TALLINN UNIVERSITY OF TECHNOLOGY
School of Business and Governance
Department of Finance

Eero Saarinen

GAME MODEL APPLICATION IN MERGERS & ACQUISITIONS, BASED ON VALMET-NELES-ALFA LAVAL ACQUISITION PROCESS

Bachelor's thesis
Programme TVTB, specialisation Finance

Supervisor: Indrek Kaldoja, MBA

Tallinn 2021

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Eero Saarinen……

(signature, date)

Student code: 182407TVTB

Student e-mail address: eesaar@ttu.ee

Supervisor: Indrek Kaldoja, MBA:

The paper conforms to requirements in force

……

(signature, date)

Co-supervisor::

The paper conforms to requirements in force

……

(signature, date)

Chairman of the Defence Committee:

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(name, signature, date)

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ABSTRACT

This thesis provides an overview of mergers and acquisitions (M&As) and highlights reasons behind M&A transactions. An overview of game theory, different types of games and the history of game theory is also given. A walkthrough of the Valmet-Neles-Alfa Laval empirical case where Valmet and Alfa Laval as acquiring companies compete for ownership of the target Neles is given and a general game model for use in M&A cases is constructed using the Valmet-Neles-Alfa Laval case as a framework. The results indicate that that the acquiring company that takes the first move towards pursuing the target has the advantage in acquiring ownership of the target.

Keywords: Merger, Acquisition, Game theory

INTRODUCTION

Mergers and acquisitions (M&As) have grown to become a significant part of the economic world. It is argued that M&As are necessary for large enterprises to develop (Stigler 1996). However, a large percentage of M&A deals fall through, or their results are unsatisfactory. M&As are often unpredictable and some research has shown that 70-80% of cases have not met their projected operational synergies. (Coffey et al. 2002) Yet still, the value of M&A transactions doubled in two years at the start of the century, reaching 3,8 trillion USD in 2006 compared to 1,9 trillion USD in 2004 (Clayton 2010). M&As often occur after long negotiations between the target company to be acquired and the acquiring company/s, when two or more acquirers are competing for the same target, the M&A process can be thought of as a strategic decision-making game where the acquirers try to outdo each other in the process of reaching their ultimate end goal, acquiring, merging, or taking over the target. In the end, one of the acquirers will come out on top with a more favorable outcome (Jemison, Sitkin 1986).

Game theory is exactly the study of these strategic decisions, and what motivates competitors to make them. This thesis takes a look at M&As and aims to find a general game model that can be used to study M&A cases where two companies are competing for one target company, with the competing companies being dubbed “Player 1” and “Player 2”, Player 1 makes the first move in the M&A game and shows interest in the target company. The whole M&A process begins with one of the possible acquiring companies taking initiative and making the first offer to start the M&A process. The literature on the advantage of making the first offer in negotiations is contradicting, with some researchers believing it to be a concrete rule to never make the first offer, and others believing that it is possible to have an advantage when making the first offer (Osório 2020). The hypothesis to be tested here is that the competing company that shows interest and makes an offer to the target company second will have a higher chance of a favorable outcome. i.e. the player that has the second turn in the M&A game model will have a higher chance of reaching their desired end outcome. Previous literature has shown that for an M&A transaction to occur with minimal negotiation, and be as simple, fast, fluid and easy as possible, it is optimal for the target to be pessimistic, and the acquirer to be risk-taking (Agarwal 2011). However, there are

gaps in the literature concerning a case where more than one acquirer is interested in the target. Focus in previous literature has been heavily focused on interactions between the target and acquirer, and making observations such as Agarwal (2011) into what factors affect the pricing in the M&A process, there is not much information about what are the possible ways that an M&A transaction can play out when it is looked at from a point of view that multiple "players" are involved in trying to obtain the target in some way or the other, such as a merger or an acquisition. Previous research has identified qualitative research as a fitting way to study M&As (Straub et al. 2012), and more specifically game theory has been identified as a valuable tool for use in the study of M&As (Coate, Fischer 2012). Therefore the need for constructing a general game model to study M&A cases is realized, and this thesis uses the empirical Valmet-Neles-Alfa Laval case as a framework to form a general game model.

