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■ OPPINNÄYTETYÖ- AMMATTIKORKEAKOULUTUTKINTO
MATKAILU-, RAVITSEMIS- JA TALOUSALA

HEALTHY SPRING ROLLS TO FINNISH MARKET

TEKIJÄ/T: Thy Huynh

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<p>Tiivistelmä</p> <p>Tämän opinnäytetyön tarkoituksena on kehittää ja tuoda terveellisiä ruokatuotteita suomalaisille markkinoille. Tuotekehitystyön päämääränä on luoda terveellisiä kevätrullia ja niihin sopivia reseptejä. Ohje on suunnattu pääsääntöisesti keskisuurille ruokatuottajille, jotka tekevät ruokatuotekehitystä yrityksissään.</p> <p>Opinnäytetyön teoriaosa perustuu tuotekehitykseen. Lisäksi siinä kerrotaan kevätrullan historia. Empiirinen osa koostuu kokonaisten tuotteiden suunnittelusta ja toteutuksesta ja niiden resepteistä. Tuotteen kehitysvaiheessa toteutettiin kysely, jotta saataisiin tietoa kuluttajan mielipiteestä ja ostovoimasta. Tuotteen soveltuvuuden markkinoille osoittaa asianmukainen pakkaustapa, pakkausmateriaali ja kustannukset, jotka lisäävät kilpailua.</p> <p>Sydänmerkki, Hyvää Suomesta ja Avainlippu ovat olleet päämäärinä ruokatuotekehitystyössä alusta alkaen. Paikallisilta tuottajilta tulevia kotimaisia raaka-aineita on käytetty mahdollisimman paljon prosessin aikana edellä mainittujen symbolien säilyttämiseksi. Tuotteet on lisäksi tehty Suomen ravitsemusneuvottelukunnan ravitsemussuosituksen mukaisesti. Tämän kehitystyön tuloksena saatiin neljä Sydänmerkki-symbolin vaatimukset täyttävää tuotetta resepteineen.</p> <p>Opinnäytetyön aihe on trendikäs, sillä nykyään ruosta ollaan yhä enemmän tietoisia. Ihmiset ovat menossa takaisin perusarvoihin ja haluavat tietää, mitä syövät ylläpitääkseen terveyttä ja hyvinvointia</p>	
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<p>Abstract</p> <p>The goal of this thesis is to create healthy spring rolls and their applicable recipes for the Finnish market. The manual included in the Appendices is mainly aimed at middle-scale food producers that engage in the development of food products.</p> <p>The theoretic part of my thesis is based on product development. It also includes the historical background of spring rolls. The empirical part consists of designing and the execution of the complete products and their respective recipes. The included survey was carried out during the developing stage of the entire development process in order to collect the consumer's opinions and purchase willingness. The product feasibility specifies the appropriate packaging method, the packaging material and the cost, which would increase competition in the market.</p> <p>The Heart Symbol, the Hyvää Suomesta or the Flag Key label have been set up as the objectives of the food's product development from the beginning. Domestic raw materials, which come from local producers, are used as much as possible during the process in order to obtain the previously mentioned labels for the spring rolls. All of the products are made based on the nutritional recommendations from the National Nutrition Council of Finland. Four products and their applicable recipes are achieved as the result of this development.</p> <p>The topic of this thesis is current trend, as people are more aware of food nowadays. People are going back to basic values and they want to know that their food maintains health and wellbeing.</p>			
Keywords Food product development, healthy product, spring roll, healthy spring roll			

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1 FOREWORD

The aim of this thesis is to develop a new healthy food product to introduce to the Finnish market. The product's ingredient selection and processing are designed to secure the healthiness of the product. With the balanced match of European and Asian ingredients, the product will hopefully fit Finnish tastes.

The product I would like to develop is spring roll; as this is a familiar food for me, an Asian person living in Finland. In addition, I have noticed that many Finns are interested in spring rolls as part of Asian cuisine. Spring rolls are rarely found in supermarkets in Finland; and most of them are imported. Therefore, I came up with the idea of turning the spring roll into a popular product, made in Finland. Besides variety of flavor, matters of allergies and nutrition are taken into account, so that the product will be both healthy and suitable for everybody.

The thesis is divided into five categories, explained in the following figure.

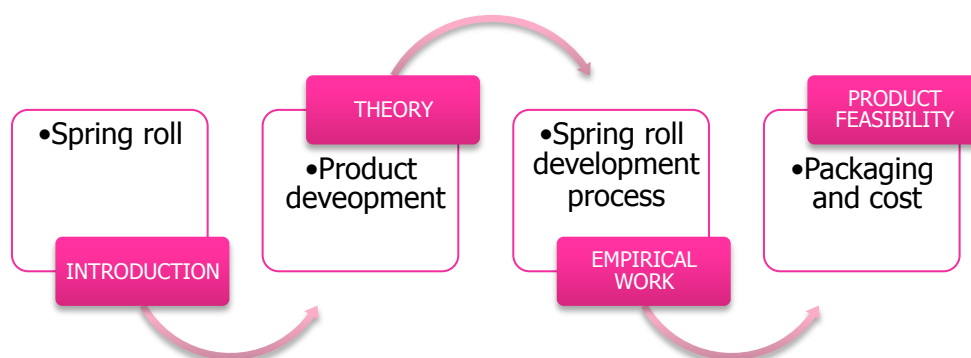


FIGURE 1. Thesis structure

The introduction part briefly presents general information of spring rolls, such as the history, cooking methods and its nutritional information. The theory portion will discuss matter of product development, which will serve as the foundation for the entire development process. Empirical work is the main part of this thesis, as it describes the process from initial concept to the finished products and their recipes. Product feasibility recommends the appropriate packaging method and package materials, as well as reasonable costs for the products.

The thesis mainly discusses the spring roll development process, which includes four stages: objective defining, planning, producing and evaluating. However, the process's purpose is merely to create new applicable recipes that will be provided to food manufacturers, restaurants and supermarkets.

2 INTRODUCTION OF SPRING ROLL

Spring rolls are one of the most famous Asian dishes, consisting of vegetables, noodles and meat filling inside thin pastry wrap or rice papers. The dish is cooked with deep-fried method and highly recommended as a starter. (iFood.tv 2014.) Normally, a homemade spring roll's size is dependent on the round wrappers' size which is around 8,5 inches circle (equal to the size of a common tortilla). However, the skilled cooks often make thumb-sized spring roll with smaller circles or a triangle-shaped wrapper. (Nguyen 2009.)

2.1 History

There have been contrasting opinions on the history of spring rolls, some of which state that the dish originates from Vietnam and others claim that it is from China (One Vietnam 2010). Nonetheless, according to Pacific West (2012), spring rolls are thousand-years dish from China around 992 Anno Domini (A.D.)

The dish was originally made for imperial China and in the shape of cakes eaten for welcoming the spring; thus, initially it was called a "spring dish". For some unknown reason, the cakes were gradually shaped into rolls; which is where the name of "spring roll" comes from. There are various unique recipes for the dish, which has been the symbolic food in many Asian countries/regions including Taiwan (made of herbs and ground peanut powder), Hong Kong (known as "Dim Sums"), Vietnam (known as "Goi Cuon" or "Cha Gio"), Phillippines/Indonesia (known as "Lumpia") and South Korea (known as "Chungwaon"). (iFood.tv 2014.)

Nowadays, due to the available pastry wrap/rice paper in many Asian markets, the process of making spring rolls has been diminished to 3 steps: preparing fillings, wrapping and deep fat frying. Many different versions of the dish's fillings have been created with pork and chives, shepherd's purses and sweetened bean paste etc. A golden-colored, crisp outside and fresh inside spring roll can be regarded as a convenient and delicious food. For enhancing the flavor, the dish can be served with a variety of sauces. (Culture China 2014.)

2.2 General spring roll's recipe

Due to the variety of flavors in different Asian countries, spring rolls can be found with various kinds of recipes all around the world. However, a popular and typical pork recipe by Marion Grasby on Taste Magazine (September 2013) is included in this thesis. Assuming that 16 spring rolls will be prepared in 30 minutes and fried in 15 minutes, the following recipe will be applied.

2.2.1 Ingredients

Most of the ingredients for a spring roll are basic ones in Asian cuisine, which are often seen in daily meals. Thus there are a few ingredients that are not familiar to Finnish people such as glass noodles (made from the mung bean) and fish sauce. However, the combination of these ingredients is ra-

tional and creates a harmony that makes the flavor of spring rolls mostly suitable to everyone. The following table specifies the needed ingredients in spring rolls.

