO 2010.)

The use of this technology being applied in the food industry whereby they use microbial inoculants to enhance properties such as taste, aroma, shelf-life, texture and nutritional value of foods (FAO 2010) to have a capturing display to the food producer or retailer, thou there are benefits that have been attached to this methodology such as an objective to improving the process control, better flavor, fresher produce and enable the minimal use of pesticides to the environment since it is genetic engineered technology that enhances crop protection and thus increasing crop productivity (Cooperative Extension Service 2003.)

The dangers of using biotechnology in view of the author stand much heavier than the benefits and against such activities are issues on safety standards arising when consumers in the future will become defendant on foods that have biotechnology used on them and having health issues arising that have been brought forward in this thesis such as ***allergens and toxins*** whereby the consumers immune system becomes degraded, ***antibiotic resistance*** whereby new forms of bacterial are likely to emerge as stronger and harder to treat and in a larger case it might lead to ***loss of biodiversity.*** (Cooperative Extension Service 2003.)

4 COUNTRY LEVEL

Food Safety Standards even on a country level can largely be affected by international laws, but to consider things logically, national bodies that oversee consumer protection, will need to step up measures in screening majority of what is being sold. In Finland for example we know it's impossible to be able to grow different kinds of crops all year round, the soil and weather conditions do no support this, due to this imports of food crops will be of great advantage but here comes the concerning question,

- Where are these crops going to come from?
- Under what conditions are these crops grown under?
- What governing bodies are inspecting the safety levels of these crops and are they legitimate bodies?

Among the many question that keep arising when dealing with safety, all safety issues are for the better of the consumers and also for the businesses running these transactions as described in the second chapter.

But the proposal for tighter safety standards and the world's major cooperation each have a different view. Below is an extract for one of the world's top publishing research groups that sound deeply disturbing in going against food safety standards.

"The genes of all living things on Earth – including the sunflower, a valuable oil crop – consist of varying sequences of four chemical compounds: adenine, thymine, cytosine, and guanine, abbreviated as A, T, C and G. By identifying genes and manipulating them, scientists hope to create new crops that will help us face the challenges of global warming and population growth" (National Geographic 2014.)

Two issues from the above "global warming & population growth" will in turn against human rights. Food scarcity will surely be an issue for millions or perhaps billions of the earth's population to deal with in future, but to try to imply that engineered food will be a successful way to combat this, it doesn't give a sure safety, not even with the result of a fully ripe crop assures us that it is safe for consumption.

Now if one country wants to import food from another country, it's necessary that both buyer and seller should have a list of conditions on what it is that they are dealing with. It is quite hard on the present day to know what is organic and or what is engineered, for this reason, the next chapter will introduce a technical method to be able to identify food products and their effects to the human body, but on this chapter, the author wishes to look into specific location perimeters and laws by first looking at also international laws that have a tie to national laws, and how they can be of effect in assuring consumer safety and how they can be used to spread the impact of an intended standard.

4.1 National Body: GS1 Standards & Traceability

GS1 is a non-profit standardization organization that has 111 member organizations and close to 2 million member companies serving in 150 countries with about 2,000 employees. (GS1 2014.)

With the specialization to be able to trace or track down every food item's origin that has been placed on the dinner table through the complex supply (value) chain, for example a dinner plate that contains salmon can be easily traced using the Trace Fish standard which that describes the efficiency in the tracing of fish food and uses a method called TraceFood that can be applied to any type of food. (Luokkamäki 2013, 11.)

A simple trace may show the following information: from the package that is arrives in the retail store, the consumer package usually contains traceability key that has a production date, item number and producer ID. From the wholesaler the package is usually in a fish crate with a unique ID. From the wholesaler the previous entity is the Processing plant where the fish crate is also marked with a unique identification, and the prior facility before this is the Harvesting plant that gathered the fish from the farm where the boat that was used has also its ID. If the fish didn't come from the fish farm but rather another part of the ocean, or if the fish feed originated from another area, the feed or the fish is also given a unique ID that traces its origin.

A part from tracing one item on the food plate, GS1 Company is able to do this due to the need of a visible supply chain whereby all entities involved can share information. GS1's Visibility strategy stands as one of the main pillars of its continued success, as increasing visibility in the supply chain is done to reduce costs and improving operational performance. Users that comply with the GS1 Standards have a higher likelihood to easily monitor transport and logistics activities (Luokkamäki 2013, 10.)

GS1 as a standardization entity affects major industries that deals with mass production whereby the scales of the economy in way of ensuring the cost of advantage that arises with increased output of a product with its set of quality standards isn't overlooked in place of gaining more profit, and that the quantity produced is marching with the cost per unit. This step is important due to the fact that it ensures food safety and traceability which in the end also affects the overall economy, this is important also in measuring the scale of risk that might spread in such an organization in the event of food contamination.

4.2 EFSA: European Food Safety Authority

One of the leading organization in Europe responsible for overseeing feed safety is the EFSA, it handles risk assessment and has close ties with national authorities, stakeholders and being able to be efficient in providing independent scientific advice and clear communication. Its major topics include consumers, animals, plants, environment and science.

The table below outline the panels and units that are involved with EFSA.

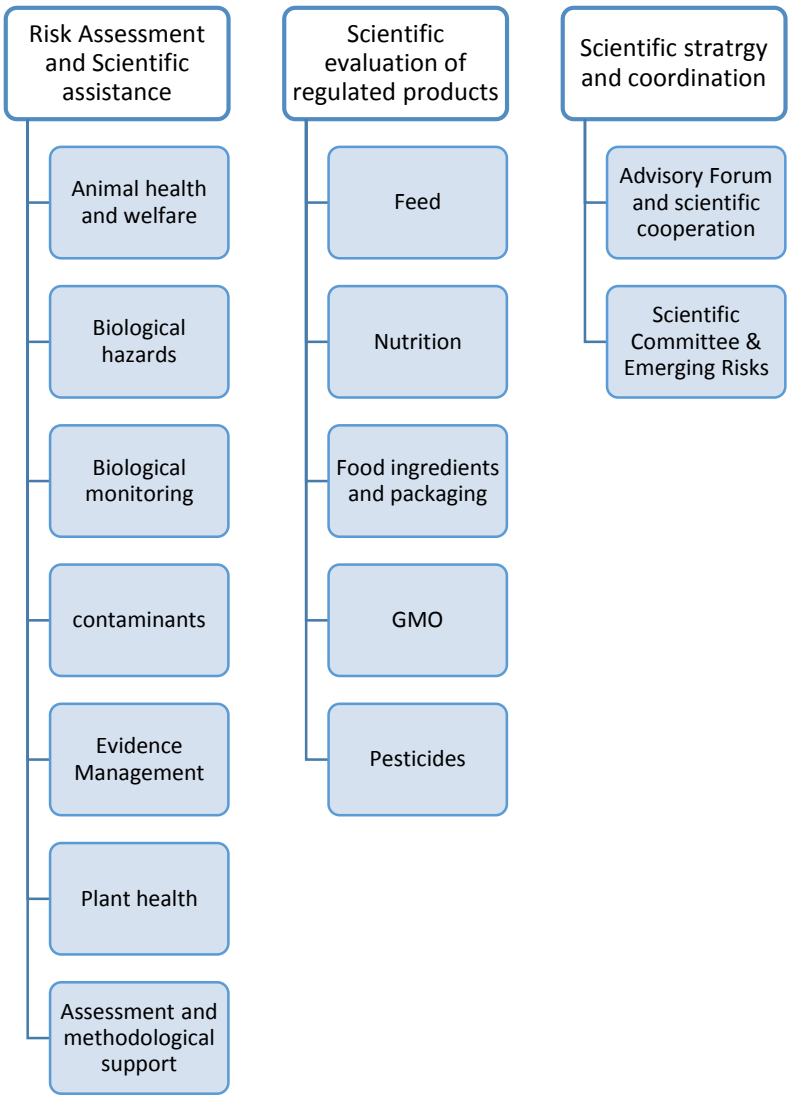


FIGURE 7. Panels and Units involved with EFSA (EFSA 2014)

EFSA brings a more independent scientific advice on food and feed safety since January 2002 when it was set up following a numerous cases of food crises in the 1990s and started on communication on risks associated with the food chain (EFSA 2014.)

Standing as Europe's food safety watchdog in ensuring a high level of consumer protection while maintaining confidence in EU food supply (EFSA 2014), the organization has developed a standardized data model known as the Standard Sample Description (SSD) that can be used in reporting harmonized data on analytical measurements on the occurrence of chemical substances in food, feed and water. (EFSA 2010.)

Among the data that EFSA gathers, analyses and summarizes data is:

- Food consumption and exposure of individuals to risks related to the consumption of food
- Incidence and prevalence of biological risks
- Contaminants in food and feed
- Pesticide residues

4.3 Finland: The Department of Food Hygiene and Environmental Health

Standing on the position as one of the nations in the Nordic region with a high level of food safety, Finland has international recognition in ensuring safety level along the food supply chain.

Heading the at the Ministry of Agriculture and Forestry, Mr. Niemi Director of Food Safety states through the ministry's website that the basic responsibility for safety lies with businesses operating in the food chain. Official controls at municipal, provincial and national level together with controls on imported and exported foodstuffs ensure a high level of consumer protection. (Ministry of Agriculture and Forestry 2010.)

In recognition to international laws even through the Codex Alimentarius, Finland is in agreement with organizations such as UN's Food and Agricultural Organization (FAO), the World Health Organization (WHO), the World Trade Organization through the Sanitary and Phytosanitary Measures (SPS).

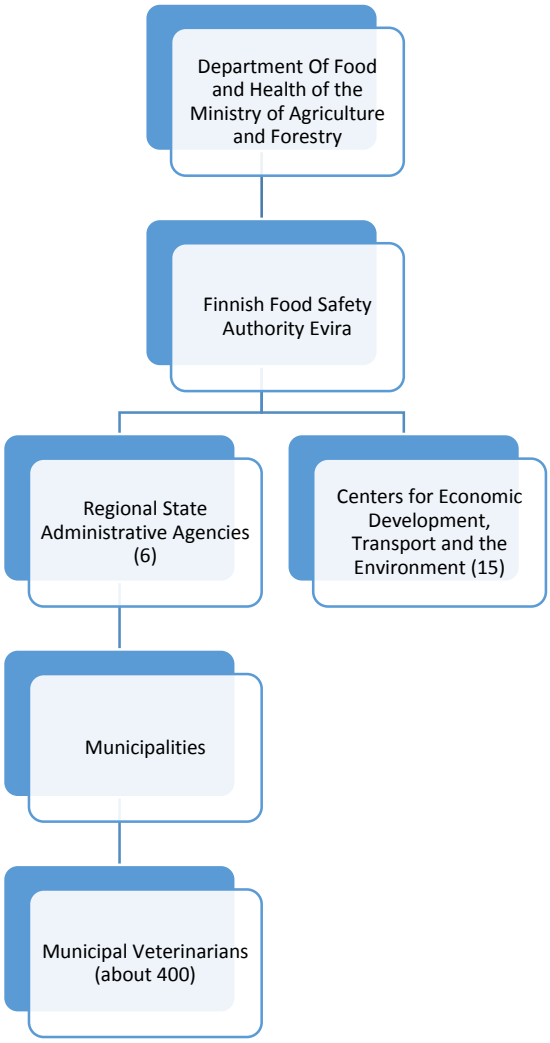


FIGURE 8: MINISTRY BRANCHES (Ministry of Agriculture and Forestry)

The ***Ministry of Agriculture and Forestry*** emphasizes on quality and safety check throughout the food chain, in all food stuffs and agricultural inputs, animal health and welfare and plant health. ***The Finnish Food Safety Authority Evira*** is in charge of the control and perform inspections as well as conducting scientific research and risk assessments. ***The Centers for Economic Development***, Transport and the Environment helps the FFSA in controlling and inspecting the agricultural inputs and plant health. ***The Municipalities*** is responsible for practical control of environmental healthcare and veterinary practice in their respective territories (Ministry of Agriculture and Forestry 2009.)

