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Using Game Theory to Predict the Future of the Finnish Grocery Market

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This thesis researched how game theory can be used to determine the potential future direction of the Finnish retail grocery market. In order to do so an intensive literature review was conducted in order to understand the theory and develop necessary skills for its application. In addition the Finnish grocery market was reviewed thoroughly to identify patterns of behaviour and strategic directions of the main companies.

Three main companies were identified, S Group, Kesko and Lidl, which have been in fierce rivalry in the market. S Groups position was perceived to be strong, while Lidl's aspirations of growth were conceived. The effect of the slow economic growth period changing customers' attitudes, together with the tightening competition in the retail market, is expected to bring changes in the near future.

Following the market review process the situation was depicted as a game and analysed using different approaches within game theory. The analysis showed that of the three main players, Lidl is expected to gain market share over the others, S Group and Kesko. However this was dependent on whether a favourable decision as to building regulations was made for the company. Changes in market share were seen as being more subtle should the new regulations not be adopted.

Concluding it was perceived that game theory is an extensive and highly exploitable field to use in situations where strategies are assessed against those of others,' as such an approach helps evaluate the overall competitiveness of a company's strategy.

Keywords	Game theory, Strategy, Grocery market

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1 Introduction

The Finnish grocery market is dominated by three main players: Lidl, S Group and Kesko. The German Lidl is growing at a rapid pace, while the grocery market is not (Manninen 2014a), While S Group's position is strong Kesko has been losing market share for a long period and recently announced layoffs as a part of the changes the company is making (Markkinointi & Mainonta 2014).

So far, the domestic chains S Group and K Group have embraced the situation of Lidl's growth without high concern (Manninen 2014b). This is because they are unwilling to enter into price competition as this would lower their own margins, but they state that they would be able to reduce Lidl's market share if desired (Manninen 2014b). However such a possibility might be inevitable although the market share of Lidl is still relatively low, if the growth pattern continues, others will have to respond. Certain measures have already been taken, for example the launch of Kesko's K-menu product line and S-groups Kotimaista product line.

The central question of the thesis is "*In what way can game theory be used to predict the future direction of the Finnish retail grocery market."* Finland's weak economic condition has lead consumers to cut from their grocery budget and the increase in food prices have lead them to more affordable choices (Saario 2014). The thesis will look into possible decisions and actions from each of the retailers by using game theory through which the situation will be examined as a game.

Through game theory an individual or an organisation is enabled to consider the likely moves and the consequences of these moves of a counterpart to his own strategy. Dixit and Skeath (2004: 5) describe strategic thinking based on ones interactions with others, where *"… someone else is also doing similar thinking at the same time and about the same situation."* There is no earlier research found on the topic of game theory being applied to predict the future direction of the Finnish retail grocery market. And while no approach can guarantee that the correct decision will be made, they can help avoid some of the mistakes easily made when examining different options (Schwartz 2004).

1.1 Method of Study

The thesis will begin with a brief introduction to the field of management science, followed by a literature review on game theory. This is important because the field itself is rather extensive, so in order to apply the methodology successfully, a thorough review is required. The aspects of game theory seen most appropriate towards depicting the situation of the Finnish retail grocery market will be focused on.

Data collection was based on books and articles on game theory. These sources ranged from the very first prestigious books and articles on the subject, such as *"Theory of games and Economic Behavior"* to more recent ones such as *"Strategy: An introduction to game theory."* Different authors had very different approaches in discussing the theory. Von Neumann and Morgenstern were very mathematical, as it was their book which brought game theory to everyone, while others, especially the ones after 2000's were more practical and used relatable examples.

Following the literature review a review of the Finnish retail grocery market will be conducted. The market will be first viewed generally after which the main players will be introduced separately. A thorough review is needed to examine past and expected behaviour from the key players. This is done through assessment of the companies own publications, financial articles and contemporary news on the grocery trade sector. The majority of source articles were in Finnish, originated largely from domestic financial journals.

The review should give insight into the potential direction of the Finnish grocery market as a whole, as well as for each of the players. This analysis will then function as the basis on which to make assumptions needed for depicting the situation as a game.

After the market review game theory will be applied to the situation and possible outcomes will be identified and analysed. Ultimately the report will conclude on the findings and provide insight on the possible future direction of the market.

2 Literature Review

2.1 Management Science

Management Science can be defined as a quantitative approach to decision making, in which different scientific methods are used to analyse the situation in order to make a valid decision (Anderson, Sweeney, Williams, Camm and Martin 2012: 2). A quantitative approach refers to the use of quantifiable, numerical data or data that can be presented in numbers or figures instead of qualitative data where this is not the case. The term management science can be also often referred to as operations research and decision science.

The use of quantitative methods in management is seen to originate during the scientific management revolution of the early 1900s led by Frederick Winslow Taylor (Anderson et.al 2012: 2). However, modern day management science research was seen to advance during the World War II period. Primarily the science of management was examined to deal with strategic military problems. This involved the formation of teams, and the members within, each with their own attributes. Many of these members who took part in such military programmes continued their research into management science even after the war.

Later research together with the inputs of various scientists from different fields emphasized the power of mathematical modelling and analysis in real-world problem solving. Such trends introduced a large number of methodological developments in the field. Solving linear programming problems was one of these major developments in the field, and its originator George Dantzig who worked as an mathematical advisor at the U.S. Air Force Comptroller's Office invented the simplex method to solve these problems (Cottle, Johnson and Wets 2007). In addition to Dantzig's contributions in linear programming, he did lots of other work in mathematics and is therefore regarded one of the greatest mathematicians of the twentieth century.

A second major development in the field which emerged post World War II was digital computers and the computing power they introduced (Anderson et al. 2012:2). This enabled the use of computers together with the methodological developments to solve a large variety of problems. From there the field has emerged to its current status "*where it supports decision making and control within organizations, by helping people to see the possible consequences of their actions*" (Pidd 2009: 21).

2.2 Game Theory

Game theory, also known as the theory of games of strategy, is an important approach which can help in gaining insights into competitor interaction (Johnson, Whittington and Scholes 2011: 217). A competitor can be regarded as any counterpart of a particular situation, such as teams, companies or political candidates.

The decision makers, also called players, compete against each other, selecting strategies without knowledge of the strategies selected by the other player or players (Anderson et al. 2012: 236). When one thinks carefully before acting, and considers objectives and preferences, limitations and constraints, of one's actions, and the final actions are based on personal criteria to do the best, this is called rational behaviour (Dixit and Skeath 2006: 5)

Most real-life situations are affected by external and chance elements, so like many alternatives none is expected to offer a definite solution. Such problems in finding solutions can be, for example, when people have more options they often tend to make worse decisions (Schwartz 2004). This phenomenon is something that is discussed more extensively by Barry Schwartz in his book The *Paradox of Choice: Why more is less.* However game theory has become a provider of concepts and techniques of analysis for many disciplines and the authors (Dixit and Skeath 2004: 4) describe game theory as the science of rational behaviour in interactive situations.

John Von Neumann is generally considered to be the father of game theory. From the establishment of the theory in 1928 after proving the minimax theorem, the fundamental theorem of game theory discussed later in this thesis, to the publication of his book *"Theory of Games and Economic Behavior"* he, together with Oskar Morgenstern, has laid the foundation for extensive work in the field.

"The purpose of this book is to present a discussion of some fundamental questions of economic theory which require a treatment different from that which they have found thus far in the literature"

Von Neumann, Morgenstern 2004:1

The authors' first sentence in their book states the innovativeness of the theory at the time. It reads:

"*The basic problems arising from studies of economic behaviour that had been of concern for long periods could be finally dealt with." "However, this requires mathematical methods which diverge considerably from the techniques applied by older or by contemporary mathematical economists."*

Von Neumann and Morgenstern 2004:1

The book emphasized a new approach in respect to understanding and acting on competitive behaviour, a common problem, and it was not until its publication first in 1944 that the mathematical theory of games received much attention (Dresher 1961: 1) Kuhn and Tucker (1958: 100) further emphasized that Von Neumanns paper*," Zur theorie der Gesellschaftsspiele"* , in which he introduces the minimax theorem, together with the publication of the *"Theory of Games and Economic Behaviour* "book contain an impressive outline of game theory and every writer in the field draws to some extent upon concepts in them.