1. Overview of Mergers and Acquisitions (M&A)

M&As have grown to become a notable part of the business world, they are important for national economies and industrial structures (Buckley, Ghauri 2003). M&As reshape industries, corporate structures, organizational cultures, and even individual careers (Marks, Mirvis 2001). A merger occurs when there are two companies present, often referred to as the acquirer and the target, and these companies combine together into one company. Although the resulting company may be considerably different than either of the two previous one, the acquirer retains its original identity. (Scott 2003) In an acquisition there is also an acquirer and target present, acquisitions are defined as the securement of an asset, such as a plant, division, or even an entire business entity, by the acquiring company (Scott 2003). A more pragmatic explanation would entail that the main difference between a merger and acquisition is, that in a merger the acquirer and target become jointly owned, and the stocks of the target disappear and are replaced by stocks of the company resulting from the merger. In an acquisition the acquirer buys the target and while the target loses its independence, the stocks of the target survive.

The most basic of M&A transactions occurs when the target's assets are in whole bought by the acquirer (Coates 2014). A problem with these types of transactions can occur when the time and effort required for the specification of the target's assets is underestimated. An alternative without the possibility of this problem arising is acquiring control over the target with the purchase of its stocks. If the aim is to obtain complete ownership over the target, a merger can be advantageous when compared to asset and stock purchases. This is because it is possible to transfer assets between the two firms without the need for specification of assets. (Branconi 2020)

1.1. Reasons behind M&A

In order to fulfill shareholders' expectations, it is pivotal for the company to grow. The options for growth are categorized into two main groups as follows: External or inorganic growth which refers to growth by external means, such as franchising or licensing, external growth also includes growth by the acquisition of or merger with another firm. The other option for growth is internal or organic

growth, which is generally a time and strength consuming alternative compared to inorganic growth, this involves the hiring of new employees, development of new products and expansion of the company geographically. (Sherman, Hart 2006) The main factors that determine the amount of internal and external growth a company might utilize are (Sherman, Hart, 2006):

1) fragmentation, competitiveness and pace of marketplace and industry;
2) access to and cost of capital;
3) specific capabilities of management and advisory teams;
4)strength and growth potential of current core competencies;
5) volatility and loyalty of distribution channels and customer base;
6) extent to which speed to market and scale are important;
7) extent to which a company operates in a regulated industry;

Whichever of these growth options, or combination of a company might decide to utilize, they are the means for a company to increase their capital base (Andrade, Stafford 2004). It is argued that M&As are essential for big enterprises in the U.S., and very few enterprises used internal growth as their main means for overall growth (Stigler, 1996).

Synergy is defined as the interaction or cooperation of two or more organizations, substances, or other agents to produce a combined effect greater than the sum of their separate effects. In the context of M&A this means the profitability of the resulting company of an M&A transaction should be higher than the sum of the profitabilities of the target and acquirer. Driving growth through synergy is stated as the most common reason for M&A transactions. (Trautwein 1990; Berkovich, Narayanan 1993) Synergy can result from an M&A transaction in two main ways (DePamphilis 2010): Operating synergy, which refers to both economies of scale and scope; and Financial synergy, which refers to the lowering of cost of capital. Driving growth through synergy is stated as one of the main reasons for M&A transactions (Trautwein 1990; Berkovich, Narayanan 1993)

Another large reason for M&A transactions is the possibility of gaining access to intangible assets. The knowledge age has brought with it an abundance of information and data, one of the most important intangible assets to have in order to transform this information and data to growth of the company is human knowledge. Intangible assets can be divided into three groups (Chatzkel, Saint-Onge 2009): Human capital, which Refers to the sum of all the knowledge, skills and experience of individuals working at the company, structural capital, which refers to the non-physical infrastructure and databases of the company that often promotes the growth of human capital, and

finally, customer capital, which refers to the connection that the company has with customers, and the sum of the value of the relationships with customers.