The Ministry has also placed it in their concern to keep the safety for consumers from the primary production as a pivot point in removing food related health dangers

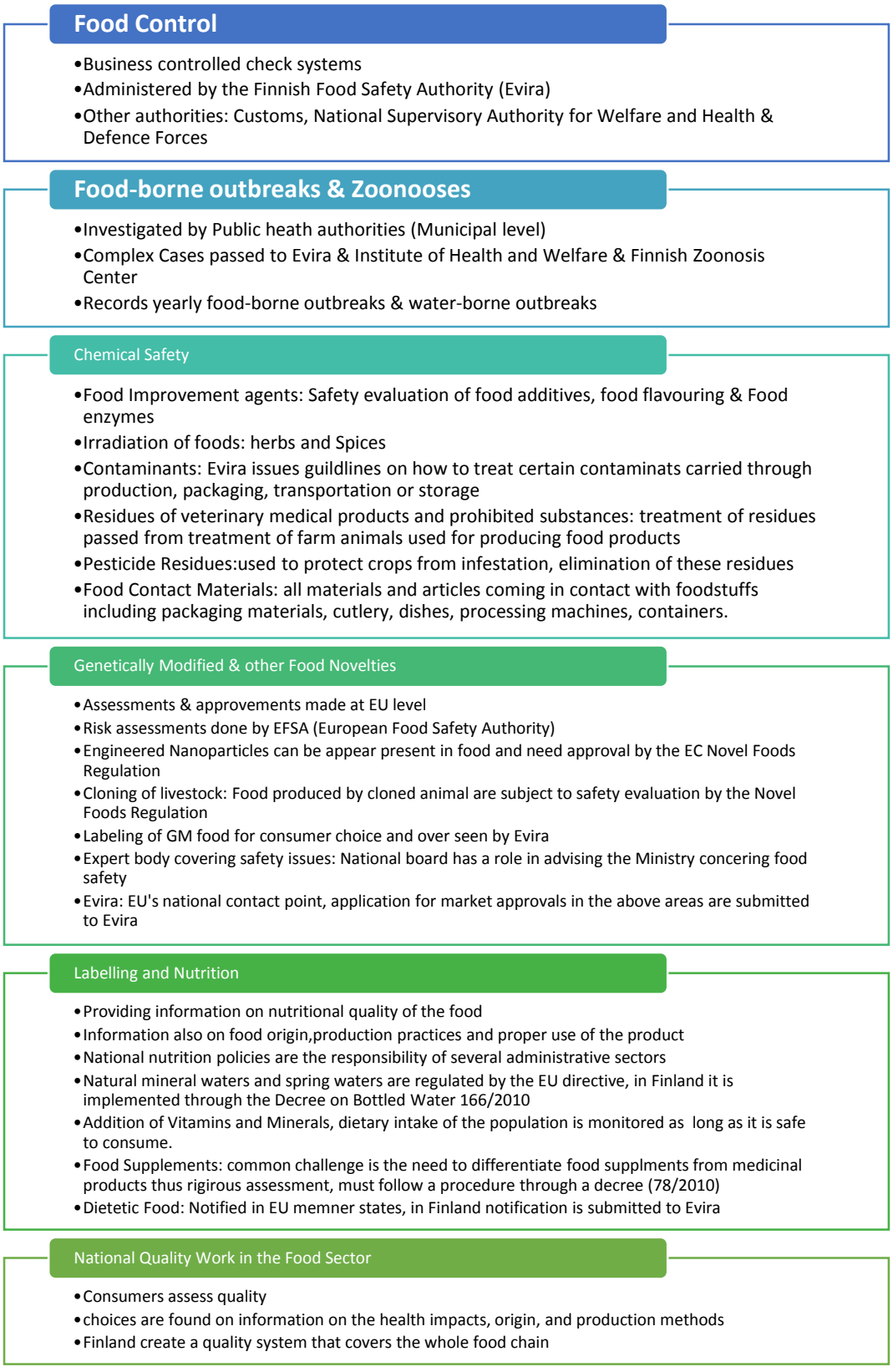


FIGURE 9: MINISTRY RESPONSIBILITIES (MINISTRY OF AGRICULTURE AND FORESTRY 2009)

4.3.1 Evira

"Evira promotes safety, quality and reliability within the food supply chain, all the way from nature to table" (Evira 2014.)

The organization has three main departments in ***Control, Research & Laboratory*** and ***Administration*** that deal with Animal Health and Welfare, Food Safety and Prerequisites for Plant Production and Plant Health. With a god number of offices around Finland, the organization has the following five main responsibilities

1. To Work for the Finnish Government reporting to the Ministry of Agriculture and Forestry
2. To be a national opinion leader, consulted expert and partner within the sector
3. To act as a European and International Organ
4. To Assume responsibility for predicting, preventing and managing quality and safety risks related to food, drink and agricultural production
5. To promote animal health and welfare, as well as plant health. (Evira Strategy 2014.)

Among Evira's critical success factors is to be able to build a strong relationship with consumers all over Finland, one way this can be achieved is to increase the transparency of official actions and the visibility of research. (Evira Strategy 2014). The author finds this to be very important since in the ***Third Chapter*** there is an outline of research results found whereby there are elements that affect the food sold to consumers, not only was there found evidence but one of the world's most renowned researchers in food safety faced rejection to his findings due to the fact the results would cripple major cooperation's that produced ***gene altered*** produce to the consumers, concerning the growing effect of climate change, this concern of building trust with consumers is also in Evira's long term goal and thus for there to be a full trust bond, the visibility while in research without holding back any critical results should be made known to the public, either long term or short effects should be published either by risk forecasting and analysis are effective throughout the food supply chain. (Evira Strategy 2014.)

Another important factor that Evira brings to the table that is connected to consumer safety and underlying the needed standards is the need to prepare for a

crisis situation which entails having the necessary readiness to place risk measurements on the front.

In 2008, Evira coordinated an annual pesticide control to detect pesticide residue through the national control programme and the EU's harmonized control programme. Duties were carried out whereby the Municipal health inspectors, Customs inspectors and Welfare and Health (Valvira) collected samples from wholesale stores, packaging firms, retail stores and farms, imported products, alcoholic products in warehouses of wholesalers & retail stores. The analyses were carried out in two accredited laboratories. Customs laboratory (93% of the samples) and the MetropoliLab (7%of the samples)

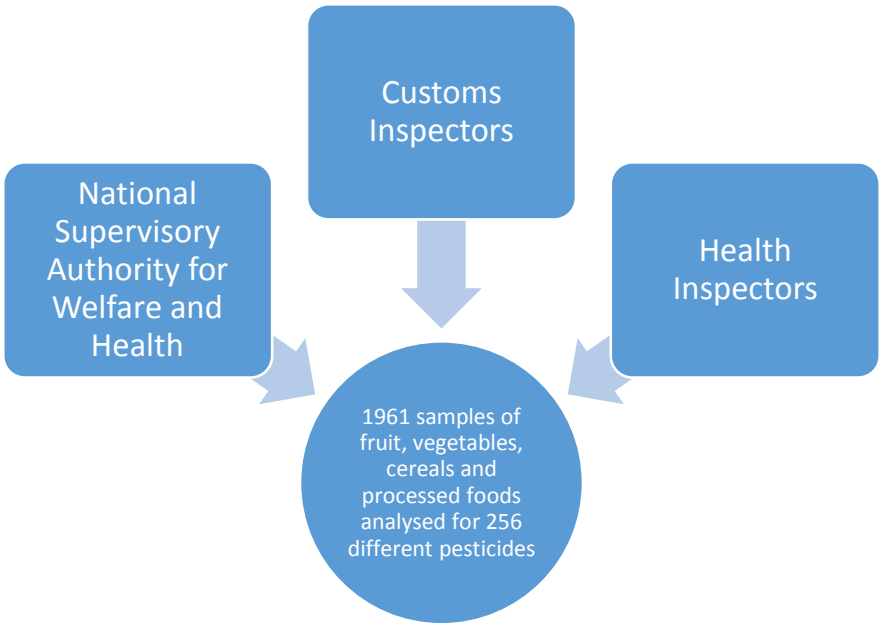
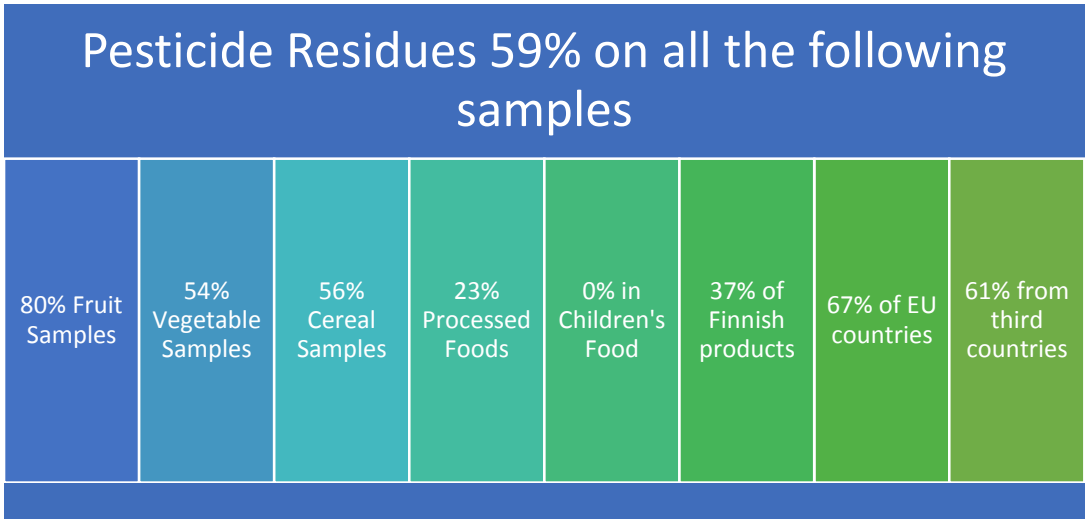


FIGURE 10: PESTICIDE RESIDUE MONITORING IN FINLAND (EVIRA)

The result came out from the following samples 104(5%) of the samples were organically produced. 24 samples intended for children and infants, 9 of these organically produced. 286 samples were of domestic products & 738 of products from other EU countries & 887 of products imports from so-called third countries, 50 samples could not be established, 122 follow-up samples found to be non-conforming

TABLE 5: PESTICIDE SAMPLE RESULTS (EVIRA)



The above table clears for us the table in understanding where safety standards are needed most, as discussed earlier that the trading environment requires us to trust the food sources in certain aspects as controlled pesticide use, even given the fact that some are quite harmful to the consumers on a long-term effect.

As introduced in the ***Third Chapter*** the harmful effects of pesticides, it is then a matter of implementing tighter safety standards. Standards on one hand help to reduce the scale of the calculated risk of the contaminants, even as the data brought forward depends from where the sample comes from thus both environmental and human health have a different scale of risk (Suter II, 2000.)

Concerning the affected entity. Researcher say that ecological entities may be more sensitive than humans given the below reasons we shall find it important to place more protective standards on ecological protection.

1. Ecological receptors experience modes of exposure, such as respiration of water, consumption of sediment or drinking of waste sumps that do not occur in humans
2. Ecological receptors experience quantitatively greater exposure such as a diet of 100% local fish.
3. Ecological receptors include particular taxa with inherently greater sensitivity than humans
4. Secondary effects such as production of herbivore populations due to loss of plant production are not important for humans

4.4 Governmental Duties to the the public

4.4.1 Certified Goods

Many retail stores and outlets have policies to inform their public even through press releases of the availability of fresh products and non – gmo produce, but companies that deal with farm chemicals and sell to the retailers still have not issued clear labels on what is contained in their products, this labelling information is critical for consumers to understand how their part in the production plays in affecting the growth of organic produce that may end up causing allergies once on consumer's hands. Operations that produce the organic agricultural ingredients, the handlers of the ingredients used in the growing of the crop and the manufacturer of the final product must all be certified by an accredited organic certifying agent (NSF 2014.)

On the other hand there are a handful of consumers that don't not know yet which products are best for their body systems, this is due to the fact as pointed earlier that consumers will have a tendency to first check the price of the product and buy it before they can fully understand the origin of the product.

4.4.2 Innovation

Among the challenges that production companies face, three of the most intricate steps in ensuring guaranteed traceability includes the need for improved innovation tools. Improved tools leads to improved product information thus improved product quality can easily be achieved. When a supplier and a customer know that they are looking at the same accurate and up-to-date data, it is smoother, quicker and less costly for transactions to take place. (GS1 2008.)

I. The assurance of fresh products (non-engineered) – which is possible through Electronic Data Identification (EDI), which also help in acceleration in work speed at reception points and delivery to shops.