Leonard (1995: 731) continues on the impact of the book by noting that even the work of several subsequent contributors such as John Nash and Robert Aumann is seen to be based on the Theory of Games and Economic Behaviour by Von Neumann and Morgenstern. This work includes fields other than economics such as political science and evolutionary biology.

2.2.1 Types of Games

Game theory has several applications and methods, suitable for different situations. This section will discuss the different types of games in the theory.

Simultaneous-move games are situations where the players make one move simultaneously. Therefore players are unaware of the moves of other players. Conversely, sequential-move games involve strategic situations with a strict order of play (Dixit and Skeath 2004: 20). In sequential- move games players take turns making their moves, and they are aware of the moves made by prior players. As a result the way current actions will influence future actions, must be considered extensively. However, as in the real business world, sequential and simultaneous moves can be and are both used in combination, depending on the nature of the situation.

Sequential games are not discussed as extensively as simultaneous play games by many authors. That is the case in this thesis as well, because with respect to the case study of the Finnish retail grocery market conducted in this thesis, in which three main players will be identified, the process and environment is better depicted with a simultaneous-move zero sum game. Zero-sum means that the gain or loss for one player is equal to the loss or gain for the other player (Anderson et al. 2012:236). As a result, the gain and loss balance out resulting in a zero-sum for the game. What one player wins, the other player loses.

Conversely a non zero-sum game would then mean that a loss or damage caused to one player, does not translate as a gain to the other player. An example of a non zero-sum game is war, where the damage caused to the opponent is rarely considered a gain by the counterpart.

I originally planned the game between the three grocery market players to be depicted as a zero-sum three person game. However von Neumann and Morgenstern (2004: 220-238) largely discussed the issue of three person zero-sum games by introducing coalitions between players.

The coalitions Von Neumann and Morgenstern introduced were discussed by Harold Kuhn and Albert Tucker (1958: 101) as well:

> *" …von Neumann- Morgenstern solution for cooperative games, where all possible partitions of the players into two coalitions are considered and the reasonable aspirations of the opposing coalitions in each partitions measured by the minimax value of the strictly competitive struggle between them."*

However, considering coalitions between the players was not suitable for the Finnish retail grocery market study because it does not fit the reality of the market. In addition none of the other authors used as references in this report discussed the topic of three player zero-sum games at all, where as the discussion was limited to only two players, which is largely the case in zero-sum games.

In addition after researching the matter, some authors such as Roy Gardner discussed the zero-sum three person games in his book "`Games for Business and Economics" (1995), but no clear process was identified. In some cases the third player could not have seen to win the game, but had a role of a "spoiler" for the other players, in determining the winner. There were also papers on the complexity of Nash Equilibria in multiple player zero-sum games and problems associated with the approach.

As a result of these issues, the attempt to formulate the game as a three person zero-sum game was seen outside the parameters of this paper and the idea was abandoned. Therefore, the focus in this thesis is on zero-sum games with two players and no co-operation between the players.

Co-operation naturally refers to the degree of co-operation between the players in a particular game, where for example some players can cooperate against another. In non-cooperative games, there is no constructive communication between the players. This does not however mean that the players have no interdependence. Interdependence exists where the outcome of choices made by one player are dependent on the choices made by other competitors (Johnson et al. 2011: 217) In situations of interdependence it is highly important to get in the mind of competitors, form a view of competitors' potential actions and construct personal actions based on those (Johnson et al. 2011: 217). In addition moves should be chosen in a way that acknowledges the competitors' responses and actions to those moves in the future. In such cases game theory can be seen as a highly relevant approach to use.

2.2.2 Formulation of Games

In formulating the game the basic characteristics of the game consist of the following:

- List of players
- The strategies available to each player
- The payoffs of each player in relation to all of the combination of strategies by all players
- The assumption of rational behaviour by each player, to obtain the goal of maximisation of utility

After identifying the players in a game, the next stage is to consider the strategies. Strategies are the choices available to players, but in devising them one must consider whether the game involves simultaneous moves made only once, or whether it involves sequential moves (Dixit and Skeath 2004: 20). If a game has sequential moves, actions of latter players can be dependent on the moves of prior players. Thus, in deriving a solid strategy, all of the different scenarios must be planned out.

Next the payoffs are determined. Each player is assigned a numerical scale or a simple numerical rating, with which the outcomes of the game can be compared. The number associated with each possible outcome is called that player's payoff or utility (Watson 2013: 13). A higher number represents a better outcome for the player. Depending on the game, the payoffs may be expressed in monetary amounts, or they can be any other utility considered to be a good performance indicator such as time or the amount of visitors.

One of the assumptions made by game theory is that in standard game-theoretic analyses, each player behaves according to the *"rational man"* paradigm (Rubinstein 1998: 121). As so the theory assumes that players are perfect calculators and able to flawlessly follow their best strategies to receive the highest possible payoff. Von Neumann and Morgenstern (2004: 8) elaborate on this issue by assuming that "*the consumer desires to obtain the maximum of utility or satisfaction and the entrepreneur a maximum of profits."* Thus the individual who seeks to obtain these or any other maxima of a utility is seen to act rationally.

2.2.3 Solution of Games

2.2.3.1 Sequential games

Game trees are used to help in solving sequential-move games. Game trees entail all the components of a game, players, actions and payoffs (Dixit and Skeath 2004: 46). It is a technique used for displaying and analyzing such games. These start from left and end on the right, when drawn. Figure 2.1 illustrates a simple game tree. The initial node/root has possible actions the player might take reaching out from it, these are shown as branches. The tree shows the point, where the turn shifts to the following player, and eventually, possibly, back to the first player, depending on the game. At the end there is a terminal node, and the associated payoff.

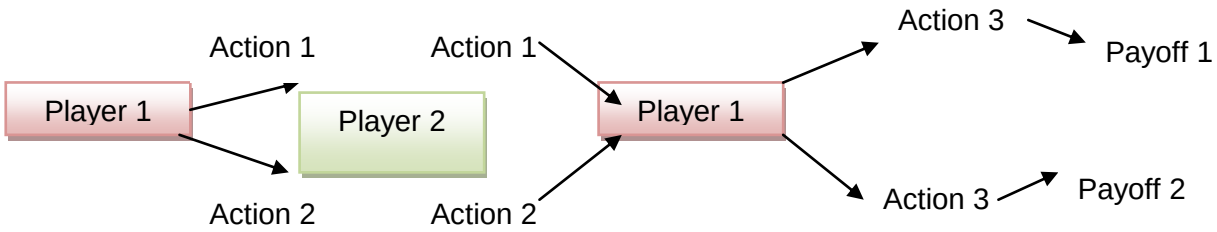

Figure 2.1 A simple game tree with two players

Finding the equilibrium in sequential- move games is based on the backward induction method (Watson 2013: 186), the player looks ahead, at the outcomes of all terminal nodes in a game tree and reasons back to determine behaviour. Dixit and Skeath (2006: 54) refer to this method as the rollback method and state that in a case all players use such analysis to determine their' optimal strategies, these strategies are called the rollback equilibrium of the game.

2.2.3.2 Simultaneous move games

2.2.3.2.1 A pure strategy solution

A game is said to have a pure strategy solution if it is optimal for both players to select one strategy and stick to that strategy without regard to the action of the opposition (Anderson et al. 2012: 239) In this respect the game is seen to have a saddle point (Dresher 1961: 12), also known as an equilibrium point, whereas the maximum of the row minimums equals the minimum of the column maximums, thus the players cannot improve their payoff by changing to a different strategy. In such cases a pure strategy is the optimal strategy for the players. An example of a payoff table can be seen from table 2.1 *(see page 13),* in which a pure strategy solution is found by using the minimax approach.

A Game Has a Pure Strategy Solution If:

Maximum of row minimums = Minimum of column maximums

Figure 2.2 A pure strategy solution

2.2.3.3 Nash equilibrium

A Nash Equilibrium in a game is a list of strategies, one for each player, such that no player can get a better payoff by switching to some other strategy that is available to him while all the other players adhere to the strategies specified for them in the list (Dixit and Skeath 2006: 87) The choices made by the players are considered best responses for the chooser to the other's action. Nash equilibrium does not require the choices to be strictly better than other available choices, nor it has to be jointly best for the other players, it is most simply the best strategy one can choose by acting unilaterally, which is the case in non-cooperative games.

Nash equilibrium was the discovery of John Nash, who in 1950 defined and characterized the equilibrium for n-person games (Holt and Roth 2004). Later in 1994, Nash together with Harsanyi and Selten received the Nobel prize in economic sciences for their contributions to analysis of equilibria in the theory of non-cooperative games.