Human, structural, and customer capital all together create knowledge value capital, and it is argued that these intangible assets now hold more value in organizations than physical or financial assets. A downside to intangible assets in the knowledge age is that they are more difficult to control and their value is hard to accurately estimate since they are dependent on the behavior of people. The reasons mentioned above can be thought of as the main broad reasons behind M&A transactions, it is possible to take this even further and introduce reasons for M&A transactions from the view of the target and acquirer. (Duksaite, Taimosiuniene 2011) The reasons for the acquirer include (Duksaite, Taimosiuniene 2011):

1) tax benefits;
2) changes in markets;
3) changes in technology and industry;
4) cost reduction;
5) obtaining a new customer base;
6) research and development

The reasons for the target include:

1) lack of resources
2) growth has been maximized
3) lack of access to capital
4) new competitors emerging
5) investors that own the company wish to cash out

In conclusion, Growth is cited as the most common reason for M&A transactions (Duksaite, Taimosiuniene 2011), but it is the pursuit of more specified goals that leads to growth and studying these specific goals can uncover the real reason for an M&A transaction (Branconi 2020). So it is argued that growth is the broad end goal that companies involved in M&A transactions always strive for, but the ways in which the growth is driven behold the true answers as to why M&A transactions take place.

1.2. Different types of M&A

The Organization for Economic Co-operation and Development (OECD) provides classifications for different types of M&As, the following classifications are made based on the motivation behind the M&A process.

- Horizontal Merger: two competitors combine.
- Vertical Merger: two companies with complementary activities combine, such as a buyer-seller relationship.
- Market-extension merger: two companies selling the same products in different markets combine.
- Product-extension merger: two companies selling different but related products in the same market combine.
- Conglomerate merger: relates to all other transactions that do not belong into the aforementioned criteria. Usually the two companies do not have a specific relationship and are in different lines of business.

The OECD also provides classifications based on the outcome of the M&A, they include the following:

- Statutory merger: The target company ceases to exist and the acquirer takes control of the target's assets and liabilities.
- Subsidiary merger: The target company becomes a subsidiary of the acquirer. A reverse subsidiary merger occurs when a subsidiary of the acquirer is merged with the target.
- Consolidation: When the target and acquirer combine to form a completely new company, the original companies cease to exist and their shareholders become shareholders of the new company. In a consolidation the original companies are often of similar size, whereas in a merger there is usually a significant difference.
- Reverse merger: Acquiring company ceases to exist and merges with the target. A private company can become publicly listed with the help of reverse mergers, (i.e., The acquiring private company buys the publicly listed target). A reverse merger is also known as a reverse takeover (Branconi 2020). Not to be confused with a demerger, which occurs when a company separates into two smaller organizations.
- Merger of equals: the target and acquirer are of similar size.

The key point to understand of M&A transactions is that no matter what type of specific transaction might be in question, the net result often remains the same, where two companies, originally with

separate ownership have now joined together to operate under one roof, with the goal of gaining financially or strategically. The financial, strategic, and cultural impact of the deal however, may vary considerably depending on the type of M&A transaction (Sherman, Hart 2006).

1.3. M&A performance outcomes

This thesis does not study nor discuss the performance outcomes of M&As to a major extent, nevertheless, the outcomes of M&A and what determines a successful M&A transaction is an area that has been widely studied as part of M&A literature (Das, Kapil 2012), and therefore it is necessary to give a brief explanation of this topic. Previous literature in the field of finance suggests that M&As do not consistently add value to the acquirer and failure rates for M&As range from 44 to 50 percent (Cartwright, Schoenberg 2006). There is a significant amount of different unique variables for measuring M&A performance (Das, Kapil 2012). Previous literature also suggests that every M&A is unique and the findings related to performance are therefore not comparable (Lubatkin, 1987). This is reinforced by more current findings that state researchers have come up with their own performance measures and specific variables for their individual study objectives making comparability difficult (Das, Kapil 2012). Due to the inconsistent findings in previous literature and issue of comparability, there is no universal method to determine the performance of M&As in a satisfactory manner (Barmeyer, Mayrhofer 2014; Faccio, Masulis 2005; Kiessling et al., 2008.).