II. The assurance of the correct product DATA – this is the data that reflects on the consumer labels, this data can be improved through the network

where this information is stored which is also referred to as the GDSN (Global Data Synchronization Network)

III. The assurance of consumer safety – this has to do with the way ensuring that when there has been an alert of contamination that the taking back or recall for the product will be immediate through the easiness in capturing product data that allows the fast track and tracing

(Increasing Traceability with GS1 Standards)

5 CASE STUDY: GS1 APPLICATION

In this chapter, the Author finds it necessary to bring in a solution for the various threats facing consumers that have been brought forward in the previous chapters and how altogether standards can be effective rather than just written down and not fully implemented. It is also essential to bring in this type of technical based solution for a business that is rooted to the ecosystem, due to the fact that the supply chain and all other connected elements for the food products need to become visible for the consumers and it is up to them to choose what it is that they want to buy. Food products are biological in nature and for us to be able to know what is built up in any product in today's environment we could use technology to identify if every product in our hands is safe for consumption.

5.1 GoScan Application

GS1 GoScan stands as the first approved smart device application that grants consumers information that is connected to their instant nutrition, dietary and allergy information and much more by simply scanning the product barcode when shopping. GS1 GoScan is available on smart devices (iOS & Android). (GS1 AU 2013.)

GS1 GoScan complies of authorized and trusted data sourced that is from the food manufactures and brand owners, international food companies, distributors and major retailers, (GS1 AUS 2013) among these its strong supporters are the Australian Food and Grocery Council, the Australian Universities and national health organizations

For GS1 GoScan application to work well ***and or*** have the power to work effectively in providing end consumers with the information that they need (GS1 AUS 2013), we come again to the transparency step that each company and production company has to take, the GoScan model is wholly based on a transparency undertaking. This can be achieved by the following ways described in the next section in this chapter.

5.1.1 Application Importance

Today's consumer desire to know more about their product is growing far beyond to the level of wanting to know what manufactures are doing in the process of designing these products, in this case consumers want to know how the products that they are consuming how it was farmed, under what conditions, what fertilizers were used, what pesticides were applied, were the genes modified, all this plus more information is essential due one simple understanding that was brought forward in the ***Third Chapter*** in the ***Rostow's development model*** in understanding the importance of the ***traditional society*** that deals with ***agriculture*** until today and even in the future stands in support of the ***high mass consumption society.***

The consumer research has identified particular interest in detailed and accurate product data concerning nutrition, ingredients, allergens, organic certification and ethical accreditation. (GS1 AUS 2013.)

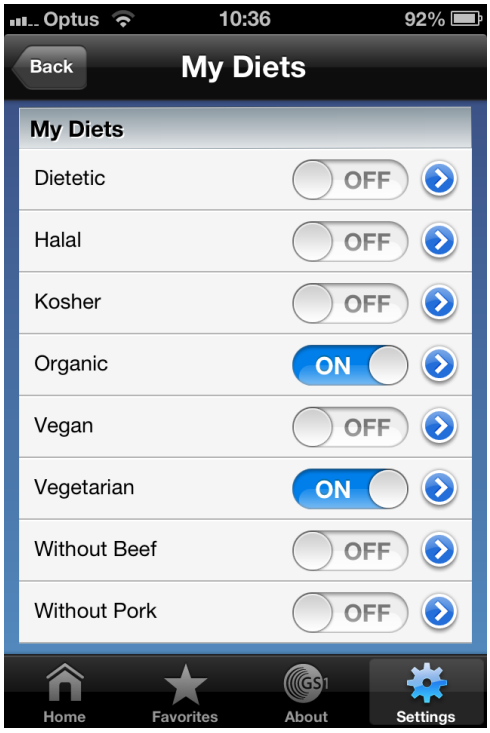
GS1 GoScan delivers authorized and trusted product data in real-time, including

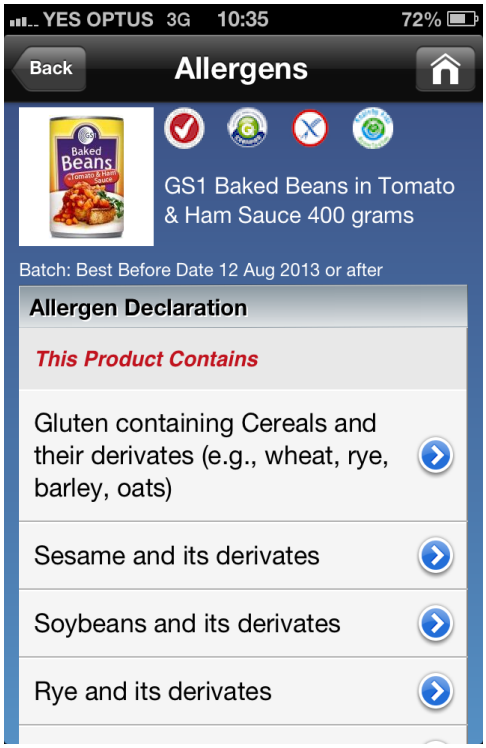
- Ingrdients lists
- Allergen declarations and other consumer information
- Nutritional content and Recommended Daily Intake information
- Preparation, usage and storage instructions
- Dietary information such as Kosher, Halal, Organic and others
- Country of Origin
- Genetically Modified and Irradiation declarations
- Basic product data such as descriptions, classification and images (GS1 AUS 2013.)

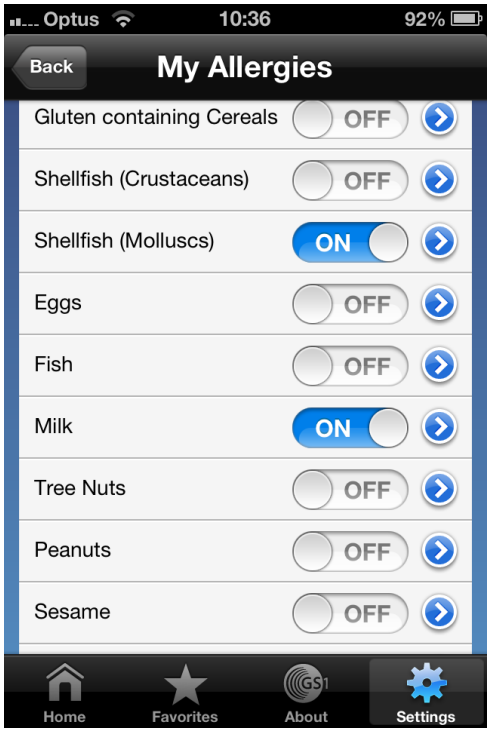
Below follow a graphic description of the application, hands on approach when a consumer scans the GS1 GoScan barcode with a mobile device and access the GS1 Data Bank which is connected to the brand owner's information. The consumer can choose if they want to scan the GS1 barcode, or manually typing the bar code number (GTIN) or even performing a text search based on the product description or product brand. (GS1 AUS 2013.)

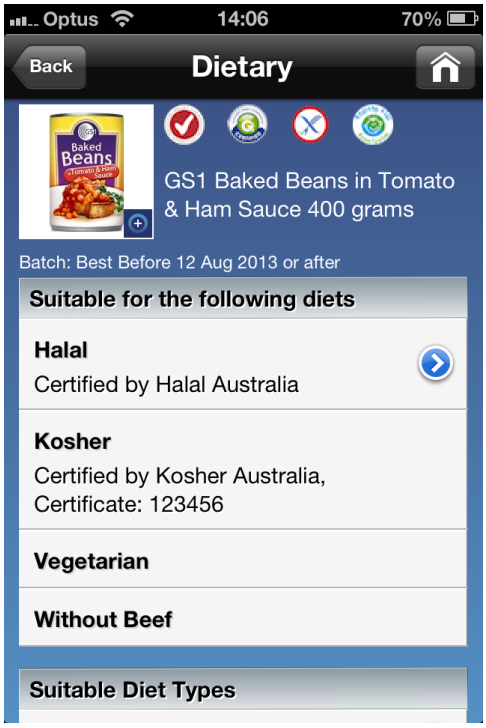
5.1.1.1 GS1 GoScan Application Displays

Below are samples from the GoScan mobile appication from scanning various foods.









(GoScan Images & Logo Courtesy of GS1 Australia)

5.2 Opportunities in Finnish Market

In order to fully understand the importance that the phone application can bring into the consumers within the Finnish market, the author carried out an interview with a specialist in transport and logistics within the GS1 Finland, who also helped in finding another contact within the S Group Finland whom a questionnaire is prepared.

When having the interview with the transport and logistics person of the GS1, the goal was to get the understanding of how standards within the global trading environment works and what with what type of system sustains the smooth workflow. The GTIN system was important as it relays the same kind of system that would be necessary for the GoScan to be a success whereby the information shown gives such details such the origin, production firm locality of the product, nutrients and other necessary information.

By being able to understand how standards work with the GS1 environment, the author then wanted to arrive to the possibility of having safety standards coded within the GTIN barcode and the information can be available to consumers in case they find a product that doesn't comply to the consumers' safety standards thus the possibility is now available with GoScan application

With the questionnaire, it was mailed to the S Group contact who works under *S* Inex partners as a Packing Specialist who responded positively concerning the use of GS1 standards whereby it was found to be used by all of the suppliers to the *S* Group. This questionnaire was drawn in order to understand the scale of effect that would be there if the GoScan application would be used by the Finland's consumers first by a selected market chain. The results that came out were promising whereby if the GoScan would be available in the market it would apply to 86% of dry foods, 93% of fresh foods and 10% of fruits and vegetables.

Also with the questionnaire the author wanted to find out what measures are taken in the event a food hazard has been detected within the market chain, the response was that there is not a single case where the foodborne illness or hazard originated from the S Group, rather as indicated through the test done by ***Evira*** in the ***fourth***

chapter, that it comes from the suppliers thus narrowing the area where tighter safety standards need to be implemented.

Following the need to uphold safety standards that have been laid out in the ***third chapter*** by one important point is increasing the level of transparency in the market using the GS1 GoScan application we can be sure that manufactures, farmers and other sectors involved in food provision follow a given standard and it is easier to identify which part of the supply chain is upholding the support for consumer protection.

As the author brought to attention the importance of organizations such as ***Evira*** and what the ***Department of Food and Hygiene and Environmental Health,*** and as one of the goals of the organizations was to create a strong bond of trust between consumers, retailers and supply chain providers, using the GS1 GoScan application would be a great opportunity to bridge this gap. GS1 is also being used globally together with Finland

One of the greatest strengthens that connects transparency and safety standards is the influencing of Food labelling laws by developing a whole database for the food industry, this over the years has had significant impact on the Food Labelling Laws in Australia (GS1 AUSTRALIA 2011). This is direct reflection of what Evira's strategy in Finland is planning to put in place.

According to GS1 Australia as being on the fore front to have an extensive, detailed and trusted information on food and beverages products that is also gaining support even as Governments around the world are reviewing product labelling legislation (GS1 Australia 2011). Consumers also have increased the demand to see manufactures provide information that is healthier and ethical. Even on the retailers end they are willing to provide a better in-store and online experience to shoppers, as a result they are also demanding ***more product information from their private label and branded product suppliers to power new value added services such as website, smart phone application and in-store kiosks*** (GS1 Australia 2011.)

5.2.1 Marketing GoScan Application

For the GoScan application to have a strong influence among Finnish consumers, first, the risks mentioned in the ***3rd*** and ***4th*** chapter should be made known to the customers, the reasons also that bring about such a situation into the market should also be made public in order to once again create a strong bond trust between the seller and the buyer.

Hereby a marketing communication process is created that can be used to establish the need for the GoScan application in the market, following the understanding that ***marketing communication is the process of presenting an integrated set of stimuli to a target with an intent of evoking a desired set of responses within that target and setting up channels to receive, interpret and act upon messages and identifying new communication opportunities*** (Chunawalla 2008). Using this understanding we can being to create a selling set-up model for the phone application for both the customer and the retailer (just in case we have consumers coming into the market to buy without smartphone, the retailer will be in charge of an in-store scanning operation), using 3 points of advertisement, promotion and demonstration.

Advertisement

The aim of advertising is to bring into being a producer-consumer relationship between an advertiser and his logical market in a way that is the warmest, clearest, friendliest and most human (Pant 2008). Using print aid such as the one that are used to advertise foods and other products, the thesis can have a section that introduces the GoScan application and from where to download it. This section can also include the reasons or the importance of the application, also a sample GTIN code can be printed on the thesis that be scanned on two or three food products. This type of action of scanning motivates the consumers to want to know more about the product. With the use of visual aid such as in-store screens can also display the same information that was is in the print, this is useful since not all consumers have access to print media and also it can be places in public places where the public are walking through and same time having a chance to understand what is being displayed even at a distance and without audio help.