TABLE.1 Ingredients for 16 spring rolls (Grasby 2013)

Names of ingredients	Amount
Bean thread vermicelli (Glass noodle)	50g
Pork mince	250g
Finely shredded cabbage	2 cups
Fish sauce	2 tablespoons
Black pepper powder	1/2-1 teaspoon
Flour	40g (1/4 cup) plain
Vegetable oil	1 tablespoon (tbs)
Finely chopped garlic	3 cloves
Grated carrot	1 cup
White sugar	1 teaspoon
Frozen spring roll wrappers, thawed	16 x 20cm
Water	60ml (1/4 cup)
Vegetable oil, to deep fry	

2.2.2 Cooking method

Spring rolls are prepared based on Grasby's recipe and the following steps:

- The glass noodle should be soaked in hot water for 1 minute before it is drained; then rinse the noodle with cold water and leave it to dry.
- Stir fry garlic along with pork in high heat vegetable oil either in 2 minutes or until the meat is browned. Continue frying with the mixture of glass noodle, cabbage, carrot, fish sauce, sugar and pepper until all the ingredients are well combined. At this point, the filling is ready for wrapping.
- Place 2 full tablespoons of filling in the center of a wrapper. The wrapping process begins with folding in two sides then covering the filling with the bottom side of the wrapper before rolling up tightly towards the top until it forms a log. (Remember one corner of the wrapper should be against your side)
- Spread the combination of flour and water over the top corner to close the roll tightly. Use the same method for the rest of spring rolls.
- Add enough oil to reach 10 cm up the side of the deep saucepan, place over medium-high heat and heat the oil to 180°C, the spring rolls are deep-fried for 2-3 minutes. Once turned golden, the

rolls are drained with oil-absorbing cooking paper.

Note: The pork filling can be replaced by chopped prawn or minced duck breast. The dish is recommended to be served with a dipping sauce that is the warm mixture of 1/2 cup white sugar, 1/3 cup white vinegar, 1 tbs fish sauce and 2 tbs water. (Grasby 2013.)

2.2.3 Nutrition information

The following table describes the nutritional information of spring rolls made by Grasby's recipe.

TABLE.2 Nutrition information per spring roll (Grasby 2013)

Nutrition	Amount
Energy	790kJ
Fat Total	8.80g
Carbohydrate Total	25.60g
Protein	2.20g
Sodium	260.00mg
Fat saturated	1.80g
Carbohydrate sugars	1.10g
Dietary Fiber	0.70g
Cholesterol	-

3 PRODUCT DEVELOPMENT

The product development is described as a whole process, which begins with the initial concept and ends with the start of product manufacturing. Product development includes the development of new products and the revamping of existing product. Thus, marketing research and the marketing plan are parts of the process. It also involves the optimization of a production's cost efficiency. (Tuononen, Hirvonen 2007, 9.)

Like all other projects, a production development project needs a project plan, which is relevant to objectives, resources, schedule and intermediate steps (Hietikko 2008, 46). The following figure defines the steps of production development process.

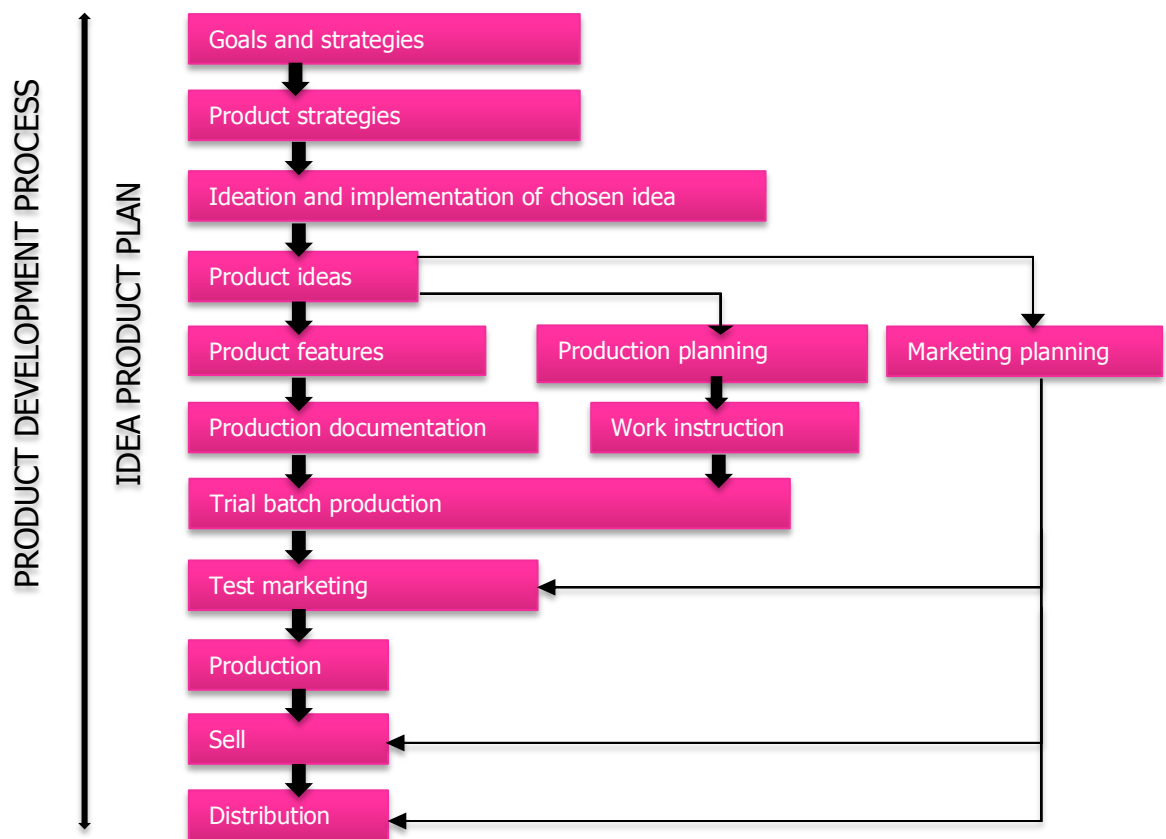


FIGURE 2. Product development process (modified from Tuononen & Hirvonen 2007, 3)

Hietikko (2008, 45-47) defines a product development project into two broad models; a sequential and a spiral model. There are common steps in both models, which are the description of need, the creative work and the detail design steps. The sequential model proceeds step by step; the next step will emerge after the previous steps are completed. In the spiral model, the steps revolve and are specified throughout the process. A product development project is defined by many stages: project setting, planning, implementation, control and termination. While building up the project, starting points, boundaries and objectives will be determined.

Product development is also one section of food production process. According to Määttä (2010, 345-346) food production development is subdivided into four entities; design, procurement, manufacturing and monitoring processes. It is typical that many parts of process occur simultaneously during developing.

As Tuononen and Hirvonen (2007, 4) mention, the planning process of product development can apply to either one or several of the following models:

- Systematic planning relates to task setting, blueprinting, developing and finishing.
- Concurrence planning involves the participation of customers, representative of the production, the raw material supplier in different stages of product life cycle.
- DFA (Design for Manufacturing) is suitable for the existing product development that reduces production costs, simplifies the production process, and optimizes raw materials.
- SET (Social, economical, technical) factors relate to considering what kind of demands for product, trends, the possibilities of using new technologies, the target's fluctuations for using money, psychological consumption and purchasing willingness.

Only a few product development project wind up in the market and even fewer of them are profitable (100 ideas, 10 products, 1 is left on the market). The decision of whether or not to continue product development is made after each stage because the error fixing of an early stage is apparently done at lower cost than a later stage. In order to avoid aberrant investments, the potential risks must be detected as early as possible. (Tuononen & Hirvonen 2007, 4.)

Time consumption of a product development process is relevant. It is not uncommon for a product idea to be developed during the span of many years before penetrating the market. The research based on the product innovation may need up to ten years before the launch. On the other hand, custom-made product that changes for each customer can be completed quickly. When scheduling a project it is necessary to consider these factors: the boundary of product conditions, availability of raw material, test batches, stability tests, packaging material procurement, labeling process, marketing material processing, updating self-monitor, other necessary permits, logistics, investments, financing and execution. (Tuononen & Hirvonen 2007, 6.)