2.2.3.4 Best- response analysis

The best response approach, as mentioned in the previous paragraph, deals with finding each player's best-response strategy, depending on the other players' available strategies. This is in order to find the Nash equilibria, where each player is acting to their best ability, given the actions of the other players (Dixit and Skeath 2006: 87). The best response analysis is a thorough way of locating all of the possible points of Nash equilibria in a game. It can be used in for example in a payoff table such as player ones best response, to each of the other players' strategy can be circled, and this is done in turn for every player. If there is a point where all the payoffs are circled in a particular cell, that point is said to be the Nash equilibria, thus the solution of the game. An example of best-response analysis for finding equilibrium in a game can be seen on table 4.3 *(see page 41)*.

2.2.3.5 Dominance

In cases where one strategy is unvaryingly better or worse than another in a game, the search for Nash equilibrium is seen to be simplified (Dixit and Skeath 2009: 91-92). This can be explained in a sense that if a particular action is clearly better for a player, regardless what the other player or players might do, it is seen as a dominant strategy, while the other strategies would be seen as dominated strategies. As so in the existence of dominance together with assuming the rationality of the player, which is one of the basic assumptions in game theory, the player should choose the dominant strategy, if all players have dominant strategies, they are expected to use it, and if one has a dominant strategy, he is expected to use it, while the others would expect him to do exactly that.

Dixit and Skeath further outline (2006: 91-92) that in some games some of the players' strategies may be dominated even though no single strategy would rise above all. Successive or iterated elimination of dominated strategies uses the process of removal of dominated strategies and reducing the size of the game in this way until no reductions can be made, and if the process ends in a unique outcome the game would said to be dominance solvable. This can be used to reach equilibrium, by removing dominated strategies from consideration, and even if it would not reach to a solution, it would however aid towards simplifying a large simultaneous- play game.

2.2.3.6 The minimax criterion

The minimax method first introduced by Von Neumann in 1928 is based on the fact that outcomes good for a particular player are bad for others (Kuhn and Tucker 1958: 100). The fundamental question for each player in using this approach is that whether the choice would be the best even though other players would find it out. In asking this question, the player must then consider the opponents' best response to the chosen strategy.

However, in a zero-sum game the best response of the opponent would constitute the worst one for the other player, thus each player must consider that the opponent will choose an action that would provide the worst outcome for the other players own action (Dixit and Skeath 2006: 99). The essence of the minimax criterion can be thus seen to choose the action leading to the least of the worst outcomes, or in other words the best payoff among the set of worst payoffs.

In depicting the solution, it can be useful to consider a two-person zero-sum game, for which the minimax criteria was originally designed(Kjeldsen 2001: 39). Following is a simple payoff table (2.1) for a two player zero-sum game, each with two strategies. As stated earlier, in a zero sum game one players gain, translates into an equal loss by another player, as such the table can be presented to show the payoffs of just one player, usually the row player, whose payoffs in turn would mean a negative value of the same payoff for the other player.

Table 2.1 A simple two player zero-sum game with two strategies

		Player 2		
		Strategy 1	**Strategy 2**	**Row minimum**
Player	**Strategy 1**	1	2	**1**
	Strategy 2	3	4	**3**
	Column maximum	**3**	**4**	

Using table 2.1 as an example, and solving the problem using the minimax approach, player one should choose the row that gives him the highest among the lowest numbers, in this case strategy 2, the maxima of the minima-the maximin. This decision would yield a payoff of 3.

Conversely player two should choose the column with the smallest number among the largest ones, the minima among the maxima, the minimax. This decision would yield a payoff of three. If player two's maximin value is the same as player ones minimax value seen from the table, then the outcome is a Nash equilibrium of the zero-sum game, such as in this example where player one would gain 3 and player two would lose 3.

This method of finding equilibria in zero-sum games will lead to Nash equilibrium in pure strategies if one exists. If the minimax method fails than the game is said to have no Nash equilibrium in pure strategies.

The different methods of analysis introduced can be used to find the pure strategy Nash equilibria of any simultaneous- play game among any number of players.

2.2.3.7 Solution in mixed strategy

Although John von Neumann placed in"… *bold relief the pioneering theorem that every game with perfect information has a minimax solution in pure strategies. "*(Kuhn and Tucker 1958: 104) , the existence of such a pair of strategies that would produce the desired result was not always guaranteed. Thus von Neumann introduced the concept known as mixed strategies (Kjeldsen 2001: 47).

If the maximum of row minimums does not equal the minimum of the column maximums, which is the solution in pure strategy as stated earlier (*see page 12-13*), a mixed strategy solution becomes optimal. In a mixed strategy solution, each player randomly selects a strategy according to a probability distribution, and the selected strategy can vary each time the game is played (Anderson et al. 2012: 239) The payoffs from a mixed strategy are defined as the corresponding probability-weighted averages of the payoffs from its constituent pure strategies (Dixit and Skeath 2006: 186). Weighting the payoffs by their probability and summing them provides the expected values for the players which can also be referred to as expected gains.

Many of the different approaches examined in pure strategies can be used for solutions in games with mixed strategies, with the same ground, using the summed payoffs, derived from probability weighted-averages to the pure strategy payoffs. For example Dixit and Skeath (2006: 195) state that in a zero-sum game, each player's equilibrium mixture probability is such that it is indifferent about which of the opponent's pure strategies the opponent will choose, the expected payoff or gain is the same.

3 The Finnish Retail Grocery Market

Having studied game theory, next a review of the Finnish grocery retail market is conducted. Within each section, some possible strategic choices will be eliminated if the review suggests them unlikely and ultimately two to three strategic choices will be outlined for each of the three key players, S Group, Kesko and Lidl. These strategic choices will be then applied to the framework of game theory in a later section. In making assumptions about possible strategic choices of the companies', it is important to become familiar with their business strategy and development so far.

A point in fact, worth mentioning is that in the data reviewed there are some deviations found as to market share percentages and revenue figures. In some cases the deviations can be quite significant, even up to a percentage unit difference when compared to another source. This is due to the differences in approach from the authorities collecting this data and reviewing it. In some cases for example Nielsen's (2014) report, they have outlined that the data concerning Lidl is their own estimate from various different sources. However the overall ratios between the differences are generally very similar, which is more important with regards to this thesis than knowing the exact statistical figures.

Grocery sales in Finland were 16.55 billion euros in 2013. The sales value increased by 3.2% from 2012, while growth in volume was minimal (+0.1%) (Nielsen 2014). In examining the market, four players can be separated from others as seen from table 3.1. These are the S-group, Kesko, Lidl and the "Suomen Lähikaupat Oy."

However, this thesis will focus on the situation between the three largest players, S-group, Kesko and Lidl. The reason for this is that the rivalry between the three has been more fierce, which will be further seen and emphasized through a wide range of articles and data. In addition "Suomen Lähikauppa Oy" has experienced constant decline of sales and market share from 2008 (Päivittäistavarakauppa ry 2014). However it is worth mentioning that despite this shift, it is naturally still a viable player in the Finnish retail grocery market and this thesis does not neglect that.

Table 3.1 The market share of the Finnish retail grocery industry in 2013.*

Group	Market share %	Daily Consumer Goods Rev. (million €)
S Group	45,7 %	7 560
K-group	34,0 %	5 627
Lidl Finland	8,1 %	1 347
Suomen Lähikauppa Oy	7,0 %	1 152
Stockmann	1,3 %	222
Tokmanni-group	1,3 %	215
M-chain	0,7 %	117
Minimani	0,6 %	94
Other	1,3 %	216

Table 3.1 adopted from Päivittäistavarakauppa ry 2014

*The table has been translated from Finnish to English by the writer of this thesis (Gul Shoaib)

As seen from table 3.1 S-group is the dominant leader, followed by the K-group, or Kesko, and then Lidl. Although Lidl holds significantly less market share power over the others, the extent to which Lidl has and will affect the industry will be examined.

In the current economic climate, consumers are shifting towards more affordable options (Manninen 2014a). Yle, the Finnish national broadcasting channel, has conducted a food basket price study in Rovanniemi, which proved Lidl to be the lowest price store among rivals (Talouselämä 2014b).The study conducted in October 2014 saw a 5 euro drop from March 2014 after a similar study. There was no statistical difference in the price changes among other chains. However in Kauppalehti's article (Laakso 2014) it was stated that the food basket study does involve some flaws, for example for S Group a low- price brand was chosen, but not all individual products in the range are the most affordable ones as to the specific product. The items in the basket included everyday groceries such as milk, bread and meat. Similar results were also seen in studies (Yle 2014c) conducted elsewhere.