2. Overview of Game Theory and Game Theory in M&A.

Game theory is the study of conflict and cooperation between rational decision-makers (Myerson 2013). Today, game theory is used to study how interrelating decisions of economic agents bring about outcomes regarding the utility of said agents, however the resulting outcomes might not be planned by any of the participating agents (Ross 2019). The focal point of game theory is a game that is used as a model of a real world circumstance with players as decision-makers in the game, contrary to other common games, game theory is not used for recreational purposes. There are multiple different types of games, but in all cases, the actions of each player have an influence on the outcomes of all players involved. A game model derives power from its simplicity, (Osborne 2004) and it is important that non-essential details are not included as to help fully understand the situation at hand. There are some essentials that must be understood to properly grasp the basics of game theory, they include rationality and preferences. For a player to be eligible as part of a game, they must be rational, and for the player to be rational their preferences must also be rational. (Branconi 2020) For a player's preferences to be rational, it must be possible to rank each decision as either better, worse or equal to another. It also must be possible to rank all decisions from best to worst in a logical manner, therefore if option 1 is better than option 2, and option 2 is better than option 3, then option 1 must be better than option 3. The payoffs from these game decisions provide the players with a certain level of utility, utility is a broad term that can be defined as a measure of a players' happiness. (Leyton-Brown, Shoham 2008)

2.1. History of Game Theory

Although modern game theory was very far from its inception at the time, strategic game-theoretic decision-making can be observed far back in history, with one of the earliest examples coming from Spanish conqueror Hernan Cortes. Cortes travelled to Mexico in the 16th century with the aim of conquering the Aztecs. Cortes and his troops were heavily outnumbered, Cortes' troops as rational decision-makers were low in morale and contemplated deserting the oncoming battle, Cortes realised this and burned all of the ships on which they had sailed. The Aztecs thought that no man would destroy his army's only way of escape, unless they were absolutely confident and

had good reason to think that they would be victorious and escape would never be needed. The Aztecs then decided that they would retreat into the surrounding, less optimal terrain, as it would surely not be a good idea to attack this army. Cortes then went on to win the battle due to the retreat of the Aztecs, they were essentially fighting while running. So the logic here is, that when Cortes' troops realise they are outnumbered, although they might be brave, a rational individual would still prefer to flee from battle with their life, rather than die fighting a battle that they already know is going to be lost. When a soldier considers that every other soldier in the army is caught in the same situation as they themselves, and their option providing the highest utility is fleeing with their life, the outcome will then be that the whole army will flee before the Aztecs have even made a move. This example shows us how the best decision for a soldier depends on the best decision for the other soldiers involved. And when they discover that the best decision for the other soldiers, who just like them are rational decision-makers, is to run away, and all the other soldiers are capable of understanding this as well, we are left with an outcome that nobody might have expected, especially if the soldiers were brave, when the whole army decides to flee. (Ross 2019)

Modern game theory was first introduced as a tool in economics in the 1940's by Oskar Morgenstern and John von Neumann (Weintraub 1992), some literature also includes other founding fathers such as Émile Borel in the 1920's (Osborne 2004) and Ernst Zermelo in 1913 (Myerson 2013), however Von Neumann and Morgenstern are staples in all previous literature concerning the introduction of modern game theory. In economics, it was initially used as a method to find compatible solutions to zero-sum games with two players. In a zero-sum game the outcome of the game provides utility equal to the sum of utility gained or lost by the participating players, therefore in a two-person zero-sum game if the outcome for player A is a profit of 1 million Euros, the outcome for player B must be a loss of 1 million Euros. (Osborne 2004)

Previous literature has mainly used a complete information static one-time game as a tool to study M&As (Jiang et al. 2016). A static game refers to a game where participating players make their decisions at the same time (Zandebasiri et al. 2020). A complete information game, also known as a perfect information game, refers to a game where all participating players share the same information and are fully aware of each others' possible strategies and moves (Osborne, Rubinstein 1994). However, it is argued that M&A games are actually vastly different, the information players have is incomplete, and the games are dynamic, not static (Nogeste, 2010). A difference to note is that in static games where all players make their moves at the same time, Acquirers and target companies often arrive at the final outcome after many different nodes of decisions that contain

the basic option for the acquirer to submit some form of an offer, and then the target has the option to bargain or accept the offer, and in the case of bargaining it is the acquirers turn again to submit an offer or back out of the negotiations (Smit, Ankum 1993), therefore most M&A games are repeated models of a game tree (Jiang et al. 2016). To reach an equillibrium point in the M&A negotiations in a minimal number of nodes it is optimal for the target to be pessimistic and acquirer to be risk taking, therefore the acquirer will be willing to offer a higher price for the target and the target will be more willing to accept (Agarwal 2011). In reality M&A games are also not zero-sum games, according to Prospect Theory humans prefer positive events at least twice as much as negative events (Khaneman, Tversky 1979). Therefore a loss of 1 million Euros will reduce utility at least two times more than a profit of 1 million Euros would increase utility. Prospect theory can help in predicting decisions made by the players. Based on this information a model is designed to depict a typical M&A case, the main difference and innovation of this model is that it depicts two competing players as a acquiring companies trying to achieve their goal of successfuly merging/taking over the target company.