According to Tuononen and Hirvonen (2007, 9-10), product design is based on the analysis of the customers' needs. These product requirements reflect the product's competitive features and the opportunities for the company to produce economically profitable and efficient products. It is not worth it to reveal everything even to the most trusted parties, because good ideas can end up in the competitors' hands. Cooperating partners can also make a confidentiality agreement. Before the actual experiment preparation, the profitability of an idea needs to be explained thoroughly. If the idea causes uneconomic profitability it is wise to terminate it as early as possible.

The good quality of the product is based on high quality raw materials. It is necessary to make quality agreement with suppliers in order to ensure the availability and homogeneity of raw materials. The contract's contents should be discussed with the major suppliers. Inquiring offers from the po-

tential suppliers is useful, and price, assurance of supply and qualities also need to be controlled. It is also wise to check the valuable information about the supplier's reliability from other entrepreneurs. (Tuononen & Hirvonen 2007, 18.) The product development process also links with the profitability and pricing of a product. Profitability especially is taken into account, for example the cost structure per portion. Either the main ingredient or all ingredients should have a price frame, which indicates the limitation of ingredients' expenses. (Taskinen 2007, 33.)

Product testing is carried out at different stages of the product design. Product testing should concern itself with the customer's acceptance of the product (eg. sensory characteristics and the price level), specify the cost of production, test the machinery and the logistics and explain how the product could be further developed. The product must achieve preliminarily approval from the consumer testing time, which is so called test-marketing stage. After the test is done, the final touches are made for the product and the pricing is determined. Then the products will be manufactured in bulk, which will be sold or distributed to the customers with feedback questionnaire, can take place. (Tuononen & Hirvonen 2007, 22.)

As Tuononen and Hirvonen (2007, 26) mention, before the production can progress, the following issues need to be ensured:

- Updating self-monitoring on behalf of the new product
- Updating the marketing plan
- Final check for package's label and labels' order
- Procuring needed raw materials for production and marketing
- The necessary additional analyzes of the product
- Method of collecting and processing customers' feedbacks
- Planning for continuous development of the product
- Introduction the preparation of new product to the staff

As Pyne (2000, 264-265) mentions, the product development team develops a prototype of product (including eg. test in kitchen step) in order to identify the market's expectation from the product. It is also important to have opinions and feedbacks about the prototype product from outsiders such as consumers, since they are a reason as to why the product is developed. Based on the feedback, the sensory features of the product (flavor, mouth feel, seasoning and color) will be changed to meet the customers' needs.

The quality of the product is measured by the sensory evaluation from the consumers. The sensory techniques provide the information from the product, for example the processing conditions and change of raw materials impact the product development process. Sensory methods are divided into two categories: laboratory methods and consumer methods. (Lapveteläinen 2010, 368.) As there is a need to evaluate the new potential product, it is critical to choose the most reliable descriptive method to get the objective of the entire look about the product' sensory and feature. Descriptive methods can be either qualitative or quantitative. (Roininen, Heiniö & Vehkalahti 2006, 93.) Sensory evaluation is used as a utility in product development; the product's evaluators could be the group

of experts in the field or a council of consumers. Group of experts could be 3 to 5 persons, who have experience about the product, its raw materials and its production (Tuorila, Parkkinen & Tolonen 2008, 106,120).

The object of sensory evaluation should be defined in order to carry on the practical implementation that will answer the question of what needs to be determined by sensory evaluation. It is necessary to set the quality requirements or quality specifications and describe the product, its use or product specifications before progressing the product sensory evaluation. Product specification includes a description of the product's ingredients, storage, packaging and usage. Designing the questionnaire carefully in order to collect the results efficiently and improve the reliability of research, the questionnaire can be a test with a small target group, if it is necessary. (Mustonen, Appelbye & Tuorila 2006, 175; Tuorila et al. 2008, 120; Lapveteläinen 2010, 373.)

The experiment's objectives and its realism should be taken into account while planning the sensory test. The term "realism" refers to the schedule arranging, knowledge and skills of the organizer and the economic reality of the sensory evaluation. It is typical that the evaluated product or sample is provided in the test of preference. The serving method also affects the test result. The test reliability and validity must be taken into consideration. The reliability of the sensory research can be increased by collecting data from the target groups. The validity refers to the appropriate choice of method, which is used to obtain the desired results (Mustonen et al. 2006, 178-181.)

The food production process consists of sub-processes; it includes not only definition of qualitative and financial objectives, but also an activities' plan, production, monitoring and constant development. The development focuses on the whole food production process and its sub-processes. Qualitative and economic implementation of food production process requires professional skills, variety of information management and flexibility. Available raw materials, number and skills of the labor force, working methods, equipment and food safety are considerate, since they greatly affect the food's production (Saarela, Hyvönen, Määttä & von Wright 2010, 344.)

4 DEVELOPMENT PROCESS OF HEALTHY SPRING ROLLS

As mentioned previously in the foreword this process' purpose is to create applicable recipes. Unlike Tuononen and Hirvonen's process, this spring roll development process will be applying the systematic planning model from them, yet it is designed in a particular manner. The value of conducting a development project following the three-stage development ladder was pointed out and demonstrated with a new unique process. The figure below describes the whole development process.

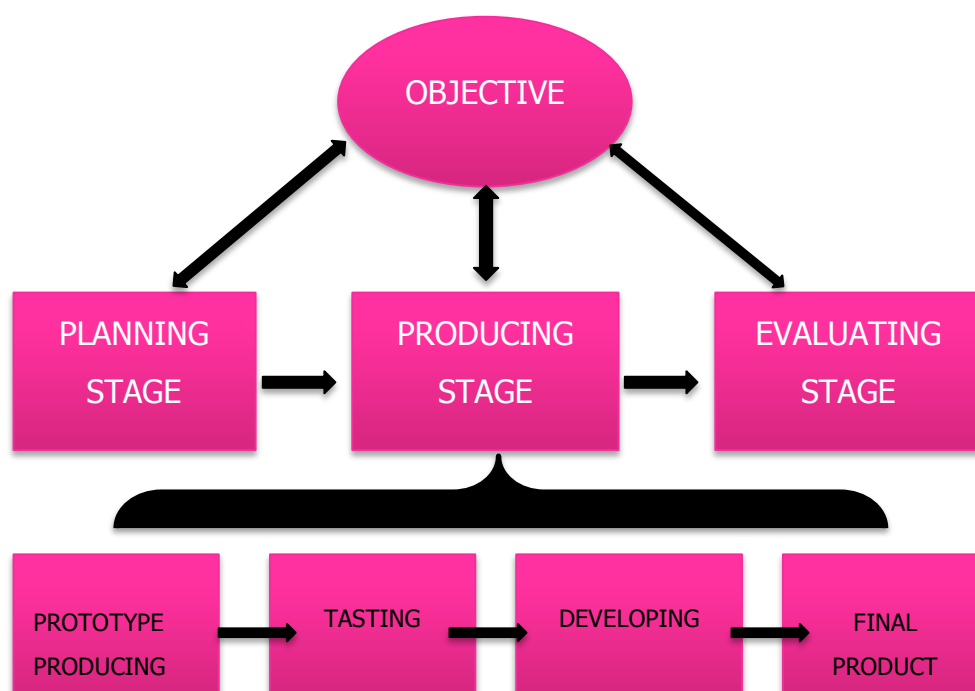


FIGURE 3. Spring rolls' development process.

4.1 Objectives

According to the National Institute for Health and Welfare, the National Nutrition Council of Finland published new nutritional recommendations on the role of dietary features, which involve the quality and quantity of diet and health. They assert that

"The share of fat in the daily energy intake should be raised, while the intake of carbohydrates should be slightly lowered, with a recommendation to obtain most carbohydrates from fibre rich foods. The quality of fats and carbohydrates is now given more consideration than previously, with the emphasis on maintaining a sufficiently high ratio of unsaturated fats." (Ovaskainen 2014).

The daily adult salt intake should not be more than 5 gram per day. (National Institute for Health and Welfare, 2014.) Relevant to the nutritional recommendations from The National Nutrition Council of Finland, these following symbols are set as one of the objectives for this thesis' process.

- Heart Symbol is a proof of food's nutritional quality and is based on Finnish nutrition recommendations. The Heart Symbol allows for consumers and professional customers

to recognize that the product is a better choice regarding fat, sodium, fiber and sugar. Since the developed spring rolls belong to the convenience foods group all the energy producing from all the foods' ingredients' fat cannot be exceed 25per cent. Or the fat is from 25 to 35 per cent; the saturated fat is 33 per cent maximum. In addition, the amount of Natrium must not exceed 300mg/100gr as well as the maximum cholesterol should be 60mg/100gr. (Suomen Sydänliitto ry 2014.)