Online social networks that are connected to the retailer such as a LinkedIn account, Twitter, Google Plus and Facebook, can also play a big role in promoting the use of the application with similar how-to-use instructions.

Demonstration

For such an application such as the GoScan, due to the fact that it is new type of application of its own kind in the market, there will be a need to show consumers how to use the software, by way of knowing which barcode to scan and which parameters within the application do they have to *check* in order to have a successful scan of the product that they want to buy.

Demonstration is a great way to know the consumer's thought on the product and also to able to get a first-hand response of the product. During the demonstration of the product that can be in a selective area within a public place or within the retail store, one key point that will be needed in determining the response sought in its promotion is conviction (Ramachandra 2010). It will be the retailer's or person's in charge of promoting the product to build a conviction that using the application is the right thing to do.

Pricing

Due to the necessity that is provided with the application such as in depth information of the product, even getting to know the exact location where it was grown and the farming condition, the author believes this information can be shared without any value of pricing added. Since the first launch of the application in Australia no pricing was placed on it so far.

Key Features

Other marketing tools that will be needed to create a dependable smartphone application for the Finnish Market will be to, the application should work

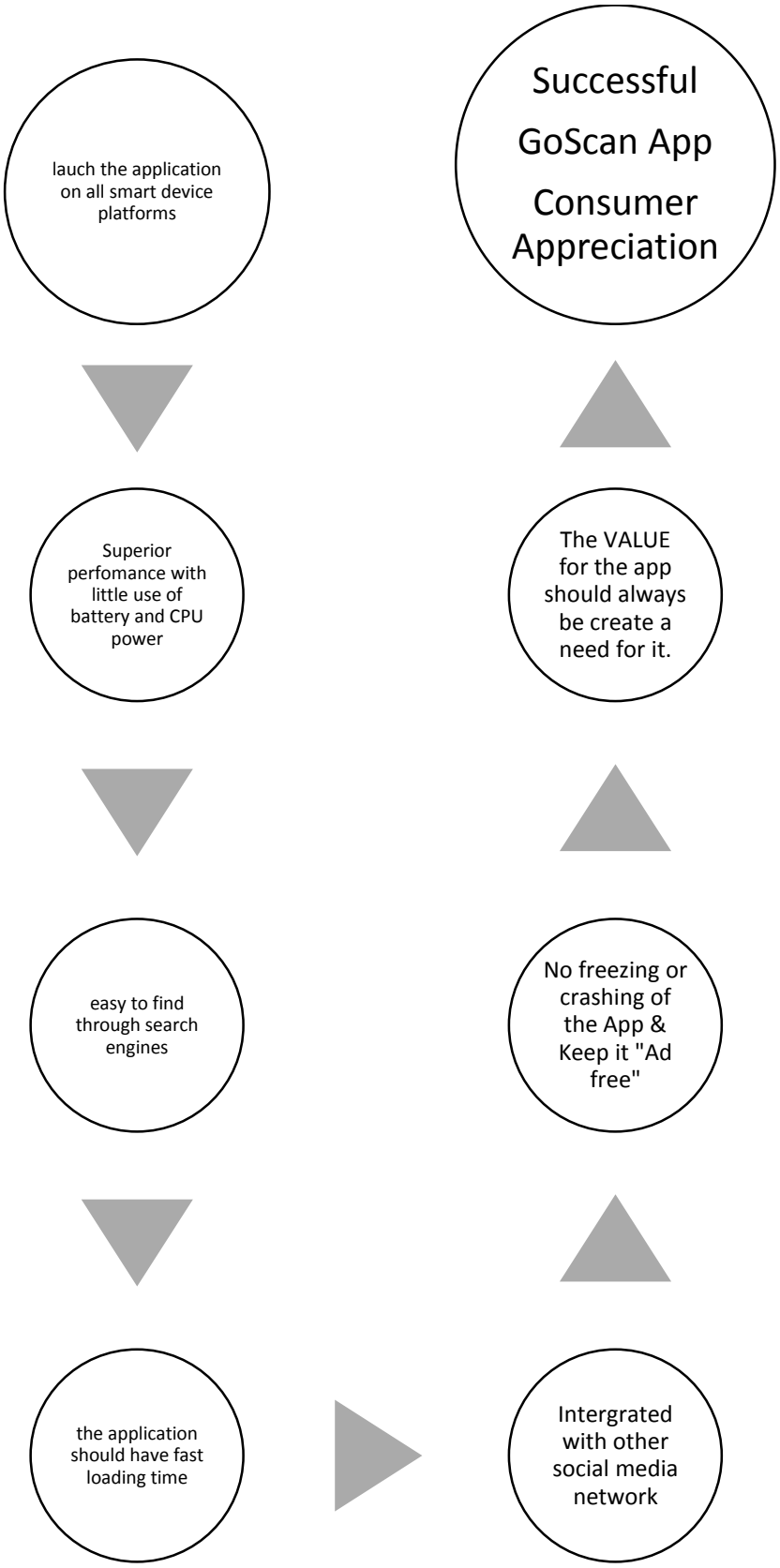


FIGURE 11: FEATURES NEEDED FOR A SUCCESSFUL PHONE APP (Addicted2Success)

Mobile applications stand in place of mobile marketing even as an upcoming tool that gives the following advantages

TABLE 6: Mobile Phone App Advantages (Mobile Commerce Report 2011)

Mobile Phone App Advantages	Possibility to communicate directly with the consumer
	When the consumer is at the store he or she can use the app that adds value to the physical product making it possible for brand owner to pass extended information that is too complex to pass through the packaging
	With the need to make consumer bonds strong this can be a viable tool
	The pricing for mobile phone application is relatively cheap and also is the developing price for an application, though the mobile phone application may require a maintaince cost
	Mobile applications are fast and efficient immediately the retailer has an important message that needs to be passed to the consumers without any delays.
	As a strategic advantage for retailers, a mobile application moves the store closer to the consumer than the presence of a physical store that is bound by opening and closing hours

Below is a list of the benefits that are likely to be experienced also by brand owners here in Finland that are apply the GoScan application.

TABLE 7: GS1 GoScan Advantages (GS1 AUS 2013)

GS1 GoScan Advantages to Brand Retailers	Providing detailed product data to consumers beyond the product label
	Enable visually impaired consumers with access to the the product data by leveraging the accessibility features in iOS & Android.
	Decrease inbound calls from consumers to customer services centers
	Link Facebook and Twitter social media communication channels via GS1 GoScan product
	Support this whole of industry initiative that creates an alternative to a physical product label when government is reviewing labelling laws and regulations
	Make detail product data more accessible to retail partners Server banner ads for competitions and promotions

Even with a good flow of information that can be provided, the author would like to bring into mind one of the main challenges that are likely to be faced that is the passing on of non-authorized product data to consumers from smart phone applications and website developers, which is obtained from different sources other than the food manufactures, thus most of ***this data is inaccurate, out of date and potentially dangerous (if referring to ingredients and allergenic) (GS1 Australia 2011.)***

To contest with this challenge, the database from where this information is coming from should be ***a single, trusted and industry-driven source of product information (GS1 Australia 2011).*** By the use of standards that can be developed a company running the GTIN of products in the supply chain in this case GS1 Finland and also working in conjunction with the Ministry of Agriculture and Forestry and also Evira.

5.3 Traceability Model for Finland

The below model explains what entails when a fresh food product moves from the farm to the retail point.

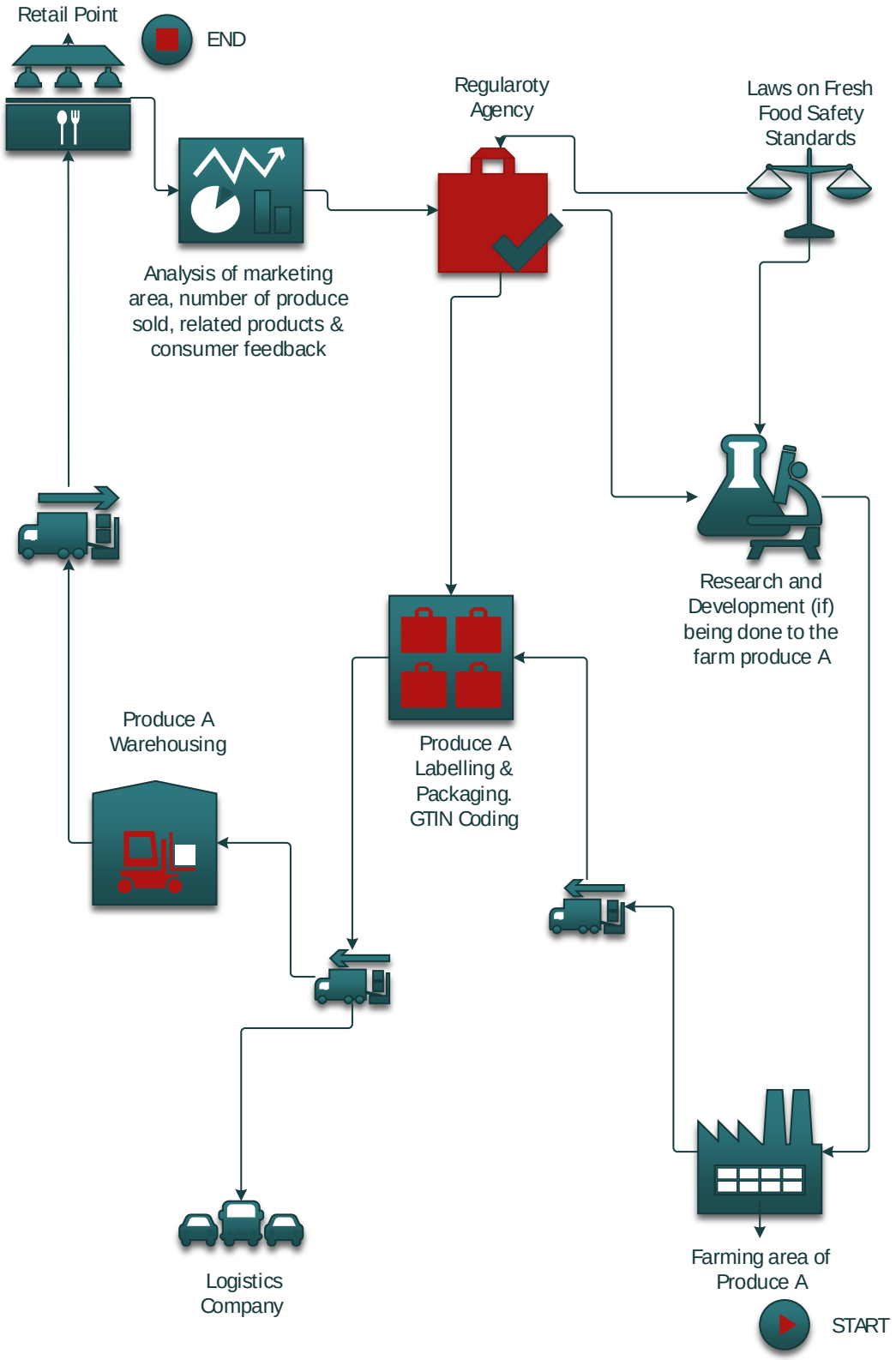


FIGURE 12: TRACEABLITY MODEL FOR FINLAND

Once a consumer has scanned the GTIN code on the product, all the above information, plus more in detail. The information can be presented optionaly in two ways, as an infographic with visuals and detailed information, or as a short clip, that has the use of real pictures of the locations pointed out in the above model.

6 EMPIRICAL RESEARCH AND ANALYSIS

6.1 Survey & Questionnaire formulation

When dealing with any topic, especially a topic that is connected to the general masses, it is important to get to understand how they are affected by it, using a survey. For this thesis the author used a questionnaire as a means of getting to know which areas withing the food safety measures are a closer concern and how by offering consumers a technological proposal, would help solve the immediate problems.

The questions brought out in the questionnaire can be found in the appendice 4, they were centered in knowing,

- What areas within the fresh foods such as price, healthfulness and taste are of high importance to them?
- Which issues are affecting food safety today?
- What do they look for in labels of foods that they buy?
- To what extent are they confident of their food supply chain?
- If they are provided for an app to help them gain extended product information, how willing are they to use it?

The survey was done with 9 questions, the questions were structured in a such a way whereby, the first section dealt in knowing the respondent's background such as age and gender, the second section dealt with understanding the respondent view on the current food safety issues and the third section was to introduce the technical approach and know if the respondent would be willing to use it in a given situation.