Lidl has been highly successful in changing attitudes towards the company since its arrival in Finland in 2002 (Kanniainen 2014). In the past the perception of quality was low and there were not many domestic products as compared to the wide range presently. In addition the company has been able to get Alko stores situated alongside its chains, which is considered an aspect of increased customer inflow (Juvonen 2014).

3.1 S Group

S Group is a Finnish cooperative retail company which produces services for grocery and consumer goods trade, service station and fuel trade, travel industry as well as the hospitality business(S- kanava 2014a: 31). In addition services are produced for the automotive and accessories trade, the agricultural trade and banking sector. The company's business model is based on chain business along with exploiting the knowledge of local markets and customers of regional cooperatives.

The group consists of the SOK Corporation along with its subsidiaries and 20 regional and eight local cooperatives, which together employ over 40,000 people. Co-op members, the customers, collectively own the firm as a whole. As of end 2013 there were over two million co-op members (S- kanava 2014a: 31).S-group's purpose is to provide its members with competitive services and benefits, which are aimed to be provided through an extensive network of over 1500 outlets throughout the country. In addition the S-Etukortti card is the key to the benefits for its members, which several studies have shown to provide its holders the best benefits and advantages (S- kanava 2014a:26).

The company focuses on its own communication channels such as the S-kanava website, Yhteishyvä magazine and website which are all said to increase interactivity. Producing content interesting to the members, traditional marketing can be reduced.

In its annual report (2014a: 30) the company has outlined the following values as the foundation of its business. Below each value, there are certain guiding principles.

- We exist for our customers
  Through offering high-quality products and services, competitive prices and an extensive network, as well as rewarding co-op members with the best benefits.
- We take responsibility for people and the environment
  . S-group also strives to be the forerunner in responsibility
- We constantly renew our operations
  This involves taking feedback from customers and stake holders
- We operate profitably
  Investments are planned with a long perspective, even decades.

3.1.1 Grocery trade

In S Group groceries are sold by the Prisma stores, S-markets, Sale stores and ABC service station stores (S- kanava 2014a: 6). In addition to Finland the grocery trade is operated in Russia and in the Baltic countries.

As seen from table 2.1 the group is the market leader in the daily consumer goods trade in Finland, with almost half of the market (45.7%). Sales in the grocery trade were slow in 2013 (S- kanava 2014a: 6) however there was a small increase in the value, despite the decline in overall volume. This is due to higher prices, which in turn is due to increases in indirect taxes affecting the grocery trade.

Following there are some changes and challenges S Group's grocery trade must be able to respond to in the future as stated in their annual report (2014a: 7).

- The recession followed by slow growth increasing uncertainty among consumers
- Tightening taxation
- Ageing population and shrinking economies

These changes and challenges have affected consumers' attitudes and are expected to mould them in the near future as well. Such shifts have for example increased the sales of more affordable products, such as private label products (Yle 2014a). Advocating the interests of the consumer is in such an environment emphasized and according to the Finnish Broadcasting Company (Yle)* (2014a) the stores willingly respond to this by adding for example shelf space and variety to the private label brands.

S Group is also part of the BSCI system, cooperating in monitoring social responsibility in the supply chain. The ranges of eco-labelled and certified products are being developed as well (S- kanava 2014a:9).In addition the company regards important to offer an domestic alternative to where ever possible, and is seeking to favour local food and products from Finnish small-scale producers, to offer consumers local alternatives, which is a desirable feature among customers (Yle 2014a).

*Yleisradio (YLE) in Finnish, which is the equivalent for Finnish Broadcasting Company in English. In this report the abbreviation Yle will be used

At S Group each cooperative attends to consumer interests by a constant monitoring of prices and product ranges, in their areas. The strategic objective is to be the most affordable in its area along with the best and most targeted product range (S- kanava 2014a:7). However such aspirations require effectiveness throughout the value chain and Ilkka Alarotu, the food trade stock manager of the S-gorup in Kauppalehti's article (Laakso 2014) gives credit to Lidl and the way they have challenged the group through pricing and says Lidl is indeed one of the masters in efficiency and procurement internationally.

S Group further outlines that price leadership is demanding as it relies on a permanent economical pricing method, through which the prices of the entire product range are aimed to be kept as fixed as possible (S- kanava 2014a: 8). As so it can be safe to assume that S Group is highly unlikely to compete solely on the basis of lower prices, from which it has abstained so far already, in the reluctance of reducing its own margins (Manninen 2014b).

Having reviewed the information on S Group three possible future strategies have been identified to be most feasible. These strategies are:

Invest in internationalisation

> In S Group's annual report (2014a: 6) it is stated that the demand situation of the grocery trade in coming years is perceived to be weak, as recovery of national economy derived from the recession is expected to be slow as well. For S Group this will lead to decline in construction investments in retail, although such investments made in 2013 were relatively heavy. Currently S Group is focusing investments in developing customer service as a whole, in the grocery trade as well as other business areas.
>
> In the light of this information it can be assumed that the company is not planning in making construction investments in the near future and thus can be eliminated as a strategic choice for S Group. However as mentioned earlier, while the demand in Finland is expected to be weak, the company recognizes plenty of growth potential elsewhere.

There are 17 Prismas in Russia and the Baltic countries, Estonia, Latvia and Lithuania (S- kanava 2014a: 6). Increasing investment in internationalisation can be seen as a good investment area as it is said to provide benefits for the group as well as for all of the co-op members (S-kanava 2014a: 7). So far the company states its procurement levels abroad to have already enabled certain products at reduced prices for Finnish consumers and will look to further strengthen the competitiveness of the group.

Investing in researching ways for improving logistics and analytics

At S Group Inex Partners Oy is in charge of the logistics services for grocery and consumer goods trade (S- kanava 2014a: 23). This is said to be done in a manner that strengthens competitive advantage, which is enabled through centralised and direct distribution, with integrating automation capabilities for assisting people, further increasing productivity and resulting in shorter lead times of goods. Inex will move its grocery logistics from the current Kilo centre in Espoo and other centres in the Greater Helsinki area to Sipoo for S Group (S- kanava 2014a: 23).

One of the biggest pitfalls for Lidl has been the uneven distribution methods of new store locations (Saario 2014). However for S Group using advancements in logistics and the fact that S Group is a forerunner in analytics, such as store-specific space optimisation, in Finland and even internationally (S- kanava 2014a: 8) can be expected to be a strong source of competitive advantage in the future for the group.

This strategic choice falls into Research and Development and finding ways to even further improve logistics and using analytics in a way to provide competitive advantage.

Invest in expanding online sales

As seen from appendix 1.1, S-groups financial result remained at the previous year's level in 2013. The company is said to have slightly higher goals for 2014, despite the challenging nature of the overall economic situation. It is conceived (S- kanava 2014a: 4). that the operating environment in retail is facing rapid changes, thus requiring continuous development from the company as well.

The group's greatest competitive advantage lays in its cooperative activities advocating the interests of consumers, in this changing world. (S- kanava 2014a: 4). Hence the focus is on the core of S Groups activities: Responsibly producing competitive products and services for their co-op members. In this regard one of the objectives for the company, in 2014 is to continue streamlining their operations. This is done to secure their price competitiveness, and further develop their services to better meet co-op members 'requirements.

With regards to the previous paragraphs, the changing environment in retail together with S Groups aspiration to better meet co-op members' requirements, a valid target for the future can be seen to further expand food sales online. However in shopping online customers must be prepared to pay the associated fees of handling and delivery (Alavalkama 2013).It is already stated in the company's report, (S- kanava 2014a: 9) that as a purchasing behaviour is changing the group will be expanding online food trade starting with big cities in 2014

3.2 Kesko

Kesko is a listed trading sector company and its operations include food, home and specialty goods, building and home improvement, and car and machinery trades (Kesko 2014: 1). The company has about 2000 stores in eight countries, Finland, Sweden, Norway, Estonia, Latvia, Lithuania, Russia and Belarus. Kesko and K-retailers form the K-group with total sales amounting to approximately 11.6 billion euros and employs around 45 000 people (Kesko 2014: 1).