IMAGE 1. Heart Symbol (Suomen Sydänliitto, 2014-12-15.)

- The Hyvää Suomesta label is an identification of a Finnish food's source. More than ninety per cent of the Finnish population recognizes this label on food packages, which is acknowledged as a sign of product safety and high quality. In regards to this label, all of the ingredients of the products must contain no less than 75 per cent Finnish ingredients. All of the used protein ingredients in the products have to be 100 per cent Finnish. The levels of domestic origins of final products are counted from the amount of ingredients recorded by the production recipe; added water is not considered as an ingredient. (Suomalaisen Työn Litto 2014.)



IMAGE 2. Hyvää Suomesta label (Ruokatieto Yhdistys 2014-12-15)

- Above 50 per cent degree of domestic origin raw materials should be used, in order to acquire the Key Flag Symbol. The Key Flag symbol is a recognition of the fact that a product/service is manufactured in Finland, which the consumers can use to recognize domestic foods with. The trademark possesses a highly positive image in Finland with an awareness of 88 per cent of the Finnish population. Moreover, the Key Flag Symbol contributes 55 per cent in the affecting demands of Finnish consumers. (Ruokatiedo Yhdistys ry 2014.)



IMAGE 3. Key Flag Symbol (Suomalaisen Liitto 2014-12-15.)

Besides the above symbols, the variety of the product is considered along with the other goals of the process. Concerning the variety of the product and catching the consumer's interests, the spring rolls will be produced with many different flavors. Moreover the recipes will be using an abundance of ingredients in the process to create unique flavors. In order to increase the competitive capacity of the product in the market, the usage and a combination of ingredients, spices, producing techniques are taken into account in order to reduce the cost without affecting the quality as well as the flavor of the products.

4.2 Planning stage

After the objectives are defined, continuing the project with a well-thought of plan is essential. This will ensure that the project moves toward its goals in a timely and cost-effective way. Food safety, recipe planning, the use of ingredients and product figure, these factors are counted in the planning stage.

Quality kitchen activities consist of hygiene, economy, safety and self-monitoring plan. Safe and hygienic raw materials are used in the producing process. Product should be stored and cooked in an economically appropriate way. Meat, fish and other raw materials are promptly transferred to cold store after handling. Ready to be cooled and pre-cooked foods are cooled immediately in the cooling cabinet after processing. In regards to self-monitoring kitchen work, the initial and final temperatures of cooled foods have to be measured and archived. Measuring a food internal temperature is an aspect of high quality food preparation and food storage and self-monitoring assurances. (Saarela et al. 2010, 349-350.)

The Excel and Jamix software are used to create the recipes, which enable to edit the amounts easily with formating formulas. New spring roll recipes are based on the original ones yet new ingredients are added to differentiate from the origin and to develop new flavors. However these flavors still meet the Finnish tastes and retain the spirit of Asian cuisine of the product. Five different filling recipes are planned by the inspiration of different cuisines. For marketing purposes, each product will be named based on key ingredients specifically such as Asian style, Tropical flavor, Indian curry, Vege roll and Saturday snack.

In regards to the requirements of Heart symbol and Key Flag labels, using of domestic ingredients plays an important role in labels' achievement. Domestic ingredients are used in the producing process that should be more than 50 per cent to achieve the Finnish Flag label and 75 per cent to achieve the Hyvää Suomesta label. The purpose of attaining one out of two symbols depends on the ingredient resources, which are available in Finnish grocery stores.

Various sizes, weights of product and different folding and cooking methods are tested during the process to determine the most ideal size, weight, folding and cooking method for final product. These factors need to be considered, since they affect the producing cost, time consumption, nutritional calculating and packaging.

4.3 Producing stage

At this stage, the product will be produced according to the plan, yet remain flexible enough to be modified as changes or new issues emerge. It's imperative to make notes about the changes, which may appear while producing to improve the recipes comparing to the original ones. Producing process is operated in the kitchen of Savonia University of applied sciences, which is fully equipped with modern technologic kitchen appliances.

4.3.1 Prototype producing

- Ingredient handling

The entire material handling process is done in accordance to the guidelines of the Finnish Food Safety Authority Evira. Hands should be washed thoroughly and frequently to ensure the safe handling of food products and general hygiene before or during the food preparation.

Fresh vegetables and raw materials must be handled properly to assure the safety of the consumers. Peeling or washing the materials carefully can remove microbes on the vegetables' surface. Root vegetables should be peeled and washed thoroughly before use. All vegetables should always be washed before use. Different cutting boards should be used for vegetables and other raw materials. (Finnish food safety authority Evira, 2014.)

Meat is a perishable ingredient, so there are several hygiene concerns that need to be taken into account to ensure the usability of the meat. All equipment and cutting boards should be clean when handling meat. Minced meat's shelf life is shorter than other kinds of meat products. Minced meat should be used as soon as the day of purchase or defrosting. The meat should reach room temperature before cooking. Cooked meat and raw meat should be covered and stored in refrigerator separately. (Finnish food safety authority Evira, 2010.)

Poultry meat requires special handling because of the salmonella risk related to the ingredients. Raw chicken should always be stored and handled separately from other food. Frozen chicken should be

placed in a shallow container and thawed in the refrigerator. One must remember to wash their hands and utensils thoroughly and immediately after processing. Chicken should be cooked until fully cooked, so that any salmonella bacteria will die. A cooked chicken's internal temperature must be more than 75 ° C. (Finnish food safety authority Evira, 2010.)

Fish should be cleaned and cooled as soon as possible before preparation. Cutting the fish should be done on a clean surface and with hygienic equipment. Fish must be handled carefully and squeezing the fish should be avoided, along with tossing and moving fish from container to others. (Finnish food safety authority Evira, 2013.) The following image displays the raw materials after handling.



IMAGE 4. Ingredients after handling. (Thy Huynh)

- Folding methods

After handling all of the ingredients, they must be mixed in a large container with an applicable ratio based on the Finnish Plate Model (Lautasmalli). According to Ruokatie (2014) the Plate Model provides a versatile combination of ingredients in a suitable balance of nutrients and energy. It also helps to assemble the meals, which are conducive to a person's health. The Plate model consists of half a plate of vegetables (eg. Salad, boiled vegetables), a quarter of the plate of carbohydrates (eg. Potato, whole grain, pasta) and a quarter of the plate of protein ingredients (eg. Meat, fish, poultry, egg, seeds, beans etc.)

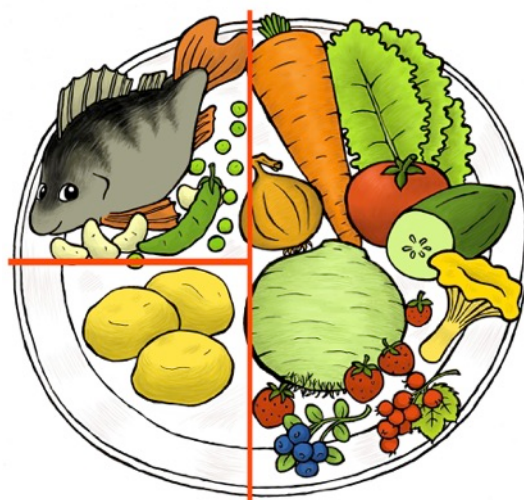


IMAGE 5. The Plate Model (Tuija Fagerlund)

As the filling is prepared, making the rolls starts by folding them on the clean surface. Essentially the folding style will be similar to the one which was mentioned in the instructions of spring rolls. However, due to using two different kinds of wrappers, which are wheat wrapper and rice paper, the folding methods will be slightly different from the original one. The two images below describe the folding techniques.

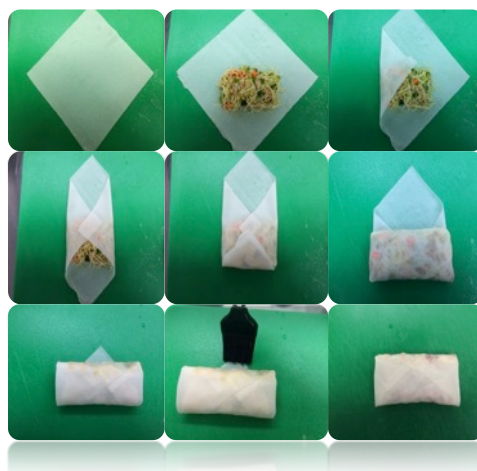


IMAGE 6. Folding process with wrapper (Thy Huynh 2014-10-20.)