6.2 Data Acquisition Process

The data acquisition process is done to understand how the surve was done, also to understand how it was analysed in helping to reach the objectives set for the thesis.

Structuring the set questions took a lot of planning, the first draft had a lot of scientific based questions which if they were presented to the respondents, they would have resulted in a misunderstanding of what was being actually asked, but with the help of the author's supervisors, simplicity in forming the questions was the key in wanting to get the needed results.

During the month of February 2015, the first draft was ready, but a delay within the month was noticed due the lack of assurance on which platform the questionnaire would be sent, either by webropol or by google forms, the author had contacted the first choice but due to lack of access codes, the second option proved to be viable and reliable, and by the end of the month the final questionnaire was ready to be sent by mail, to the staff and students of the Lahti University of applied sciences.

The time to respond to the questions was two weeks long, each responded would have taken atleast 5 minutes to answer the questions.

6.3 Data Analysis

Through google forms, the responses for the questions were being recorded to the author's excel sheet which was automatically created once the first respondent sent the feedback form, also a timestamp and date was recorded.

A total of 93 people responded to the question, a good number, enough to offer a valid response. Majority of the survey respondent were between the ages of 21 to 30. This is due to the fact that most respondents are the university students

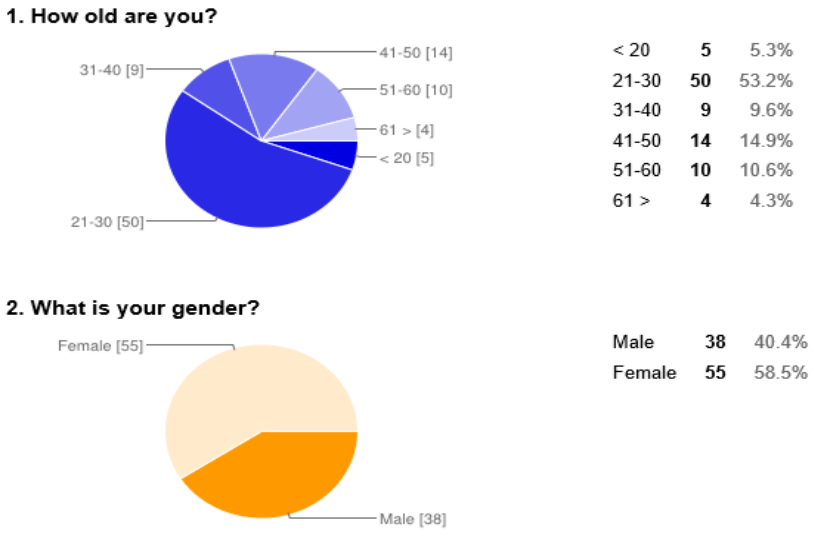
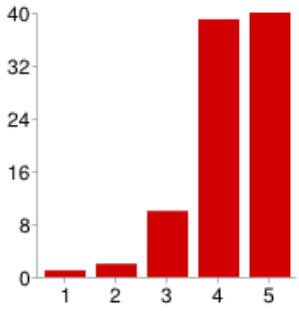


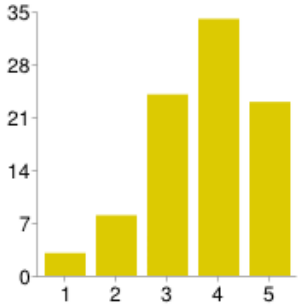
FIGURE 13: BACKGOUND OF RESPONDENTS

The second batch of responses in accordance with the colored graphs below dealt with taste, price, healthfulness and convenience. With 1 being of less importance and 5 with high importance. Surprisingly, the taste of a fresh food got more votes than the healthfulness of a product. Price was of an importance also.

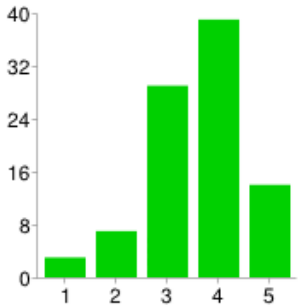
3. How much of an impact do the following have on your decision to buy foods and beverages?



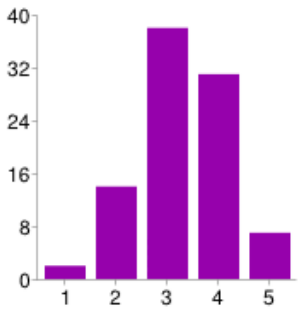
1	**1**	1.1%
2	**2**	2.1%
3	**10**	10.6%
4	**39**	41.5%
5	**40**	42.6%



1	**3**	3.2%
2	**8**	8.5%
3	**24**	25.5%
4	**34**	36.2%
5	**23**	24.5%



1	**3**	3.2%
2	**7**	7.4%
3	**29**	30.9%
4	**39**	41.5%
5	**14**	14.9%



1	**2**	2.1%
2	**14**	14.9%
3	**38**	40.4%
4	**31**	33%
5	**7**	7.4%

Colour Key: Red=Taste, Orange= Price, Green=Healthfulness, Purple= Convinience

Value Key: 1=Not Important, 5=Very Important

FIGURE 14: ANSWERS FOR TASTE, PRICE, HEALTHFULNESS & CONVINIENCE

After knowing which area of importance was for the respondents, it was necessary to narrow in more to the health factor, and the responses proved that the chemicals, food borne illnesses and the GMOs, are of a concern to the public, as discussed earlier in the thesis, the three issues can be bring serious health issues to consumers, and economic warning to the market.

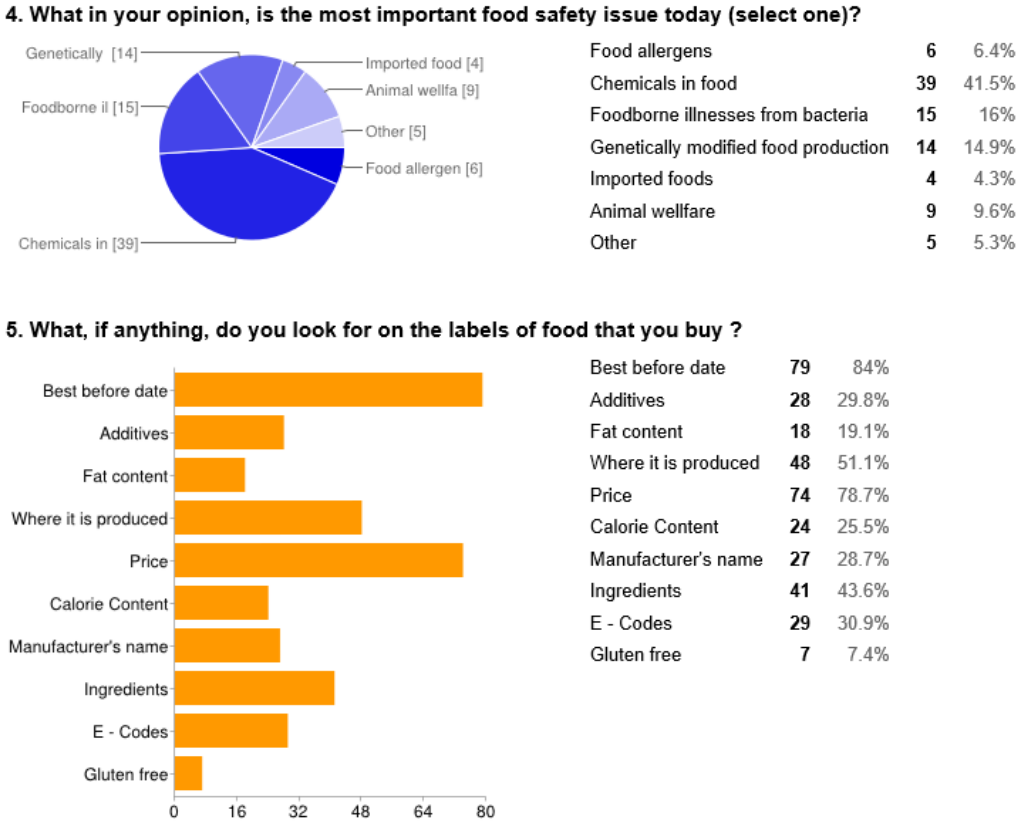
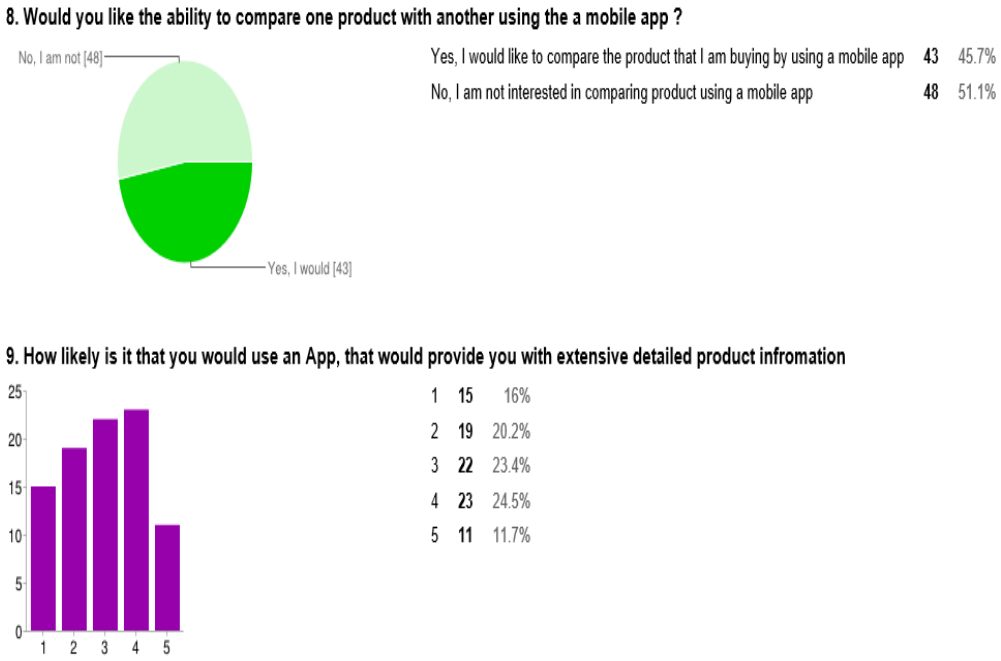


FIGURE 15: ANSWERS FOR FOOD SAFETY ISSUES AND LABELS

As also mentioned previously, most of the foods that are found to have chemicals in them, enter the markets through imports, proving the respondents give a high priority of where the food originates from second to its price.

The pie chart above also shows that consumers know little about the allergens through foods, proving thar once the GoScan is introduced it can highten the spread of such information.

The last segment of the question came with a rather relative result, as a majority of the responded were not willing to use a mobile app to know what product is closer or comparable to what they were to buy. But it opens an opportunity to plan how much usefulness it can bring to the rest of the respondents who are even willing to use the mobile app. Thus proving that it can be marketable and adaptable and with time it can be more reliable to the whole consumer group.



Value Key 1=Not Likely, 5=Very Likely

FIGURE 16: Answers for Mobile App Use

Using this results we are able to know that consumers have a growing concern of the foods in their stores, especially when in comes to the chemical compound that either in the food while it is growing that act as pesticides or the ones that are used in geo-engineering that end up in the foods that people eat.

This result show us the need for food producers to be a more active in making sure the environment and what they use to grow food is not harmful in any way. And also that once the GoScan application is introduced it will help in assuring the safety of foods and helping reduce the the presence of unhealthy foods in the market.

7 CONCLUSIONS

7.1 ANSWERS FOR THE RESEARCH QUESTIONS

The thesis was aimed on finding ways to improve consumer safety especially in the food sector, here again we reflect on the main questions that were first brought forward to analyze the conclusion if the needed solution is viable. The finding were as follows.

- ***Can the GoScan application be useful for Finland's consumers?***

Using the survey results we can be able to determine the effectiveness of the GoScan application in the market. The most assuring thing is that the consumers have a growing concern on the level of safety of their foods, and bring in this technical approach can offer a solution for both sides of the market, as food producers will be careful in knowing what chemical or procedures are taken in the growing of crops and the other end consumers will know what is in the foods that they buy.

- ***How do standards influence our economy***

If we were to have a scenario whereby rules on food production were not followed, we would see the toppling of companies to bankruptcy as well as a decrease in mortality rates and a freighting image of our environment, therefore rules regarding how food crops should be grown and produced gives us assurance that the economy also will improve and if rules are followed beyond borders then a successful global environment can be established.