Kesko's values as stated in its annual report (Kesko 2013: 6) are:

- We exceed our customers' expectations
- We are the best operator in the trading sector
- We create a good working community
- We bear our corporate responsibility

Kesko's vision is to be the leading provider of trading sector services and a highly valued listed company and the group has outlined its strategic themes in its annual report (Kesko 2013: 6):

- Strengthening sales growth and increasing shareholder value
- Making Kesko's operations as customer- oriented as possible in all divisions
- E- commerce and multi- channel services
- Exploiting business opportunities in Russia
- Responsible operations

Kesko's main business model in the Finnish market is the chain business model. This model allows independent retailers to run retail stores in Kesko's store chains, and all food and building and home improvement stores in the K-Group are run by this method (Kesko 2013: 14). Through its chain wide operations, Kesko provides the setting and the K-retailer implements the concept and responsibilities include store management, customer satisfaction, personnel and business profitability.

The annual report (2013: 14) further elaborates the chain business model discussed earlier in which the K-retailer guarantees customer-driven and efficient operations. In addition responsibility is considered a vital part of daily operations of K-food stores. The company's responsibility work was developed through a new responsibility programme, published in February 2013 making the responsibility more transparent to customers.

3.2.1 Grocery trade

K Group's grocery stores operate in four chains, K-citymarkets, K-supermarkets, K-markets and K-extras. The total number of food stores is over 900 in Finland with a few in Russia.

The customer loyalty programme K-Plussa helps Kesko develop and tailor their operations to better meet customer needs from the information collected through it (Kesko 2013: 35) The company uses electronic channels to provide benefits and offers to customers, in addition Kesko publishes the Pirkka magazine, which for example has Pirkka-product recipes and with 2.9 million readers was the most widely read magazine in Finland (Kesko 2013:35). There are various monthly offers for K-Plussa customers including chain campaigns, store-specific special offers and the low-priced Pirkka products.

The Pirkka range has more than 2000 products combining high-quality and low prices, and the brand has been successful among customers, especially in the current economic climate and overall there are 3.9 million K-plussa customers (Kesko 2013:35). The high-quality and favourably priced Pirkka is seen as a source for competitive advantage in food trade. The quality image of Pirkka products is sought to be further strengthened. An objective is to increase the selection of this line and introduce responsible Pirkka- products, meeting a responsibility criterion and 200 Pirkka organic products by 2015 (Kesko 2013: 13).

Looking further at one of Kesko's objectives, in terms of growth, focus areas are in the major growth centres in Finland and Russia(Kesko 2014: 9). The first grocery store opened in Russia,St. Petersburg, the K- food, was opened in 2012 followed by three new stores (Kesko 2013: 42). The competitive advantage of these stores is based on extensive, high- quality, fresh selections. The new stores have been well received as the customer loyalty programme was also launched in Russia, with a good reception of approximately 400 000 customers (Kesko 2013: 35). Further it is stated that by 2017 in particular, the aim is to generate net sales of 500 million euros and a positive business result in Russia after the expansion of operations to Moscow. This will however involve significant capital expenditures and its impact on Finnish consumers cannot be compared with S Groups as of yet.

Kesko has outlined some of the trends in the retail operating environment (Kesko 2014: 16). These trends include the growth of e-commerce and multi-channel retailing, the increasing product-awareness and more demanding consumers , the importance of customer oriented services, slow economic growth and consumers' price awareness and an increasing proportion of retailers' private label brands. In addition customer loyalty programmes will be designed to be more interactive and provide more individual rewards.

In the light of these trends the company's key objectives as stated in its annual report (2013: 5) include:

- Increase in K-food stores' sales
- Strong growth in e-commerce and services
- Enhancement measures throughout the company
- Profitable expansion in Russia
- Improving return on capital in the building and home improvement trade in Anttila.

Based on the objectives and other reviewed information two possible future strategies have been chosen with the most favourable expected impact. These strategies are:

Invest in expanding online sales

The state of the poor economic climate, falling employment rates and increased taxation were challenges faced by the retail industry in 2013 along with the increasingly important role of electronic commerce (Kesko 2014: 4). Despite this Kesko managed to improve their profit, because of a group wide profitability program involving cost savings that had been launched in 2012. Capital expenditure was also prioritized to focus on food and the building and home improvement trade (Kesko 2014: 5).

As witnessed, changes in purchasing behaviour of customers' is increasing online business, as a result of which Kesko has targeted e-commerce and online shopping services are strategic focal points in all of its divisions (Kesko 2014: 9). Significant expenditures on online services are expected to be made, making shopping easier for customers, which is clearly a strategic objective for Kesko, which was initiated in November 2013 when Kesko Food launched the ruoka.citymarket.fi online food store, delivering products to consumers and business customers in Helsinki and Vantaa (Kesko 2013: 42).

The online grocery store will be first expanded in the Greater Helsinki area and from there to other major cities. Ultimately the aim is to cover all of Finland in cooperation with K-food retailers. This will provide store specific product information as to prices and availability online by the end of 2016 (Kesko 2013: 11).

Invest in marketing

S- Group and Lidl grew their market share (Nielsen 2014) and although Kesko's grocery trade is among the most economically profitable ones in Europe, the decline of market share cannot continue for too long (Manninen 2014a). The sales decline resulting in the loss of market share can be seen from Kesko's net sales figures between 2012- 2013 as well *(see appendix 2).*

While losing market share, Kesko already introduced a lower price brand, K-menu, alongside its Pirkka and Euro Shopper ranges (Kanninen 2014). This is aimed to attract more price sensitive customers. The new product range focuses on everyday basic products. Indereses chief analytic Sauli Vilen says in Kanninen's article (2014) that through the new product range Kesko is aiming to change the perception among consumers that it is more expensive in compared to the S-group. Although Manninen in her article (2014a) states S-group to be cheaper and its bonus scheme more popular than Kesko's, as a listed company Kesko does focus more on profitability and in strengthening its quality profile.

The core of Kesko's customer relationship and competition is based on customer-driven brands, selections and services, and an extensive network of offerings (Kesko 2013: 8). And with respect to the trends discussed on the previous page, the strategic objectives regarding the food trade in Finland is focused on profitable growth of K- food stores (Kesko 2013:40). This will be done through focusing on the areas of competitive advantage, which include superior fresh foods departments, the best selections and a good price image (Kesko 2013: 36).

As such a viable strategic option for the company is to increase its marketing budget and promotion budget in particular. The goal is to raise awareness of people regarding these aspects of Kesko's food trade.

3.3 Lidl Finland

Previously, when studying S-Group and Kesko, the majority of the information was found in their own publications, in this case the extensive annual reports. However Lidl is a kommanditgesellschaft, a limited partnership, as such the information is more limited compared to the cooperative S-group and the public Kesko. Because of this other sources will be used to collect data, which will mainly consist of journals and other available articles.

Lidl is one of Europe's largest grocery retail chains (Lidl 2014a). The first Lidl in Finland was opened in 2002 and there are now 142 Lidls throughout the country and Lidl Suomi Ky employs over 4000 people, who have the opportunity to build careers in Finland as well as abroad. The story began in 1930 with the founding of Lidl and Schwartz- Company a wholesale business (Lidl 2014a). Following this the first Lidl stores were opened in 1970 and the expansion progressed from 1990 onwards. The business model of the company relies on a simple concept, which enables combining high quality with affordable prices. Lidl operates as an individual subsidiary in each of its operating countries.

Lidl has been highly successful in changing attitudes towards the company since its arrival in Finland in 2002 (Kanninen 2014). In the beginning perception of quality was low and there were not many domestic products as compared to the wide range presently. According to the global information and measurement company Nielsen (2014), Lidl was the most successful grocery retailer in Finland in 2013. The company's profit margin was 7.1%, where as the average grocery market profit margin was only 1.8% in 2013.In addition Lidl Finland's sales grew by almost 25% in the fiscal year ending February 2014 (Helsingin Sanomat 2014). Manninen outlined in her article (2014a) that Lidl Finland's profit before taxes grew by over 40%, which stems from the rise in market share, as customers are largely attracted by price.