In this process, the frozen wheat wrappers are used, so they need to be thawed before folding. The wrappers need to be placed in a closed container to avoid them getting dry. Water must be spread to moisturize the top corner of the wrapper so that the roll can be closed tightly.

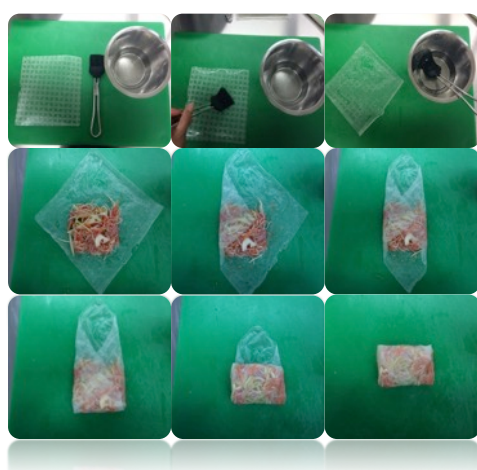


IMAGE 7. Folding process with rice paper (Thy Huynh 2014-10-20.)

Rice papers are thin by nature as well as being dry, hard and crisp. Therefore rice paper needs to be softened in warm water before using. The rest of this method will be the same as the above one, but it is not necessary to soften the top corner of rice paper.

Besides the folding style (rectangular shape), spring roll can be rolled into a cylindrical shape, but this will require more time. Approximately, it takes about 20 to 25 seconds per roll, but other preparation stages are not included.

- Cooking methods

Two cooking methods were applied in the process, which are cooking in the oven and deep fat frying. However, there are some advantages as well as disadvantages with those two methods.

Traditional spring roll is fried in the chip pan, yet it is not practical for frying a large amount of spring roll. Nowadays many different kinds of electric deep fat fryers become common kitchen appliances since they are safer for the cooks and reduce cooking time. There are a few factors that need to be considered when using the deep fat fryer; ensure that the oil in the tank is sufficient, the fat needs to be heated up to a significant temperature for minimal fat absorption into the food, set the proper temperature according to the products, be aware of the spattering of hot fat from water-contained foods while cooking, check the quality of fat, cover with the fryers with a lid to cool down before cleaning (Jokinen, Laine & Lampi 2003, 119)

The advantages of deep-frying in an electric fryer are a quick cooking technique, protecting the surface of the food from intense heat, preventing the escape of moisture and nutrients, and modifying the rapid penetration of the intense heat that ensures good color. However there are also some disadvantages to the deep fat frying method, which relate to the safety hazards and can cause difficult digestion due to the fat used in frying. Safety instructions must be followed strictly during the process; such as using vegetable oil at the right heat and a basket to raise food from the oil when the cooking is finished to control the frailties of this method (Jokinen et al. 2003, 118.)

Using the oven correctly is important in order to obtain good cooking results. There are a few steps that need to be followed when cooking, such as pre-heating the oven to get the right temperature before putting the spring rolls into the oven. The position of the baking tray in the oven and the different cooking times need to also be considered, for example, 5 baking trays of spring rolls, the one on the top would be cooked before the ones in the middle, therefore the middle ones would need more time to be cooked. Different ovens generate different temperatures although they are set at the same degree therefore it is convenient to get familiar with the oven that is most commonly used (Mcgrath 1997, 52-53.)

An electric oven that is programmable for steam/convection is usually used in the professional kitchen; attention must be paid to the humidifier and fan adjustment in order to get a good quality spring roll. The wrapper of the product should be dry, crisp and light brown; the filling should be humid and well cooked. Anyhow, the disadvantage of using an oven is quite challenging in order to get the spring roll's wrapper brown and crispy enough to meet the quality requirements of the product. In order to obtain those lacking factors, spring rolls need to be applied with a thin oil coating and cooked in an appropriate temperature and time in the oven.

4.3.2 Tasting and developing

Food experts Seija Mäki (Catering lecturer), Mari Vartiainen (Nutrition teacher) as well as a few hotel and restaurant management students from Savonia UAS were chosen to taste and evaluate the first prototypes of spring rolls. They received and answered short sensory evaluation forms for the products, which consisted of five elements; appearance, smell, structure, flavor and mouth feel. There were three different flavors of spring rolls and each one was divided into two groups: gluten and gluten free. The gluten group was produced with wheat wrapper and the other group was produced with rice paper. Every element was scored from 1 to 5, 1 being the lowest point and 5 being the highest score.

The feedback for both of the product groups were quite positive, based on the average point of each element. However, there were some elements that needed to be improved, such as the appearance and flavor of the gluten free products and mouth feel of the gluten products. The aim of this evaluation is to verify the product quality and to identify the factors that need to be enhanced in order to complete the products before the consumer survey

In order to develop a product, it is imperative to identify the aspects which need to be improved. Thus, the quantitative research method is applied so as to clarify the developing factors and the purchase willingness of the consumers. The quantitative method was designed as a survey by using a questionnaire form, it was used as a complementary tool for the validity and reliability of the whole research process. This mainly included paper responses.

Three products from the gluten group were tested in the survey, which was carried out at the dining room of Savonia UAS kitchen on second of February 2015. There were 30 participants and each of them tasted three different spring rolls and answered the questionnaire, which included the following six questions:

Question 1. The age of the respondents

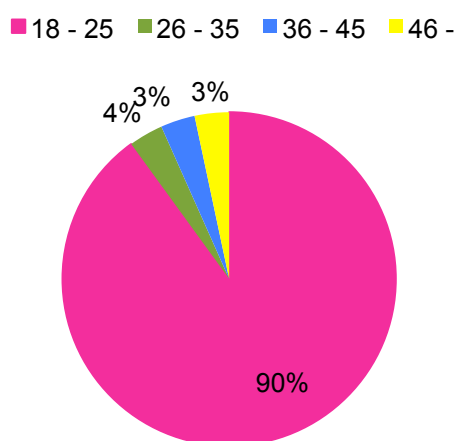


FIGURE 4. The age of respondents ($n = 30$).

This question aimed to get a clear idea about how old these respondents are and put them into several groups. The result shows that ninety per cent of the participants were between the ages of 18 and 25 since most of the respondents were students. The rest of the groups were divided equally.

Question 2. The gender of the respondents

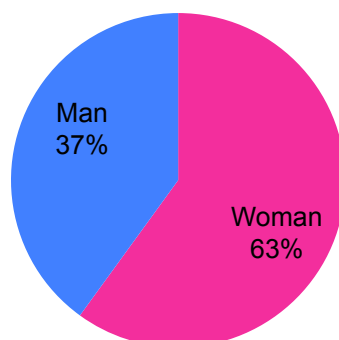


FIGURE 5. The gender of respondents ($n = 30$).

This question was aimed to find out which gender occupied a bigger percentage. The result was 63% of the participants were female and the rest were male. The idea of this question was about collecting different answers from both males and females.

Question 3. Have you ever tried spring rolls before?

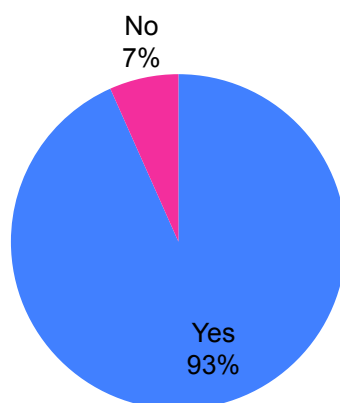


FIGURE 6. Previous experience about spring rolls of the respondents ($n = 30$).

This question was meant to get a clear idea as to whether or not this questionnaire is worth to go on and whether the final results are believable. The majority of the participants (93.33%) were familiar with spring rolls before the survey. Therefore they could be expected to respond to the product survey fairly.

Question 4. How are you going to evaluate the following factors of the products?

The main purpose of this question was the evaluation of the spring rolls in order to find out which factors would need to be developed further. Five aspects were taken into account, which were appearance, smell, structure, flavor and mouthfeel. The participants were asked to score each factor from the lowest grade (1) to the highest one (5). The below figures indicate the results collected from the survey.