- ***How can the traceability model used in GS1 GoScan be of value to consumer awareness and safety***

Traceability places a strong role alongside safety standards in way of being able to know all what is entailed in a product, from the type of soil that is grown under, to the type of fertilizers used, the additives, presertives and the effects there of.

- ***What areas can be stressed, in the traceability model used in GS1 GoScan application to improve consumer awareness and safety?***

Organizations such as ISO, Evira give a clear picture where the "consumer comes first" these type of approach gives consumers a way to build trust with the companies that provide for them the food that they eat by knowing exactly what it is that consumers want and what is healthy for them. This can be achieved by detailing all what it is that they are selling to the consumers and its effects to the biological body even in terms of allergies through extended labelling of the product whereby once a consumer has scanned the GTIN code, all necessary details are available through allowing transparency to flow with in the supply chain.

Chemicals should be coded and readily available at the scanning of the product. By this consumers will get to know what their products is made of and also allowing a flexibility in the making of their choices.

- ***What are the present dangers facing the fresh food market? And can they be contained?***

This part was of importance since all our food comes from the natural environment, and it also important to know how to control our natural surrounding in order tube able to grow healthier foods, in this case, geo-engineering has been taking place indoor to bring about the safety of growing healthy food but the gases used in geo-engineering have been tested out to have safety issues with the human biological system, allowing only genetically altered foods to thrive in such an environment and the use of engineered nanoparticles to deliver the nutrition of these altered foods into the human body. Safety standards in such areas is proving to be more than necessary otherwise in the future the

natural state of growing food will reach a level whereby even safety standards won't have an effect.

The findings of the main question together with the sub questions was mainly derived world reports from ***ISO & CDC*** and local organization reports such ***Evira*** that handled real life cases where risk management measures have been applied following events that involved food-borne illnesses and some that had resulted to death.

7.2 VALIDITY & RELIABILITY

Due to the topic touching on delicate subjects such the foods being sold to consumers and what are the hazards that are probable in any event if the food is contaminated, also, the dangers that can be caused to the human DNA and the dangers that have been accessed in the aerosol injection in way of geoengineering for earth preservation, all this data needs valid sources and because of these the rigorous research performed from secondary sources and comparing these cases and test results from these sources and all data was coinciding with the a provable effect that brought about the writing of these thesis.

Moreover the carrying out of the interview brought out also the concerns that have also been documented even by ***GS1*** Company, ***Evira*** and other large bodies such as the ***American CDC*** organization which offer valid data on different risk assessment cases.

7.3 SUGGESTIONS ON FURTHURE RESEARCH.

7.3.1 Transparency in Goods & Services

As consumers and also as business owners all derive their daily needs from the same food source, thus both ends have a need for the supply chain to have a rule of law on what it is that they are delivering and also what it is that is best for both ends.

In the author's view its quite logical that some businesses have certain recipes that they want to keep as trade secrets but for us to understand the safety level that is important for all consumers that will transact with the business, it is therefore important that these secret recipes are made known on a ***certain identifiable level*** with a ***regulatory agency*** for the analysis of food safety.

The need for transparency is there due the huge influx of foods into the market that are not safe for consumption thus without placing any bias rule on region or product it will be necessary for checking the contents thereof.

7.3.2 Stretching Safety Standards Perimeters

The author finds it necessary that in today's modern age, technical input such the GS1 GoScan is like to give a great output in support of measurement on consumer safety on the below two areas.

Farming Methods

The need to outline how fresh food farming was done for a certain crop will be necessary for monitoring the safety steps that are needed to be taken and what type of fertilizers have been used and also state the atmospheric state and atmospheric condition in order to identify any inhabitation of geo-engineering compounds than can be present on the surface.

Product Production Methods

This mainly involves the elements in processed foods, the state of the food production company, some of the chemicals and additives that are present in todays processed foods are very likely to have long term negative effects on the consumer, such as novel foods described in the ***Fourth Chapter.***

7.3.3 Fair Pricing

Siting back to ancient tradition that the Jewish governing system relied on and that brought them great success in their society in respect to Jehovah (Leviticus

25:14 1611). It states ***"And if thou sell ought unto thy neighbor, or buyest ought of thy neighbour's hand, ye shall not oppress one another"*** in simple understanding it states that if one sells any good or service to a person or one trades from another, none should oppress the other. Pricing in regard to gaining a financial support for the business is an unavoidable pillar in business ethics. The Talmud (T. Bava Metzia 50b). magnifies this and states that if the overcharge is more than one-sixth (if the retailer sells an item for a price that is one-sixth higher than what is generally accepted as a fair price then the sell can be ruled as null and void) (Journal of Macromarketing 2001.)

The reason why the author finds it important is that since the intrusion of genetically altered foods into the market their prices have been very low and the natural fresh foods remain high thus consumer even during a stage of economic recession will likely turn to these genetically altered foods, thus a battle of profit making emerges.

8 SUMMARY

This theses aims to improve ways on consumer safety by way of implementing tighter safety standards on food production and by a technical approach of knowing what it is exactly that the consumer is buy using applications such as the GS1 GoScan technology.

From the 2nd Chapter the author began by identifying the various authorities and principles that standards have in our today's economy, from there the author draws down to safety standards in order to keep a clear line on what it is that is of great concern in this thesis and how important it is that we need standards as rules to know what cooperation's can produce for consumers and be accepted in the market place.

In the 3rd Chapter the author retreats to the various threats that facing the role of safety standards in the global economy the chapter is important due to the fact that issues such genetically altered foods are in our markets today, engineered nano technology has found its way into the agriculture industry and also geo-engineering has a huge role in today's society on how foods are growing and how farms are producing these food, even to the level than consumers are unaware of the various compounds being injected into the atmosphere, though they can be subtle the health effects of these are not to be overlooked.

In the 4th Chapter the author found it necessary to introduced renowned international and national affiliated organization that have a role in consumer safety and Finland as an example on how they have a tightly organized system in food safety monitoring including Evira.

In the 5th Chapter the aim was to bring out a technical solution in way of upholding safety standards for consumers with the advantages that the GS1 GoScan application brings in creating fairness in the trading environment.

In the 6th Chaoter, the aim was to measure the concerns of the consumers and also to view the response given the technological approach to solving the concerns

In the 7th Chapter findings on the empirical research has been done, bringing out the needed results for understanding how the GoScan can impact the society.

References

Published References

Borich, G. D. 2011. Effective Teaching Methods: Research-Based Practice. (7th edition.). Allyn & Bacon. pp 262

Bryman A. & Bell E. 2007. Business Research Methods 3rd Edition. pp 402 – 409

Chunawalla, S.A. 2008. Advertising, Sales and Promotion Management pp 3.

Eriksson P. & Kovalainen A. 2008. Qualitative Methods in Business Reseach.pp 77-80

Evans, D.S. & Leighton, L. 1989. Why Do Smaller Firms Pay Less? Journal of Human Resources, Vol. 24, No. 2, pp. 299-318

Grunwald M. Time Magazine. 2014. New Energy. Do Worry. But Be Happy. pp16

Idson, T.L. 1996. Employer Size and Labor Turnover. Research in Labor Economics, Vol. 15, pp. 273-304

Ikujiro N. & Zhichang Z. 2012. Pragmatic Strategy: Eastern Wisdom, Global Success. pp 14

National Geographic. 2014. Food: The Truth about GMOs, pp 40

Pant, Himanshu. 2007. Advertising and Consumer Behaviour, pp 28 -29

Ramachandra, K., Chandrashekara, B., Shivakumar, S. 2010. Marketing Management, pp 154

Saunders, M., Lewis, P. & Thornhill, A. 2012. Research Methods for business students. 6th edition. Harlow: Pearson Education Ltd. pp 124 – 154

Scholte, Jan Aart. 2000. Globalization: A Critical Introduction, What Causes Gloablization, pp 103

Electronic Sources

American National Standards Institute, 2014. Standards Promote Efficiency and Economy in Business. (Online) Available on standards learn website: http://www.standardslearn.org/lessons.aspx?key=49.
(Retrieved on 6th October 2014)

BSI. Standards matter to consumers, 2014. How standards benefit us all, every day (Online) Available on BSI website: http://www.bsigroup.com/LocalFiles/en-GB/consumer-guides/resources/BSI-consumer-brochure-standards-matter-to-consumers-UK-EN.pdf. (Retrieved 30th May 2014)

CDC. 2014. PulseNet & Foodborne Disease Outbreak Detection, (Online) Available on CDC website:
http://www.cdc.gov/features/dsPulseNetFoodborneIllness/
(Retrieved on 1st October 2014)

Claudia Tuser: Rostow Model of Development with Examples vs. self sufficiency, 1960. (Online) Available on Lewis historical society website:
http://www.lewishistoricalsociety.com/wiki/tiki-read_article.php?articleId=72

(Retrieved on 9th October 2014)

Cooperative Extension Service, 2003. Use of Biotechnology in Agriculture: Benefits and Risks. (Online). Available on the College of Tropical Agriculture and Human Resources University of Hawai'I at Manoa Website:
http://www.ctahr.hawaii.edu/oc/freepubs/pdf/bio-3.pdf.

(Retrieved in the 23rd of October 2014)

DeonVsEarth, 2014. Weather Modification: Man-made "Climate Change" exposed. (Online) Available on DeonVsEarth website:
http://deonvsearth.com/geo-engineering-and-weather-modification-haarp-conspiracy-theory-debunked/(Retrieved on August 20th 2014)

Donna R. 2012, Quanlitative vs Quantitative Data. (Online) Available on the Regentspreparation website:
http://regentsprep.org/regents/math/algebra/AD1/qualquant.htm
(Retrieved 23rd September 2014)

EFSA: 2014a. Panels & Units: (Online) Available on EFSA website.
http://www.efsa.europa.eu/en/panels.htm
(Retrieved on 15th October 2014)

EFSA: 2014b. About EFSA. (Online) Available on EFSA website:
http://www.efsa.europa.eu/en/aboutefsa.htm
(Retrieved on 15th October 2014)

EFSA: 2012c. Food Safety Cooperation Beyond Borders. Working alongside the European Food Safety Authority. (Online) Available on EFSA website:
http://www.efsa.europa.eu/en/corporate/doc/foodsafetycooperation.pdf
(Retrieved on 15th Ocotber 2014)

EFSA: 2012d. Use of the EFSA Standard Sample Description for the reporting of data on the control of pesticides residue in food and feed according to Regulation (EC) No. 396/2005. (Online) Available on EFSA website:
http://www.efsa.europa.eu/en/efsajournal/doc/2628.pdf
(Retrieved on 15th October 15, 2014).

Evira: Mission. 2014a. (Online). Available on Evira's website:
http://www.evira.fi/portal/en/about+evira/about+us/evira-s+strategy+2014-2020/
(Retrieved on the 17th of October 2014)

Evira Strategy: 2014-2020. 2014b. Building Tomorrow's Food safety and sustainable welfare today. (Online) Available on Evira's website:
http://www.evira.fi/files/attachments/en/evira/about_us/evira_strategia2014_2020_en.pdf

(Retrieved on 17th of October 2014)

FAO. 2010. Food and Agriculture Organization of the United Nations. Agricultural biotechnology in developing countries. (Online) Available on the FAO website: http://www.fao.org/docrep/meeting/019/k6993e.pdf

(Retrieved on 23rd of October 2014).

Features of a top selling Smart Phone App. 2013. 10 things every top selling iphone-android-ipad-app needs to be successful. (Online) Available on the addicted2success website: http://addicted2success.com/success-advice/10-things-every-top-selling-iphone-android-ipad-app-needs-to-be-successful/.
(Retrieved on 14th of November 2014)

F. M. Fishel, 1963. The Role of the Codex Alimentarius in Determining International Standards for Pesticides and Food. (Online) Available on University of Florida Website: http://edis.ifas.ufl.edu/pi237. (Retrived 8th August 2014)

Genetically Engineered Food News: 2014. Why the Governement should ban the use of the Cow Growth Hormone. (Online) Available on the following website: http://geneticallyengineeredfoodnews.com/cow-growth-hormone.