Lidl's growth is based on price and price perceptions (Manninen 2014b). In addition the economic situation has further aided the company's growth together with the increase in domestic products at Lidl's stores. A highly positive piece of news for Lidl was when the company was able to have Alko stores alongside its chains, a topic which had raised many debates. (Kanniainen 2014; Manninen 2014a)

Talouselämä (2014) published an article about Lidl Finland and how it has already for a while being donating unsold groceries and also other products to people who need it via organizations. Certain items are also used for feeding animals in local farms. The ethical and ecological stance aside, the company itself benefits from this by reducing costs in areas of waste management and disposal.
Because of such actions and results Lidl has improved its business in Finland significantly since entering Finland (Salo 2014). Further Lidl's success is based on listening to their customers wishes as to product line, store operations, personnel training and marketing and advertising (Savaspuro 2014a)

Further Yle (2014a) published a news article about how individual consumers can save significant money by focusing their shopping in Lidl, and in particular Lidl's own product range, which provide the most affordable options. It was further stated that in the slow economic growth period, the demand for these economically priced products increases and the stores willingly respond to this by adding for example shelf space and variety. In addition these products are deemed less volatile to price fluctuations.

A price comparison was conducted in relation to S-markets Rainbow range and K-supermarkets Pirkka range. The study (Yle 2014a) showed Lidl to claim the first position, while S-market was second and K-supermarket was third. The selection manager at S-group was rather astonished by the result, while the sales manager at Kesko food emphasized the quality of products. However it was further emphasized that the basket consisting of the Pirkka products had the most domestic products, which is said to raise costs, but is considered by some to be a desirable feature among consumers. The chains have recognised this and all of them are aiming to increase the range of domestic products (Yle 2014a).

Lidl's challenger position can be seen to work towards its advantage in dealing with the troubles faced in settling in Finland (Savaspuro 2014a). The customers have noticed strong advances in the chain, although the competitors were seen to have reached such advances much earlier. However Kanninen (2014) states that due to the fact that Lidl's market share is still relatively low, it must continue to grow for many years before reaching sales volumes of Kesko or the S-group.

According to Kauppalehti (Rajala 2014) Lidl's recent growth cannot be explained solely by the opening of new stores. The fact is that Finnish consumers have been increasingly attracted to the low-prices offered by the chain. The growth of Lidl is based on price and price perceptions (Manninen 2014b) with the economic situation having played its part and the effect of traditional loyalty programmes is said to have decreased, which Lidl's success reveals. Customers prefer cheaper prices than some sort of guarantee of a money back scheme (Savaspuro 2014a). Finnish consumers are smart and identified the importance of variety in choice and competition in turning towards Lidl (Manninen 2014a).

Low price perceptions and distinct advertising have attracted consumers to Lidl.(Heiskanen 2014) and while other companies' in the food sector are reducing or keeping their marketing budgets constant, Lidl has increased its budget annually (Savaspuro 2014b), and the company says it will do so in the future as well. However the purchasing manager of Lidl reveals that the sum is still relatively low, as Lidl aims to operate as efficiently and economically as possible. This is something further emphasized by(Manninen 2014a) that even though Lidl's competitive advantage is based on low costs enabling low prices.

The German owners have pumped over 600 million euros into Lidl's Finnish subsidiary (Rajala 2014) and despite making a loss during the first 5 years, since that Lidl has made increasing profits. Ultimately consumers' have come to notice that Lidl provides some high quality items as well, in addition to its cheap price-level (Savaspuro 2014b). Through persistency, its long sighted view and with hard work, Lidl has succeeded in establishing itself in the Finnish grocery market, which was previously controlled by two players, as a duopoly.

Based on the review, the most contemporary and necessary strategic direction for Lidl is to keep expanding its store network and growing.

Invest in expansion of store network

In this context Lidl has one strategy with two options. The company can either build standard sized stores, or larger stores with simultaneously expanding existing stores depending on the Finnish authorities

Lidl Finland's chief executive, Lauri Sipponen, stated that the company is planning to further open several new stores in the near future and keep its momentum of growth (Manninen 2014a). The biggest challenge however for Lidl's aspirations comes from the fact that the grocery market is strictly regulated in Finland making it very difficult for new entrants to expand and build new stores (Heiskanen 2014a).

At the moment the concern is on restrictions made on building large stores, which is a problem for Lidl. The chief executive of Lidl further states in Heiskanen's (2014a) article that Lidl would like to expand some of its existing stores, and the expansion would be possible from their perspective, but the law is against such actions.

Sipponen continues in another article by Heiskanen (2014b) that stores under a size of 1900- square metres, in which size category most of Lidl's stores fall, are no longer adequate for the chain. He admits that if it was possible Lidl would expand all of its stores, because due to increased sales and personnel, the expansions are seen necessary. He expresses his wish about how government should support expansion, especially in the prevailing economic situation. The authorities say that regulations can be applied to suit situations where a store wants to expand, but it all comes down to prevailing building plans, and situations can be assessed individually.

In Heiskanen's article (2014a) it is further acknowledged that the regulations imposed on the planning of stores is seen to clearly affect competition, which should be completely avoided. The debate is ongoing and the side in favour of the regulations leans on environmental reasons, while others see as the restrictions to favour only the dominant players, such as Kesko and the S- group.

Despite such resistance Lidl is expanding its store network in for example Eastern-Finland (Lidl 2014b; Yle 2014b) In addition it is constantly searching for new store locations and investments are also made in existing stores to provide top-class customer service. In these aspirations however the chief executive (Juvonen 2014) yet again expresses his frustration on the strict building regulations imposed on retail stores, but later expressed optimism in the companies' own publication (Lidl 2014b) and believes that a favourable decision will be made and the company will be able to expand its growth further.

4 Application and Analysis

Having studied the Finnish retail grocery market, the situation between S Group, Kesko and Lidl can be examined as a game with the game theory methodology discussed in this report (*see section "Game theory").*

First the situation is stated verbally.

Kari Luoto, the chief executive of Päivittäistavarakauppa ry says in an article by Taloussanomat (Kanninen 2014) that an increasing number of consumers are becoming more price sensitive. This shift has increased the competition in the Finnish grocery market, particularly between K-group and Lidl, while an increasing number of customers are turning to Lidl. According to the research company Nielsen Lidls market share in 2013 grew by 1.1%, while K-groups decreased by 0.7% and Suomen Lähikauppa's by 0.3%.

Having identified the problem, both for S Group and Kesko, the focus is turned to Lidl, Kauppalehti (Lukkari 2014) points out Lidl's comments in its financial statement, in which the company states that there are no significant operational or economical threats or uncertainties on its horizon. Looking into the future Lidl is looking for further opportunities and locations to expand (Juvonen 2014) Apart from opening new stores, Lidl will invest in refurbishing some of the existing ones. Conducting a decision analysis for Lidl is seen to examine the impact of its own decisions rather than solving a problem.

The ultimate aim of the analyses is to estimate the future direction of the Finnish grocery market. However according to Nielsen (2014) shops selling a full range of grocery goods totalled to 3171, as of 1 January 2014. In addition to S Group, Kesko and Lidl, Table 3.1 revealed the presence of other larger player's as well such as Suomen Lähikaupat Oy. However as stated earlier, the thesis will exclusively discuss the situation between S Group, Kesko and Lidl.

4.1 Two person zero-sum simultaneous move game

Following the game is first formulated together with the assumption of rational behaviour by each player, to obtain the goal of maximisation of utility.

Applying game theory to examine the situation, it can be clearly stated that the game is a zero-sum game, meaning that one players gain is equal to another player's loss. In stating so it is assumed that the sales volume of the grocery market is constant. In addition it is a non- cooperative game, meaning there is no constructive communication between the players. The game is also a simultaneous move game, where moves are made simultaneously and once.

Three strategies for S Group were outlined, two for Kesko and one for Lidl, with two approaches, during the review process. In the real business world, businesses can pursue more than one strategic objective simultaneously, but in applying these tools, the goal is to identify the most favourable one with respect to the competitors. In addition as the weak economic situation is still reflected in the Finnish market (Nielsen 2014), the importance of resource efficiency is seen to be emphasized.

As we assumed rational behaviour to maximise the utility in the beginning of the game (*see previous page*) it can be assumed that each of the actions taken by any of the companies is estimated to produce a positive result for the company. However in this case the extent of that result is dependent on actions taken by the other companies, which will have an effect on the overall outcome. As Anderson stated (2012: 605) the way payoffs are expressed is up to the organization for which the analyses is being conducted. In this situation the most appropriate performance indicator is the rise or fall of market share resulting from the combination of strategies.