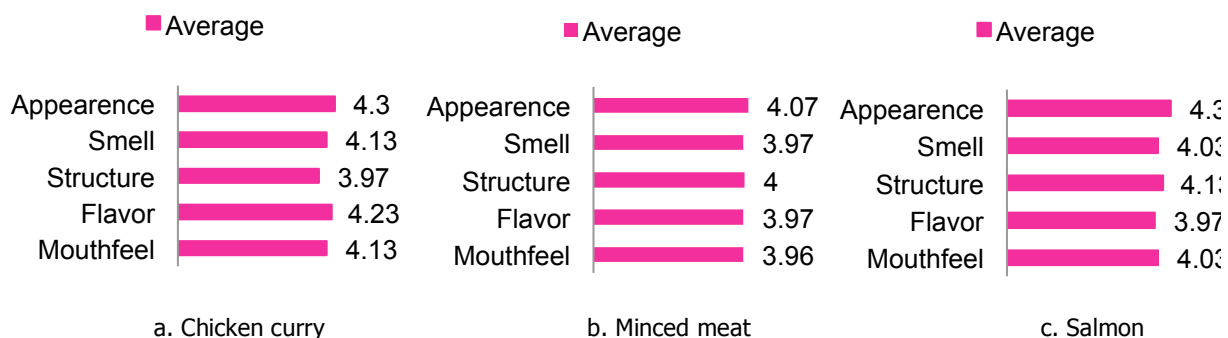


FIGURE 7. The evaluation of three products ($n = 30$).

a. Chicken curry filling product: Most of the factors of the product are scored higher than 4. However the flavor is scored 3,97/5, while the appearance receives the best responses from the participants, which is 4,3/5.

b. Minced-meat filling product: There are three factors which are smell, flavor and mouthfeel that scored less than 4. The appearance receives the most positive responses from participants with 4.07/5.

c. Salmon filling product: The highest scored factor was appearance with 4.3/5. On the other hand, the structure scored less than the rest with 3.97/5. All the other three factors are scored higher than 4.1.

Question 5. Does this product need to be developed more? If yes, then how?

With the chicken curry filled spring roll, there were 24 out of 30 respondents who answered this question. The opinions of the participants were quite varied; almost all of them liked the crispy wrapper, chicken curry flavor and the savoriness. However, some mentioned that the flavor was strong and some would prefer a little bit more salt.

With the salmon filled product, 23 respondents answered the question. Almost all of the answers complimented the flavor and balance of the ingredient combination. Nonetheless, a few of respond-

ent suggested more flavor from the salmon and a light sourness. Due to the spring rolls being exposed for a while before being tasted, a few respondents commented that the samples were not crispy enough and the structure could be more solid.

There were 21 respondents that answered the previously mentioned question for the minced meat filling. More than half of the replies were related to the suitable flavor and the rest preferred to have more flavor. Some respondents liked the mint aroma of the filling. However, some respondents did not favor this filling, since it was a little bit greasy.

Question 6. Would you like to purchase these products if they were available on the market?

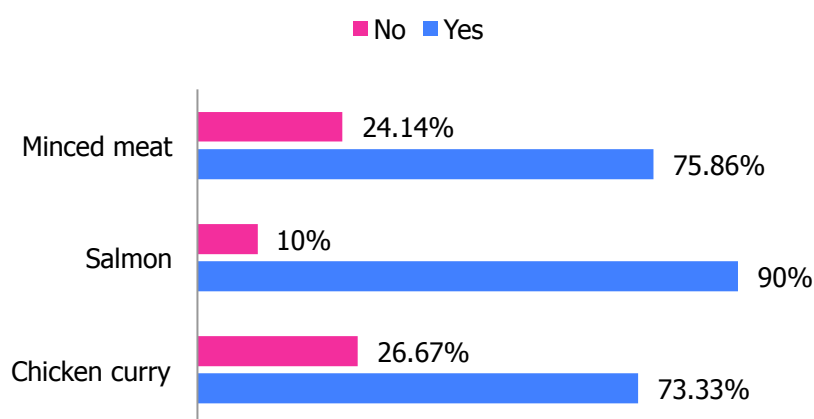


FIGURE 8. The purchase willingness of the respondents ($n = 30$).

This question was intended to find out whether the respondents would buy these products, if they were available on the market. The salmon fillings product received the highest positive responses from the participants with 90% of them indicating a willingness to buy the product. In addition, the other two fillings also received positive answers of over 73%.

4.3.3 Final products

As mentioned in the Foreword, the goal of this thesis and also of this process is to develop new applicable recipes of spring rolls for the food industry, but not to produce complete products. After figuring out what factors need to be developed for the products, they will be documented. However there are some subjective factors, which cannot be developed such as personal taste, allergic issues, eating style etc.



IMAGE 8. The final products and their fillings. (Thy Huynh)

This chapter mostly examines nutritional information of final products based on complete recipes, which is calculated by using JAMIX Food Production system. JAMIX is a professional kitchen production management system, which is a versatile and comprehensive system that allows one to manage all the main functions of a kitchen in regards to recipes and menus. In addition, the system can take care of meal orders relating to orders and deliveries efficiently and accurately. The JAMIX Food Production system consists of three parts that work together seamlessly, which are the Food section, the Warehouse section and the Meal Order section (JAMIX). These below figures will describe the nutritional information of four products. However these nutritional calculations may not be 100 per cent accurate, due to replacing some ingredients, which are not available in JAMIX system such as Pan salt, which contents 57% sodium compared to normal salt (Pan Suola 2008). These following figures indicate the nutrition facts of four different fillings of spring rolls.

Nutrition Facts	
Per 1 piece 100g	
<i>Energy</i>	<i>111.03 kcal</i>
<i>Carbohydrate</i>	<i>11.82 g</i>
<i>Sugars</i>	<i>1.64 g</i>
<i>Protein</i>	<i>6.06 g</i>
<i>Total Fat</i>	<i>3.88 g</i>
<i>Saturated Fat</i>	<i>0.36 g</i>
<i>Trans Fat</i>	<i>0.83 g</i>
<i>Sodium</i>	<i>246.4 mg</i>
<i>Dietary Fiber</i>	<i>1.92 g</i>
<i>Cholesterol</i>	<i>14.06 mg</i>

TABLE 3. Nutrition information per 100g salmon filling spring roll by JAMIX

Nutrition Facts	
Per 1 piece 100g	
<i>Energy</i>	<i>121.68 kcal</i>
<i>Carbohydrate</i>	<i>19.38 g</i>
<i>Sugars</i>	<i>2.24 g</i>
<i>Protein</i>	<i>8.11 g</i>
<i>Total Fat</i>	<i>0,69 g</i>
<i>Saturated Fat</i>	<i>0.11 g</i>
<i>Trans Fat</i>	<i>0.19 g</i>
<i>Sodium</i>	<i>241.44 mg</i>
<i>Dietary Fiber</i>	<i>1.6 g</i>
<i>Cholesterol</i>	<i>14.2 mg</i>

TABLE 4. Nutrition information per 100g chicken curry filling spring roll by JAMIX

Nutrition Facts	
Per 1 piece 100g	
<i>Energy</i>	<i>109.47 kcal</i>
<i>Carbohydrate</i>	<i>11.61 g</i>
<i>Sugars</i>	<i>2.90 g</i>
<i>Protein</i>	<i>6.37 g</i>
<i>Total Fat</i>	<i>3.59 g</i>
<i>Saturated Fat</i>	<i>1.30 g</i>
<i>Trans Fat</i>	<i>0.19 g</i>
<i>Sodium</i>	<i>241.76 mg</i>
<i>Dietary Fiber</i>	<i>2,30 g</i>
<i>Cholesterol</i>	<i>10.38 mg</i>

TABLE 5. Nutrition information per 100g minced meat filling spring roll by JAMIX

Nutrition Facts	
Per 1 piece 100g	
<i>Energy</i>	<i>95.96 kcal</i>
<i>Carbohydrate</i>	<i>15.30 g</i>
<i>Sugars</i>	<i>3.18 g</i>
<i>Protein</i>	<i>4.29 g</i>
<i>Total Fat</i>	<i>1.33 g</i>
<i>Saturated Fat</i>	<i>0.18 g</i>
<i>Trans Fat</i>	<i>0.71 g</i>
<i>Sodium</i>	<i>239.97 mg</i>
<i>Dietary Fiber</i>	<i>3.14 g</i>
<i>Cholesterol</i>	<i>0.31 mg</i>

TABLE 6. Nutrition information per 100g vegetable filling spring roll by JAMIX

The nutrition facts of four products are compared to Heart Symbol criteria in order to verify that these products are qualified to obtain this symbol, explained in the following table.