(Retrieved on 9th October 2014)

Global Research Jeffrey Smith. 2011, GMO Researchers Attacked, Evidence Denied, and a population at Risk. (Online) Available on Global Research website: http://www.globalresearch.ca/gmo-researchers-attacked-evidence-denied-and-a-population-at-risk/5305324 (Retrieved on 10th of October 2014)

God and the Laws of Science, 2011. The Law of Causality. (Online) Available on the Apologetics Press.
http://www.apologeticspress.org/APContent.aspx?category=12&article=3716
(Retrieved on 23rd of October 2014)

Grant Wiggins "Granted, and …" thoughts on education. 2013 The Standards and Creativity – Compatible. (Online) Available on Grantwiggins website: http://grantwiggins.wordpress.com/2013/04/10/the-standards-and-creativity-compatible/ (Retrieved on 7th October 2014).

GS1. 2013a. Food Safety and Traceability. (Online) Available on GS1 website: http://www.gs1.fi (Retrieved on 1st of November 2013)

GS1 GDSN. 2013b. Proven Benefits for Trading Partners. (Online) Available on GS1 website: http://www.gs1.org/docs/gdsn/GDSN_Overview.pdf (Retrieved on 7th October 2014)

GS1. 2013c. Company Overview. (Online) Available on GS1 website: http://www.gs1.org/about/overview. (Retrieved on 7th October 2014).

GS1 GoScan: 2013d Overview, Trusted product information at your fingertips. (Online) Available on the GS1 Australia website: http://www.gs1au.org/services/goscan/gs1-goscan-smart-phone-app-overview.asp (Retrieved on the 17th of October, 2014)

GS1 GoScan, 2005e. How does it work? (Online) Available on the GS1 Australia website: http://www.gs1au.org/services/goscan/gs1-goscan-app-how-does-it-work.asp (Retrieved on the 20th of October, 2014)

GS1 Australia, 2013f. Extended Labelling: Call to Action. (Online) Available on the GS1 Australia website: http://www.gs1au.org/assets/documents/services/gs1-goscan-app/Extended_Labelling_Call_2_Action_Food_Grocery_Liquor.pdf (Retrieved on the 21st of October, 2014)

Holy Bible, 1611a. The book of Leviticus, (Online) Available on King James Website: http://www.kingjamesbibleonline.org/Leviticus-19-19/ (retrieved on 1st October 2014)

Holy Bible, 1611b. King James Version. (Online) Available on the King James Online website: http://www.kingjamesbibleonline.org/Leviticus-25-14/. (Retrieved on 23rd of October 2014).

Holy Bible, Jeremiah 4:28, 1611. King James Version. (Online). Available on the King Jmaes Online Website: http://www.kingjamesbibleonline.org/Jeremiah-4-28/ Retrieved on 23rd of October 2014)

ISO. 2014a, Consumers and Standards: Partnership for a Better World. (Online) Available on ISO website: http://www.iso.org/sites/ConsumersStandards/2_benefits.html. (Retrieved on 1st October 2014)

ISO. 2014b, Iso Standards and food, Quality and Safety from farm to fork, (Online) Available on ISO website: http://www.iso.org/iso/home/store/publication_item.htm?pid=PUB100297 (Retrieved 6th October 2014)

ISO. 2014c, Food, ISO Standards and food. (Online). Available on ISO website: http://www.iso.org/iso/home/news_index/iso-in-action/food.htm(Retrieved on 14th October 2014)

ISO. 2014d, ISO 2200 & 2005: Food safety management systems. Requirements for any organization in the food chain. (Online) Available on ISO website: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=35466. (Retrieved on 14th October 2014)

Joel Bakan 2003, the Corporation: The Pathological Pursuit of Profit and Power. (Online) Available on Youtube: https://www.youtube.com/watch?v=s6zQO7JytzQ(Retrieved on 7th October 2014)

Journal of Macromarketing. 2001. The Impact of Jewish Values on Marketing and Business Practices: (Online). Available on Sage Journals website: http://jmk.sagepub.com/content/21/1/74.full.pdf+html (Retrieved on 23rd of October 2014)

Luokkamäki M, 2013. GS1 Increased Traceability with GS1 Standards, (Online). Available on google shared link: https://docs.google.com/presentation/d/1lpZFddjii6zoB26SrX-LncI4RwBRwJep5GtMEamifyk/edit#slide=id.p14. (Retrieved on 3rd October 2013)

Ministry of Agriculture and Forestry, 2010a. Food safety and Consumer Information. (Online) Available on the Ministry's website: http://www.mmm.fi/en/index/frontpage/food_safety.html(Retrieved on 17th October 2014)

Ministry of Agriculture and Forestry 2010b, Food Safety in Finland, (Online). Available on the Ministry's website: http://www.mmm.fi/attachments/mmm/julkaisut/esitteet/5mWaDKYCu/MMM_Elintarvike_englanti.pdf (Retrieved on 10th of October 2014).

Mobile Commerce Report, 2011. Mobile in Retail. (Online) Available on the GS1 Australia website: http://www.gs1au.org/assets/documents/services/gs1-goscan-app/GS1_Sweden_Mobile_in_Retail_Report.pdf. (Retrieved on the 20th of October, 2014).

NANOCAP, 2014 National Nanotechnology Intiative: What it is and How it works. Available on Nano governmental website: http://www.nano.gov/nanotech-101/what. (Retrieved on 20th August 2014)

NSF. 2015. The Public Health and Safety Organization. Organic Certification. (Online) Available on NSF website: http://www.nsf.org/consumer-resources/what-is-nsf-certification/organic-certification/ (Retrieved on 7th October 2014)

Organic Consumers Assocaitons, 2009. Arpad Pusztai and the Risks of Genetic Engineering. (Online) Available on OCA website: http://www.organicconsumers.org/articles/article_18101.cfm. (Retrieved on 9th October 2014)

Pesticide Residue Monitoring in Finland,2008. Fruits, Vegetables and Cereals. (Online) Available on the Evira's website: http://www.evira.fi/portal/en/about+evira/publications?a=view&productId=129 (Retrieved on the 17th of October 2014)

Rutgers State University: 2008 Twenty Reasons why Geoengineering may be a bad idea. (Online). Available on google shared link: http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CB0QFjAA&url=http%3A%2F%2Fclimate.envsci.rutgers.edu%2Fpdf%2F20Reasons.pdf&ei=d4RtVYuTCMqR7Abe0oCYDQ&usg=AFQjCNEIjo93zV7RkyRfD92M9crKuovTQQ&sig2=fZDnmoDXiUjjfvxUoLEQ_g&bvm=bv.94455598,d.ZGU (Retrieved on 21st August 2014)

SSRF, 2013. Spiritual Science Research Foundation. Research on vibrations emitted by bread and chapatti. (Online). Available on SSRF website: http://www.spiritualresearchfoundation.org/spiritual-life/research-on-vibrations-emitted-by-bread-and-chapati(Retrieved on 23rd of October 2014).

The National Bureau of Economic Research. Determination of the December 2007. Peak in Economic Activity. (Online). Available on the National Bureau of Economic Research website: http://www.nber.org/cycles/dec2008.html (Retrieved on 25th November 2014)

Toxics Action Center: 2012. The Problem with Pesticides: (Online). Available on Toxicsaction website: http://www.toxicsaction.org/problems-and-solutions/pesticides (Retrieved on 21st August 2014).

Understanding Nano, 2007. Nanotechnology in the Food Industry. (Online). Available on the Understanding Nano Website: http://www.understandingnano.com/column-food.html (Retrieved on 17th October 2014)

VETS: Visualization & Enabling Technologies Section, 2012. Solar Magnetic Eruption Disturbances. (Online). Available on VETS website: http://www.vets.ucar.edu/vg/SME/index.shtml. (Retrieved on August 20th 2014)

WHO. 2013a. Codex Alimentarius: Protecting consumers' health through safe and nutritious food – the first 50 years. (Online). Available on WHO website: http://www.who.int/features/2013/codex_alimentarius/en/ (Retrieved on 10th October 2014)

WHO, 2015b. Antimicrobial Resistance. (Online). Available on the WHO website: http://www.euro.who.int/en/health-topics/disease-prevention/antimicrobial-resistance/antimicrobial-resistance (Retrieved on 14th Ocotber 2014)

WHO. 2015c Food Safety. (Online). Available on WHO website: http://www.euro.who.int/en/health-topics/disease-prevention/food-safety. (Retrieved on 10th October 2014)

WHO. 2015d Five Keys to Safer Food Manual. (Online). Available on WHO website: http://apps.who.int/iris/bitstream/10665/43546/1/9789241594639_eng.pdf?ua=1 (Retrieved on 10th October 2014)

World Standards Cooperation. Benefits for Standards for National Economies. 2015 (Online). Available on WSC website: **http://www.worldstandardscooperation.org/newsletters/003/newsletter03.html** (Retrieved on 7th October 2014)

Interview

Luokkamäki M. 2013 Specialist (Transport & Logistics). GS1 Finland. Interview 1st of November 2013.

APPENDICES

APPENCIDE 1. QUESTIONNAIRE

GS1 standards and Consumer Awareness Research

1. What are your main products or brands that qualify for using **GS1 Standards** ?

2. GS1 helps in **traceability** of labeled products that may contain elements that may cause food borne illnesses, how many times have such events occurred in your company ?

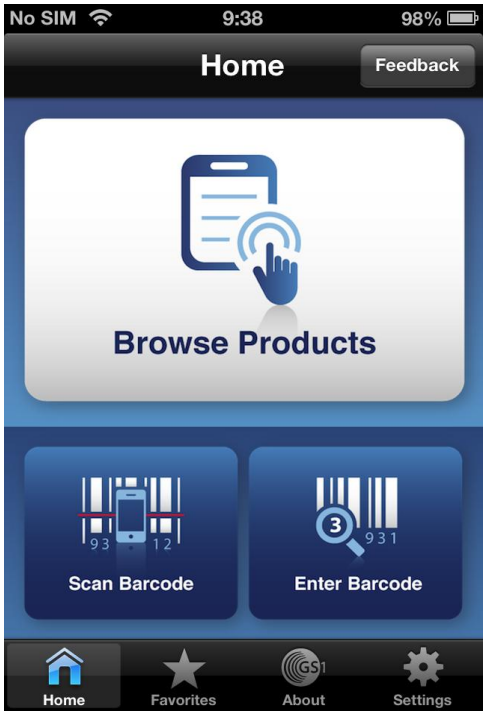
3. Our society today is at risk of certain rising dangers in the food market, how do you deal with helping consumers understand that the food they are buying has been secured from certain hazards especially coming from other nations, does your company do private testing for local and foreign produced products or is it done by a 2nd Party (***such as EVIRA***) ?

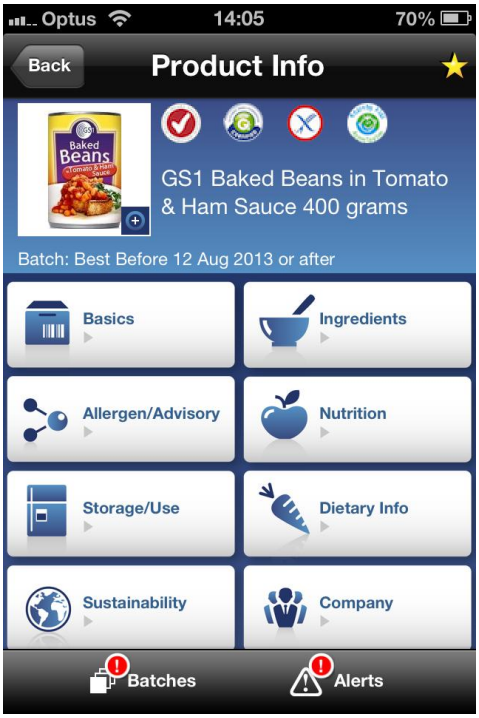
APPENDICE 2. QESTIONNAIRE CHECKLIST

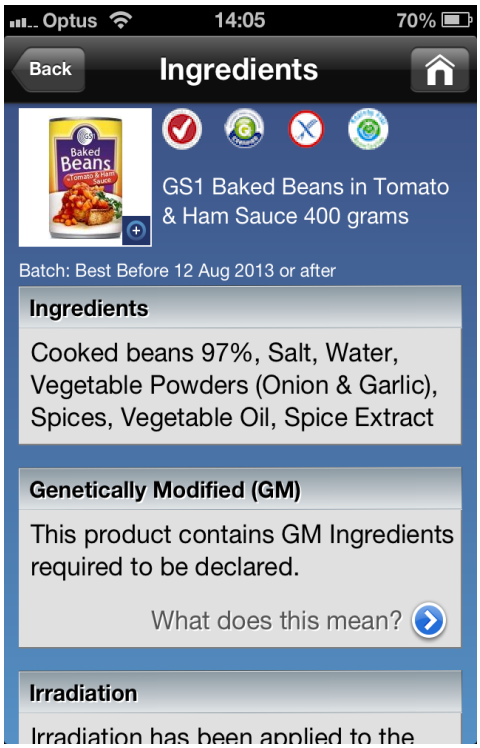
4. Below is a list of current operations for testing of food safety that consumers over the years are concerned about. Which product testing does your company mostly involve with ? (*confirmation below can be marked as yes/no*)