Based on the review process it was possible to estimate the extent of the impact the strategies would have on the Finnish grocery market. This impact is represented as a numerical figure next to each strategy. For example Lidl's strategy of investing in expanding store network through building larger stores and expanding some of the existing stores is seen to have the highest impact with the impact figure of four. However as Watson (2013: 17) states that "In non random settings, in fact, any utility numbers will work as long as they preserve the players' preference ranking."

Therefore, the assigned numerical representation of the impact of each strategy does not suggest a raise in market share of say four per cent for Lidl's strategy one. Rather the figure allows the ranking or preference of one strategy over the other and helps magnify its relation to the other strategies. These numerical values of impact will be used to assign payoffs, in a manner that if one company's strategy impact is higher than the others that combination of the strategies will bring on a negative impact for the first company.

Payoff tables will be conducted for each pair of players. In finding the solution, the different approaches discussed in section 2 "*Solution of games*" in particular pages 10-14.

4.1.1 Players and their strategies

Following the players are identified and their strategies stated along with their' relative impacts.

S Group

- ***S1: Invest in internationalisation*** ***1***

  The impact of this strategy is assigned as 1, due to the fact that the benefits it will provide to Finnish consumers are indirect as opposed to the other two strategies. In addition as international sales are relatively low when compared to domestic sales (S-kanava 2014b: 2), this is a more long sighted effort.

- ***S2: Invest in Research & Development*** ***2***

  This strategy is assigned 2 because although it is an investment planned with a long perspective, it is in line with S Groups guiding principles (S-kanava 2014a: 30). The impact of such work is seen to be high.

- ***S3: Invest in expanding online sales*** ***2***

  S Group is by far the largest player in Finland's online grocery store market, but sales are still relatively low (Alavalkama 2013). Even with doubling online sales, the overall percentage of it would still be relatively low. However it is considered a good investment with regards to the future, hence the utility number of 2.

Kesko

- ***K1: Invest in expanding online sales*** ***1***

  In Alavalkama's article (2013) Kesko and the S Group both stated that competition is good in e-commerce. The more stores practicing sales through electronic commerce, the more the concept will be familiarized to consumers, and hence the more feasible the activity will become. However, for Kesko, online sales expansion is even a larger effort and because of its weaker position in the segment the impact of this is seen lower compared to S Group's.

- ***K2: Invest in marketing*** ***2***

  K-Group's competitive edge is based on having the best selections, excellent service and knowledge of customer needs (Kesko 2013: 14).Listening to the wishes of customers together with exploiting customer data, enables the K-retailers to tailor product selection and services to better meet the needs of customers. The chain's common product selections are thus often complemented with local food procured through local producers.

  Investing in marketing, and promotion in particular can be seen to have a large impact on Kesko's food trade business, through raising awareness of the company's range of offerings.

Lidl

- **L1: Invest in expanding store network- Building larger stores and expanding some of the existing stores 4**

  This strategy is Lidl's priority and can be seen to have a strong impact.

  Lidl is far away from Kesko (Saario 2014), which has over 900 stores while Lidl has 140. The company simply does not have the capacity to serve the volumes of customers that high, and it would demand many larger stores and a large increase in the amount of regular stores as well as online retail. And while speaking of electronic commerce, Lidl's chief executive, Lauri Sipponen, says in Alavalkama's (2013) report that the company is studying and analyzing the possibility of online grocery retail, but as of November 2013 there are no concrete plans for doing so, with the situation having not changed since.

  L2: Invest in expanding store network- Building regular size stores 2

  The second strategy is significantly less appealing to Lidl, however still would expect to bring on a good impact.

4.1.2 S Group and Kesko

Below is a payoff matrix prepared for S Group and Kesko. Because it is a zero-sum game, it is adequate to present the table by stating only one player's payoffs, in this case S Group's because it is presented as the row player in the table.

The payoffs were determined with relation to the estimated impact of the strategies. For example the impact of S Group investing in online sales was stated as 2, and Kesko's as 1, however if both of them would invest in expanding online sales, S Groups impact was seen to be reduced by Kesko's impact of investing in online sales, thus resulting in a payoff of 1 for S Group, and -1 for Kesko for that combination of strategies.

Table 4.1 Payoff table for S Group's and Kesko

Strategies	K1 Invest in expanding online sales	K2 Invest in marketing
S1 Invest in internation-alisation	0	-1
S2 Invest in R&D	1	0
S3 Invest in expanding online sales	1	0

Next the solution for the table is identified.

It can be clearly seen that strategy one for S Group is a dominated strategy. This is because regardless of what strategy Kesko would choose, payoffs from strategy two and three are clearly betterfor S Group than payoffs from strategy one. Therefore, both companies can ignore this option as long as they assume rational behaviour by the other. For Kesko its' strategy one is dominated by strategy two as well. Thus the size of the game may be reduced.

Table 4.2 Reduced table for S Group and Kesko

	K2 Invest in marketing
S2 Invest in R&D	0
S3 Invest in expanding online sales	0

As seen from the reduced table Kesko will choose strategy two and S Group is indifferent about choosing strategy two or three, because it will yield the same payoff (0). As so the game is seen dominance solvable and there are two points of Nash equilibria in the game.

➔ S2+K2 and S3+K2

S Group will either invest in Research and Development or in expanding its online sales, while Kesko is expected to invest in marketing. The payoffs for both are zero (0).

From the result it can be seen that there is no expected change in market share between S Group and Kesko.

4.1.3 S Group and Lidl

For S Group and Lidl a different approach is used for finding the solution, although it would be possible to use the same approach as earlier with S Group and Kesko.

In the table below the solution is searched for using the best-response analysis. S Groups best response for each of Lidl's strategies is circled in blue and conversely Lidl's is circled in orange.

Table 4.3 Payoff table for S Group and Lidl

Strategies	L1 Invest in expanding store network- Building larger stores and expanding some of the existing stores	L2 Invest in expanding store network- Building regular size stores
S1 Invest in internationalisation	-3	-1
S2 Invest in R&D	-2	0
S3 Invest in expanding online sales	-2	0

It can be seen that there are two cells with both circles in them, the best-responses for both players. This means that the game has two points of Nash equilibria.

➔ <u>S2+L1 and S3+L1</u>

S Group will either invest in Research and Development or in expanding its online sales, while Lidl is expected to invest in expanding via opening larger stores and expanding existing stores.

From the result it can be seen that S Group will lose market share to Lidl with the utility of two, which corresponds to the amount Lidl will win. In addition the table shows that if Lidl would not be able to execute its strategy one, due to regulations, S Groups strategies would remain the same, however with better payoffs (0).

The validity of the conclusion can be checked by performing a cell-by-cell inspection to find the Nash equilibria as the game is quite small. This will however produce the same result. In addition it can be observed that the game is again dominance solvable. Strategy one is clearly better for Lidl than strategy two and strategies two and three are clearly better for S Group. There are two Nash equilibria points in the game.

4.1.4 Kesko and Lidl

The game between Kesko and Lidl is clearly dominance solvable as well because both players have dominated strategies. For Lidl strategy one dominates strategy two and for Kesko strategy two dominates strategy one. In other words strategy one is better for Lidl without regard to Kesko's strategy and strategy two is better for Kesko without regard to which of its own strategies Lidl chooses.

Table 4.4 Payoff Matrix for Kesko and Lidl

Strategies	**L1 Invest in expanding store network- Building larger stores and expanding some of the existing stores**	**L2 Invest in expanding store network- Building regular size stores**
K1 Invest in expanding online sales	-3	-1
K2 Invest in Marketing	-2	0

This game has only one point of Nash equilibria, which is:

➔ <u>K2+L1</u>

Kesko will invest in marketing, while Lidl is expected to invest in expanding via opening larger stores and expanding existing stores.

From the result it can be seen that Kesko will lose market share to Lidl with the utility of two, which corresponds to the amount Lidl will win. In addition the table shows that if Lidl would not be able to execute its strategy one, due to regulations, Kesko's strategy would remain the same, however with a better payoff of (0).

Further for validation purposes the result can be examined by applying the minimax method with an updated table.

Table 4.5 Payoff table for Kesko and Lidl to find the minimax value of the game

Strategies	L1 Invest in expanding store network- Building larger stores and expanding some of the existing stores	L2 Invest in expanding store network- Building regular size stores	Row minimum
Invest in expanding online sales	-3	-1	-3
Invest in marketing	-2	0	-2
Column maximum	-2	0	

Row maximum

Column minimum

After applying the minimax criteria to the two player zero-sum game, it can be seen that the maximum of the row minimums is -2 and the minimum of the column maximums is -2. These two figures are the same meaning there is a solution in pure strategy and that is the Nash equilibrium point of the game. Here the solution of the game, which was solved earlier by reducing the size of the game, excluding dominated strategies, is observed here through the minimax approach.