Criteria	Heart Symbol	Salmon	Chicken Curry	Minced Meat	Veggie
Fat	Max 4g/100g	3.8g/100g	0,69g/100g	3.59g/100g	1.33g/100g
Saturated fat of the total fat	Max 33%	0.36%	0.11%	10.50%	0.18%
Sodium	Max 300mg/100g	246.4mg/100g	246.0mg/100g	241.7mg/100g	239.97mg/100g
Cholesterol	Max 60mg/100g	14.06mg/100g	14.21mg/100g	10.38mg/100g	0.31mg/100g

TABLE 7. The comparison of four products to Heart Symbol

As it is shown in the figure, the amounts of products' elements (fat, saturated fat, sodium and cholesterol) are less than Heart Symbol's ones. In other words, these products are qualified to obtain the Heart Symbol. And this is the most important factor of the entire process since the objectives are achieved.

According to the Valtion ravitsemusneuvotelukunta (2014) it is good to eat a healthy meal regularly everyday; for example a breakfast, lunch, dinner and one or two snacks if necessary. Regular meals keep the blood glucose levels stable and curb hunger as well as protect teeth from decay. In order to get 1800 kcal of energy per day, we need to consume three meals and two refreshments, which consist of about 400 kcal for breakfast, 600 kcal for lunch, 100 kcal for snack, 500kcal for dinner and about 200 kcal for supper (HUS 2015).

Since every spring roll provides 98 kcal of energy in average it can be served as a warm meal with cooked potatoes or rice or as a snack with salad and a little sauce. It depends on the side dishes; three or four rolls can be served in a warm meal and one to two rolls for a snack or supper. Besides the flexible combination of spring rolls with other side dishes, they also can be served as a starter, in parties, picnics etc. as shown in the photos below.



IMAGE 9. Spring rolls are cut into four small pieces and served in a cocktail party (Thy Huynh)



IMAGE 10. Spring rolls are served with side dishes as a warm meal. (dreamstime)

4.4 Evaluating stage

This chapter will be divided into two brief parts, which relate to the evaluation of a product and the entire process. It is relevant to the satisfaction of results, objective achievement, improvement suggestions etc.

4.4.1 Product evaluation

According to Ancient Value (2015), the process evaluation needs to examine the product design and development process. Research studies indicate that production design and development is an imperative key in the product quality and performance. The product designers apply their knowledge and expertise to forecast the product's practicality and its probable users. That is a key in understanding the fact that the product has to appeal to the consumers' opinions from the initial concept to the distribution to the market place.

According to the result of the survey, most people are familiar with spring rolls and the purchase willingness of these products from the respondents is highly positive. That means that these products have a large potential to penetrate to the market. However the products of the gluten-free

group are not mentioned much during the production process, since compared to products from the gluten group they are mostly similar, yet they require more time to produce.

By analyzing and comparing the nutritional facts of products to the nutritional requirements of the aforementioned Heart Symbol, it can be seen as quite impressive that four products, which are the salmon filling, the chicken curry filling and the vegetable filling spring rolls are qualified to obtain the Heart Symbol. In order to obtain the other two symbols, it mostly depends on the raw material used throughout the production process. Because these products were produced in the kitchen and fully supported by Savonia UAS, and therefore domestic ingredients were used as much as possible for the purpose to achieve the Hyvä Suomesta label. On the other hand it will affect to the profit and price of products. Nonetheless the Key Flag Symbol will be another affordable option for manufacturers, if they want to reduce the costs and still remain competitive in the market.

Particularly, there are a few factors, which need to be improved upon, such as the crispiness of the gluten-free product and reducing saturated fats in the minced-meat filling product. There are some suggestions from the respondents that these products could have more flavors. For health purposes, the salt content will be remaining at the acceptable level in regards to the Heart Symbol requirements, yet more herbs will be added to the filling or a small bag of sauce will be provided along with the products.

The allergic issue and nutrition are taken into account to ensure that the product is safe and healthy for all consumers. All the samples manufactured during the process are stored separately in ventilated freezing cabinets, which are kept in the product development kitchen.

4.4.2 Process evaluation

According to the World Health Organization (2000, 8 - 9) the aim of process evaluation is to enhance the current project by understanding it prudently. Process evaluation indicates what is achieved by this project and for whom these products are provided. For a variety of reasons, process evaluations are performed. It is most useful as clear objectives have been developed for the evaluation and the intended users are involved at the planning stage.

From the beginning, the process was modified from the model of Tuononen and Hirvonen, yet it was designed particularly and moderately. Marketing planning, selling and distribution are not included in this process. Because the final consequence is to produce applicable recipes based on the manufactured products, the Heart symbol and the Hyvä Suomesta or the Key Flag Symbol are set as goals for this process. During the process, potential consumers were involved at the developing stage to increase the reliability and validity of the development process.

In regards to the objectives that have been set for this development process, the results that have been achieved are satisfactory. Four differently flavored products are produced and all of them are potentially qualified to use the Heart Symbol. The process took longer than expected, due to per-

sonal reasons (schedule, work) and the availability of the kitchen. Thus, there is one product which has not been fully produced and tested during the process; it still remained as the designed recipe. However development on this product will continue along with other new products in the future, since it does belong to the healthy spring roll selection. Documents and photos were carefully recorded during the whole process and it was fully supported by Savonia UAS and two supervisors.

5 PRODUCT FEASIBILITY

This chapter will recommend a suitable packaging method, preserving process and packaging materials, which can be applied in order to create a complete spring roll package for the market. Additionally, the costs of products will be mentioned on a theoretical level, in addition to cost calculations of four different spring rolls. However this chapter can only indicate costs of ingredients per portion, fixed costs and semi-variable costs are not included.

5.1 Packaging

Packaging is crucial to protect the contained products from natural and man-made environmental harm. Moreover packaging serves other functions, such as communication, information, portioning, dispensing, etc. (Brody 2002, 51). Therefore this chapter will briefly discuss issues of packaging and labeling ideas for the spring roll product.

Packaging is a process, which aims to keep products clean, prevent damages and keep them safe for food distribution, storage, sale and use (McGrath 1997, 116). According to Robertson (2012, 2 – 4), the packaging process should meet several requirements, including physical protection that protects products from inappropriate temperature, shocking, pressure and electrostatic discharge. Besides, packages can be used to reduce the securities risks and improve the lost prevention by attaching authentication seals and security printing to commodities. In addition, the packet of a product has a marketing function of communicating the brand's message as well as the identity of the business, attracting and providing information about the product to its potential customers. The packaging can also be used to add the convenience when handling, selling and recycling processes. (Gordon Robertson, 2012, 2-4.)

Moreover, the preserving process is very important stage for packaged products and freezing is the ideal preserving method that will be applied in the spring roll packaging process. Freezing is a process for preserving food products by reducing temperature to the level at which ice crystals start to form within the food, at the degrees of -10 to -20 the growth of microbes and other deteriorating factors will be limited at a minimal rate. Mostly, the ideal temperature for frozen foods is in the range of -55 to -75, even when the frozen foods are frozen at -40 there still remains a small amount of unfrozen water. Besides, an initial requirement for freezing process is that after deep-frying from hot oil, the spring roll has to be frozen as quick as possible to remain the brittleness of the products (Heldman, Hartel 1997, 116).

The system of freezing is mostly applied for frozen food products including two categories namely Indirect-Contact Systems and Direct-Contact Systems. For this spring roll freezing process, the Direct-Contact Systems is operated in a freezing tunnel with a conveyor and low-temperature air is directed all over the surface of foods; by that way, all the spring roll will be frozen in the shortest time.

In addition, the paper-based materials are recommended for spring roll products, this material has

the advance of being fully recyclable, causing fewer adverse effects on environment compared to plastic packages, thus maintaining the environment in a good condition (Hamblin, 2013). There are many different categories of paper-based containers for frozen foods and the uses of each category may vary from types of food, using ingredients, and concerning aesthetic aspects of packages. The optimal material for spring roll frozen cartons is board, which is made in a similar process to paper but is thicker and stiffer with a good degree of whiteness and the capability of creasing without any cracking. Frozen cartons made from white boards that are coated with wax, polyvinyl chloride, or polyethylene are too resistant to fat and oil, enhancing its strength and appearance. (Practical Action, 2013.)