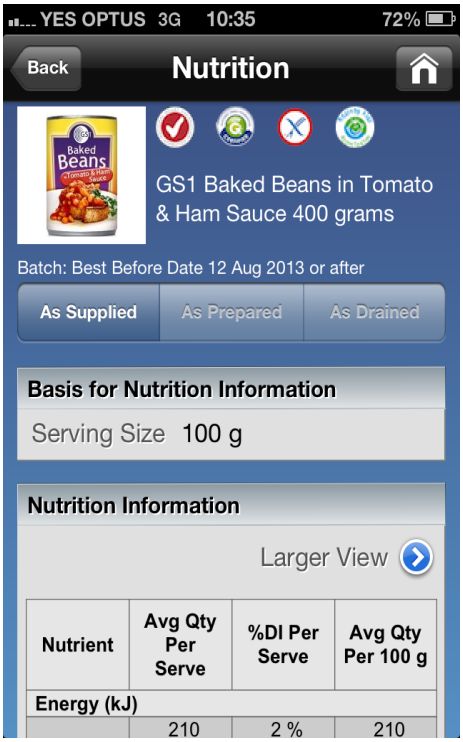
Item Testing	GMO (genetically modified organism) labels	Radiation testing for harmful particles	Toxic chemical testing
(a) Seafood			
(b) Cash crops			
(c) Meat products			
(d) Animal feed			
(e) Beverages			
(f) Water Supply			
(g) Electronics			

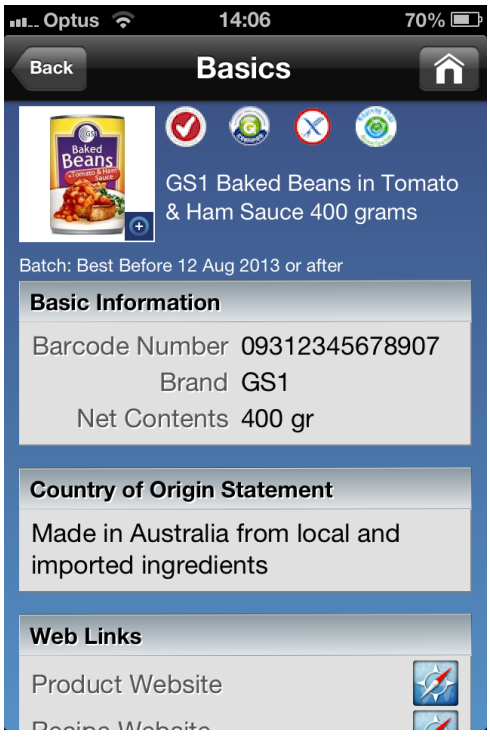
APPENDICE 3. GS1 GoScan Apllication Hands On View

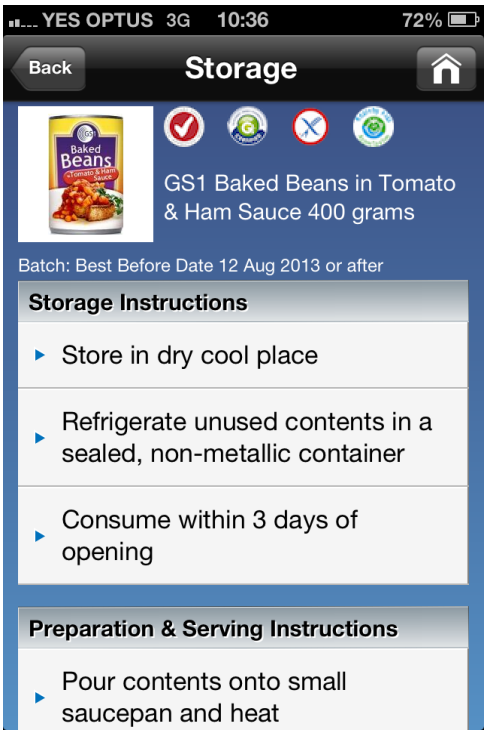


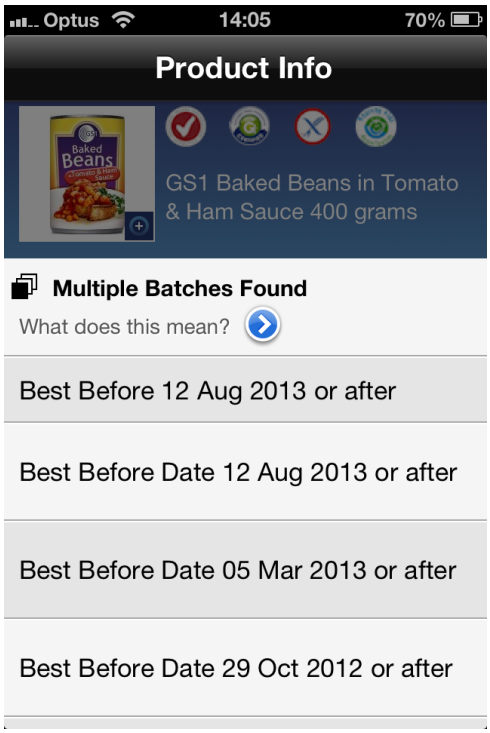


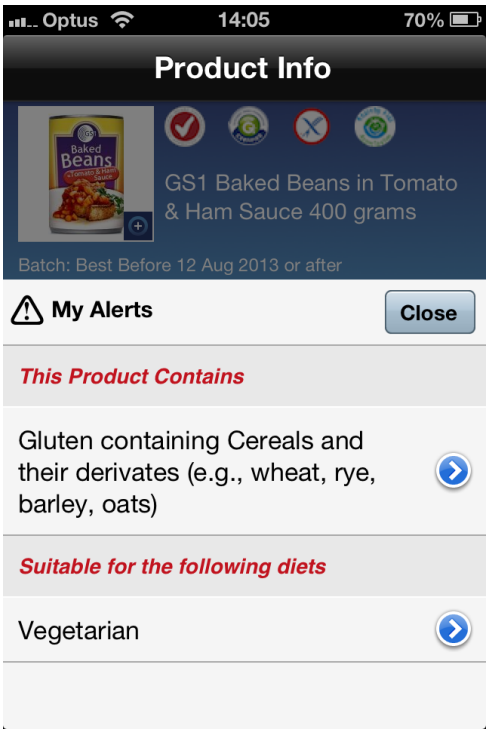

Optus 14:05 70%
Back
Ingredients
GS1 Baked Beans in Tomato & Ham Sauce 400 grams
Batch: Best Before 12 Aug 2013 or after
Ingredients
Cooked beans 97%, Salt, Water, Vegetable Powders (Onion & Garlic), Spices, Vegetable Oil, Spice Extract
Genetically Modified (GM)
This product contains GM Ingredients required to be declared.
What does this mean?
Irradiation
Irradiation has been applied to the

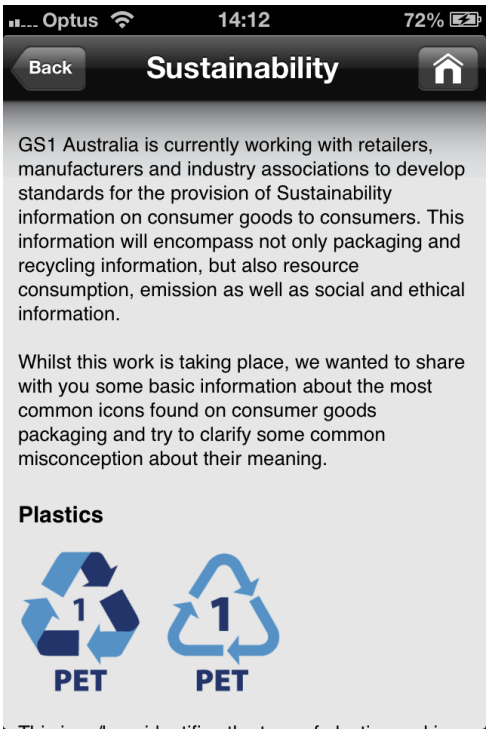

YES OPTUS 3G 10:35 72%
Back
Nutrition
GS1 Baked Beans in Tomato & Ham Sauce 400 grams
Batch: Best Before Date 12 Aug 2013 or after
As Supplied
As Prepared
As Drained
Basis for Nutrition Information
Serving Size 100 g
Nutrition Information
Larger View
Nutrient
Avg Qty Per Serve
%DI Per Serve
Avg Qty Per 100 g
Energy (kJ)
210
2 %
210


Optus 14:06 70%
Back
Basics
GS1 Baked Beans in Tomato & Ham Sauce 400 grams
Batch: Best Before 12 Aug 2013 or after
Basic Information
Barcode Number 09312345678907
Brand GS1
Net Contents 400 gr
Country of Origin Statement
Made in Australia from local and imported ingredients
Web Links
Product Website


YES OPTUS 3G 10:36 72%
Back
Storage
GS1 Baked Beans in Tomato & Ham Sauce 400 grams
Batch: Best Before Date 12 Aug 2013 or after
Storage Instructions
Store in dry cool place
Refrigerate unused contents in a sealed, non-metallic container
Consume within 3 days of opening
Preparation & Serving Instructions
Pour contents onto small saucepan and heat







(GoScan Images & Logo Courtesy of GS1 Australia)

APPENDICES 4: SURVEY QUESTIONNAIRE

Consumer Safety & Extented Product Labelling

1. How old are you?

- ◯ < 20
- ◯ 21-30
- ◯ 31-40
- ◯ 41-50
- ◯ 51-60
- ◯ 61 >

2. What is your gender?

- ◯ Male
- ◯ Female

3. How much of an impact do the following have on your decision to buy foods and beverages?

a. Taste

	1	2	3	4	5	
Not Important	◯	◯	◯	◯	◯	Very Important

b. Price

	1	2	3	4	5	
Not Important	◯	◯	◯	◯	◯	Very Important

c. Healthfulness

	1	2	3	4	5	
Not Important	◯	◯	◯	◯	◯	Very Important

d. Convenience

	1	2	3	4	5	
Not Important	◯	◯	◯	◯	◯	Very Important

4. What in your opinion, is the most important food safety issue today (select one)?

- ◯ Chemicals in food
- ◯ Animal wellfare
- ◯ Imported foods
- ◯ Food allergens
- ◯ Foodborne illnesses from bacteria
- ◯ Genetically modified food production
- ◯ Other: ☐

5. What, if anything, do you look for on the labels of food that you buy ?

- ☐ Best before date
- ☐ Additives
- ☐ Fat content
- ☐ Where it is produced
- ☐ Price
- ☐ Calorie Content
- ☐ Manufacturer's name
- ☐ Ingredients
- ☐ E - Codes
- ☐ Gluten free

6. Below is a list of adjectives used to describe you as a shopper, please choose four that appropriately fit you

- ☐ worried
- ☐ brave
- ☐ hesitant
- ☐ choosy
- ☐ optimistic
- ☐ nervous
- ☐ distrustful
- ☐ cautious
- ☐ excited
- ☐ simple
- ☐ focused
- ☐ bargain-hungry

7. To what extent, if at all, are you confident in the safety of the food supply

- ◯ Extremely confident
- ◯ Somewhat confident
- ◯ Neither confident or unconfident
- ◯ Not very confident
- ◯ Not at all confident

8. Would you like the ability to compare one product with another using the a mobile app ?

- ◯ Yes, I would like to compare the product that I am buying by using a mobile app
- ◯ No, I am not interested in comparing product using a mobile app

9. How likely is it that you would use an App, that would provide you with extensive detailed product infromation

	1	2	3	4	5	
Not Likely	◯	◯	◯	◯	◯	Very Likely

Interview Questions

1. What are GS1 Standards
2. What values does GS1 Standards bring to Finland
3. How do GS1 Standards work in logistics
4. What is Traceabilty
5. Does GS1 Finland involved with extended labelling
6. Does GS1 Finland plan to introduce the GS1 GoScan application
7. What companies are affiliated with GS1 globally and in Finland.