5 Conclusion

Identified in the introduction to this thesis, the central question was "*In what way can game theory be used to predict the future direction of the Finnish retail grocery market."* As a conclusion it is useful to consider the extent to which that question has been successfully answered.

The report began with a literature review on game theory. The extent to which the theory reaches was gauged. It was seen that game theory if used correctly can provide valuable insight into the future direction of a company in relation to its competitors.

A study of the Finnish grocery market was conducted and the annual reports of S Group and Kesko proved highly beneficial in getting to know the companies, their values and bases of competitive advantage. The information was complemented with various financial articles and contemporary news on the competitive situation of the market. Based on the review it was possible to outline a few strategies and their' possible market impact for each of the main competitors, S Group, Kesko and Lidl.

Following the literature review and the company studies, the situation could be depicted as a game, within the framework of game theory. Different approaches were used to solve the games and further validate the solutions. In analysing the results it was seen that Lidl is expected to gain market share over both S Group and Kesko in the near future. However this scenario is possible only in the case if the company is able to open large stores and be permitted to expand its current regular-sized stores.

The issue is still unresolved, but is likely to be decided upon in the near future. Due to the restriction, during the analysis the option of Lidl not being able to implement its primary strategy was contemplated. It was seen that if that would be the case, depriving market share from S Group or Kesko would be challenging, with regards to the companies' own strategies. This necessity for Lidl to expand aggressively through opening larger stores in order to become a viable threat to S Group and Kesko was already observed in the company review section.

The competition between S Group and Kesko is expected to continue in a more subtle manner as seen from the analysis.

An issue worth emphasizing again is that during the review process, the importance of rational thinking and behaviour is seen to be highly important. This is one of the basic assumptions for game theory as well. While different people might emphasize different issues after individual reviews on the Finnish retail grocery market in an individual manner, if all embrace the notion of rationality equally, the results can be expected to be rather aligned.

Additional restrictions as to the analysis include the fact that companies' can employ more than one strategic objective simultaneously, or conversely some companies may fail to respond adequately. A point worth mentioning is also that the industry was considered with the presence of three players only. The analysis suggested that Lidl is expected to gain market share over the other competitors if it was successful in implementing its primary strategy, and if not so the gain would be minimal. However, in regards to the whole market and the presence of other players as well, strategy two for Lidl already can be seen to be adequate enough to gain market share overall.

Overall it was seen that game theory, in fact was a highly useful approach to examine the potential future direction of the Finnish retail grocery market and it can be used very effectively in such situations. For companies integrating such methods of quantitative analysis they may be able to judge consequences of actions prior to making decisions. Such cautiousness can be seen to be especially useful in times of economic downturn. And while a strategy can independently seem good on paper, it can in fact turn out to be a weak response in relation to the competitors' strategies.

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S Group Key Figures

S Group Key Figures 2009–2013

EUR Million	IFRS 2013	IFRS 2012	IFRS 2011	IFRS 2010	IFRS 2009
SOK Corporation					
Revenue	8 539	10 634	11 280	9 258	8 532
Depreciation and impairment losses	66	63	72	65	72
Operating profit	-8	-7	19	49	63
Financial income and expenses (+/-)	7	1	0	7	-26
Profit before taxes	-15	-9	20	41	37
Profit for the financial year	5	-23	12	34	37
Total assets	1 641	2 055	2 178	2 068	2 015
Non-current assets	699	697	689	702	684
Inventories	190	221	462	346	346
Current assets	942	1 036	1 026	1 020	966
Assets held for sale	7	322			19
Equity attributable to equity holders of the parent, total	594	591	569	567	536
Minority interest	1	2	5	20	20
Provisions	26	9	8	12	16
Liabilities	1 046	1 189	1 604	1 481	1 439
Liabilities associated with assets held for sale	4	273			21
Interest-bearing liabilities	162	425	362	323	395
Cash and cash equivalents and short-term investments	158	178	166	268	241
Net interest-bearing liabilities	4	247	196	54	154
Personnel at 31.12.	9 353	10 630	9 934	9 708	8 889

EUR Million	FAS 2013	FAS 2012	FAS 2011	FAS 2010	FAS 2009
SOK					
Sales (excl. VAT)	7 496	7 384	7 048	6 557	6 162
Sales to cooperative societies	7 114	6 974	6 674	6 202	5 797
Operating profit before extraordinary items, appropriations and taxes	48	4	49	22	59
Profit/loss for the financial year	48	-8	39	8	45
Personnel at 31.12.	1 517	1 755	1 280	1 196	863
Cooperative societies + subsidiaries					
Sales (excl. VAT)	10 462	10 373	9 854	9 092	
Sales (incl. VAT)	-	-	-	-	8 840
Number of societies	28	29	29	31	36
Memberships of societies	2 109 025	2 055 227	1 993 779	1 933 587	1 707 274
Personnel at 31.12.	32 093	32 787	32 208	30 240	27 010
S Group					
Retail sales (excl. VAT)	11 353	12 037	11 461	10 465	
Retail sales (incl. VAT)	-	-	-	-	10 544
Outlets	1 646	1 697	1 668	1 636	1 526
Personnel at 31.12.	41 784	43 417	42 142	39 948	35 899

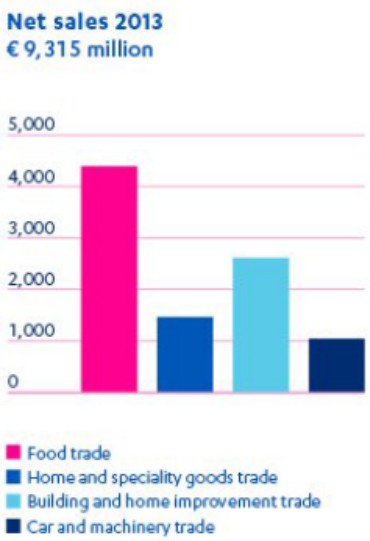
Calculation of key ratios

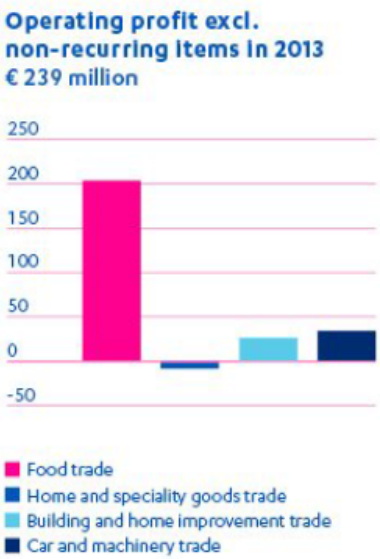
Net interest-bearing liabilities = Interest-bearing creditors - cash and cash equivalents and short-term investments

Appendix 1. S Group key figures adopted from S Group's year (S-kanava 2014a: 33).

Kesko Key Figures

2013 in figures





Key figures

		2013	2012	2011	2010	2009
Net sales	€ million	9,315	9,686	9,460	8,777	8,477
Operating profit	€ million	248	212	281	307	232
Operating profit excluding non-recurring items	€ million	239	230	279	268	155
Profit before tax	€ million	242	210	282	312	217
Return on capital employed excl. non-recurring items	%	9.8	9.0	13.1	14.0	7.4
Return on equity excl. non-recurring items	%	7.7	6.9	8.8	8.7	3.8
Cash flow from operating activities	€ million	414	382	216	438	379
Capital expenditure	€ million	171	378	425	325	198
Equity ratio	%	54.5	52.5	53.9	53.5	54.2
Dividend per share	€	1.40*	1.20	1.20	1.30	0.90
Earnings per share, diluted	€	1.75	1.26	1.84	2.06	1.27
Earnings per share excl. non-recurring items, basic	€	1.68	1.47	1.84	1.78	0.71
Equity per share	€	22.96	22.48	22.29	21.81	20.39
Personnel, average		19,489	19,747	18,960	18,215	19,200

** Proposal to the AGM*

Appendix 2. Kesko's key figures adopted from KESKO'S ANNUAL REPORT (Kesko 2014: 3)