After spring roll products have been packaged into boxes, the next stage of the packaging process is the labeling. Labeling can be described as a piece of printing paper or all printed parts in packages' surface that displays information about the products. Roles of a product's label are the guiding of customers in their products selection, protecting human health and safety. (Vidar, M. 2010, 17.) According to the Finnish Food Safety Authority Evira, every food labeling in Finland must be implemented based on the **Decree of the Ministry of Trade and Industry on the Labelling of Foodstuffs** (724/2007 and 1224/2007) with Directives 2000/13/EC (regarding to labeling, advertising and presentation) and 2003/89/EC (relating to ingredients within product). And in particular for the frozen spring roll package, the label is required to provide information as follows:

- Product's name
- Product's ingredient list (with sort order in weight)
- Product's net quantity
- Product's durability or 'use by' date
- Product's storage conditions
- Name and address of business or manufacturer
- Origin country where foods imported from
- Product's using instruction
- Barcode

Moreover, there are several adjustments in the Finnish legislation, for instance, ingredient used to manufacture the products that must be indicated in labels (European Commission, 2015).



IMAGE 11. Package design. (Thy Huynh)

5.2 Cost

According to Dudbridge (2011, 55-57), in food manufacture operation there are many important factors that should be considered, such as quality, service and the safety of foods. However, without an efficient cost management process, the production can result in business losses. Business costs are literally explained as an amount of money that has to be paid to keep business operating. Costs in food manufacturing are divided into three categories, namely variable costs, fixed costs, and semi-variable costs; the purpose of this classification is to simplify the cost controlling process, giving a better understanding of the costs of manufacturing and making it easier to determine the financial problems as soon as a business experiences losses.

- Variable cost is all expenses involved in labor forces, packaging materials, and raw materials. The figure of variable cost will be rise up or drop down depending on the amount of finishing products.
- Fixed cost is expenditure for every basic regular. It does not change over periods of time, for example renting cost, insurances, depreciation or utility. Moreover, to keep the business in good financial condition, the fixed cost should always be minimized so that the business can sustain in low sale period.
- Semi-variable cost describes expenses that will be changed when the active level changes. For example; when the manufacture is getting busier the extra costs have to be paid for extra working hours, buying more producing materials and extra ingredients.

Particularly, in order to gain the Key Flag Symbol for these spring roll products, there is at least 50 per cent degree of domestic origin used in the manufacturing process. Achieving the Hyvä Suomesta quality standard and the Key Flag Symbol may boost the total manufacturing costs of the spring roll products to a higher level; however, there is a high rate in consumer demand for products that have the Key Flag Symbol which account for 55 per cent. (Suomalaisen Työn Litto, 2014.)

Furthermore, there are several expenditure factors that should be considered in the spring roll production. First of all, to meet the Hyvä Suomesta quality standard, over 70 per cent of the total

spring roll's ingredients and 100 per cent of the protein ingredients have to be manufactured in Finland. (Ruoka Omasta Maasta, 2014.) Therefore, the mission of the cost controlling in the manufacturing process is achieving Hyvä Suomesta standard and Key Flag Symbol, as well as remaining reasonably priced for a spring roll product. The following table describes ingredients cost of four products.

Currency €							
Product	Selling price	Price €	Vat %	Net price	Variable costs	Margin €	Margin %
Salmon	1,50	1,50	14	1,32	0,54	0,77	58,7
Chicken curry	1,25	1,25	14	1,10	0,52	0,52	52,4
Minced meat	1,25	1,25	14	1,10	0,47	0,63	57,2
Veggie	1,00	1,00	14	0,88	0,41	0,47	53,5
Total	5,00	5,00		4,39	1,93		55,45

TABLE 8. Variable cost and estimated selling price of four products.

6 CONCLUSION

The purpose of this thesis is to develop and introduce healthy spring rolls for the Finnish market and its main task is to create the applicable recipes, which could be offered to the food industry. Moreover, healthy spring rolls are not only theoretic, but also their recipes were also tested during the project. Four different prototypes and their recipes were created as the result of this project.

The history of spring roll was briefly mentioned in order to give the reader general knowledge about the product that would be developed. The theoretical part presented product development, which is the foundation of the entire project. It determines the structures, as well as the boundaries for the development process. The empirical part included the development process and the results of the survey.

The most complicated one is the development process, which was operated based on Finnish diet habit and new nutritional recommendations from the National Nutrition Council of Finland. That means that the consumers' health and the quality of the product are considered as priorities. In other words, the recipes must fulfill these priorities. It took over five months to accomplish four different products, which met the set objectives. From the recipe designing stage to production stage and the final stage (applicable recipes), persistence and accurate calculations were required, since one recipe could be tried repeatedly until it was appropriate. Furthermore, the recipes had to correspond to the healthy nutrient requirements and reasonable costs.

The survey was carried out within a group of 30 people, in order to analyze the elements that needed to be developed to fit Finnish tastes and to gauge their purchase behavior in daily life. The questionnaire focused on the essentials in order to assist the development process. The answers are reliable because the respondents are familiar with the products. Almost all of them are Hotel and Restaurant Management students, so they could be considered as experts.

The thesis' validity is sufficient, since it indicated not only that the entire product development process, but also the product's feasibility. Packaging methods and costs are mentioned appropriately, which are suitable for the product and keep the costs reasonable in order to compete with other healthy products.

In general, I am satisfied with the results of my work; especially the fact that the products are qualified for the quality labels, which was set as the objective. The product development processes have proceeded according to plan, although it has been slightly behind the schedule, due to the scope of work having increased and this project needing the work of two persons. However I am glad that I did the work independently and therefore I had the full influence on decision-making and the development process was implemented smoothly. Through this project I learned that product development process is all about the multiple steps, which must be followed in an orderly fashion. The most challenging parts of the food development process were the ingredient combination to create a new

flavor yet remains suitable to Finnish tastes, portion setting and nutrient calculation. My work was very interesting, abundant and I have gained great experience through this project.

Although the project stopped at four recipes in this thesis, my passion for food product development is still going strong. I plan to continue developing healthy spring rolls or other healthy food products in the future. I believe healthy foods play a very important role in our lives. Hopefully these recipes will be turned into products, which will be sold in the supermarkets or served in restaurants.

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APPENDICES

Appendix 1. The questionnaire for spring rolls in Finnish

KEVÄTKÄÄRYLE**1. Ikä**

- 18 - 25
 26 - 35
 36 - 45
 46 -

2. Olet

- Nainen
 Mies

3. Oletteko aiemmin maistaneet kevätkääryleitä?

- Kyllä
 Ei

4. Miten arvioisitte maistamaanne seuraavista tekijöistä ?
 (1 = epämiellyttävä, 3 = neutraali, 5 = miellyttävä)

	1	2	3	4	5
Ulkonäkö	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tuoksu	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rakenne	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maku	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suutuntuma	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Tarvitseeko tuotteita kehittää lisää? Jos tarvitsee, niin miten?

6. Ostaisitteko näitä tuotteita kaupasta, jos niitä olisi saatavilla?

- Kyllä
- Ei, miksi?

KIITOS OSALLISTUMISESTA!

Appendix 2. The questionnaire for spring rolls in English

SPRING ROLL**1. AGE**

- 18 - 25
 26 - 35
 36 - 45
 46 -

2. Gender

- Female
 Male

3. Have you ever tasted spring roll before?

- Yes
 No

4. How are you going to evaluate the following factors?
 (1 =distasteful, 3 = neutral, 5 = tasteful)

	1	2	3	4	5
Appearance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Smell	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flavor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mouthfeel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Does the product need to be developed? If yes, then how?

6. Would you like to buy this product if it is available on the market?

- Yes
- No, why not?

Thanks for your participation!

Appendix 3. Products recipes in Finnish

Appendix 4. Profit calculation

Currency		€						
Product	Selling price	Vat %	Net price	Variable costs	Margin €	Margin %	Numb. of prod.	Sales
Salmon	1,50	14	1,32	0,54	0,77	58,7	2000	3 000
Chicken curry	1,25	14	1,10	0,52	0,52	52,4	2000	2 500
Minced meat	1,25	14	1,10	0,47	0,63	57,2	2000	2 500
Veggie	1,00	14	0,88	0,41	0,47	53,5	2000	2 000
Yht/ ka	5,00		4,39	1,93		55,45	8000	10000

	€	%		
Revenue	10 000	114,0	%	
-Vat	1 228	14,0	%	
Turnover	8 772	100	%	
- Variable costs	3 885			
Contribution margin	4 887	55,9	%	
- Labour costs	680			
Wage margin	4 207	48,2	%	
-Fixed costs	170	2 %		
Rent	30	0 %		
Electricity	5			
Marketing	25	0 %		
Management	70	1 %		
Other costs	40	0 %		
Operating margin	4 037	46,2	%	

Labour Costs	
Cost / h	17 €/h
Lohi	10 h
Kana	10 h
Jauheliha	10 h
Tofu	10 h
Total	40,0 h