2.2. Types of games

Game theory includes multiple different types of games, and four basic types of games (Gibbons 1997) are walked through in this chapter to better grasp the concept of game theory.

Static games with complete information

A two-player simultaneous move game is considered, simultaneous-move meaning both players make their decisions at the same time. The visual representation of the game is shown in figure 1. Considering the game with complete information, each player knows about the options of the other player, and their payoffs. The numbers in the matrix represent the utility for each player in the specific outcome, the first numbers represent player 1's utility and the number after the comma represents player 2's utility. The first step of the game is for player 1 to choose whether they move up or down, and for player 2 to decide whether they move left or right, these decisions happen at the same time. Player 1 will gain the most utility by moving down, and the worst case scenario when moving down will provide more utility than any of the options when moving up, so player 1 will always opt to move down. Player 2 has complete information and understands this, therefore as a rational decision maker player 2 can eliminate the row with all the options when player 1 chooses to move up, as they know that no matter what this should not be the case. Player 2 then

looks at the possible outcomes when player 1 moves up and chooses the outcome which offers the highest utility, and we arrive at the most common solution to the game, which happens when player 1 moves down, and player 2 moves right, and receive respective utility payoffs of 2 and 3. This is also the Nash equillibrium point of the game, these types of games may have multiple Nash equillibria, however in figure 1 the only one is when Player 1 goes down and and Player 2 goes right. (Osborne 2004)

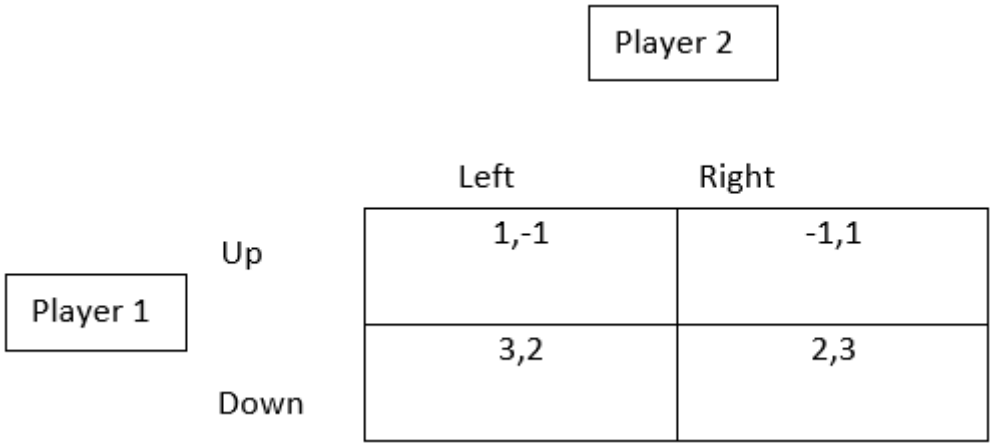

Figure 1. A static game with complete information in the normal form

Dynamic games with complete information

The next games discussed are dynamic games with complete infromation. Consider a two-person sequential-move game, sequential-move meaning players move in turns, with player 1 taking the first turn at the first node, and player 2 going second at the second node. The game is shown in figure 2 in the extensive form, it is also possible to show the game in a normal form as a matrix such as in figure 1, however the game is not played using the normal form, as the game moves in turns where players do not pick their overall strategy with one choice. The extensive form is the proper depiction of these types of games, as it shows how the game moves in turns. (Gibbons 1997) This type of visual representation of a game is often called a game tree, where the game is played by following the arrows and moving in steps along the “branches”. The most basic solution to this game would be when player 1 chooses to opt out and instantly end the game with the first decision. Considering the game with complete information, each player is aware of which node the game is currently being played at (Binmore 1994), i.e. Player 2 is always aware that Player 1 has either made a bid or opted out, in figure 2 this is rather self explanatory, as Player 2 cannot decline or accept a bid that was never made if Player 1 decides to opt out. Usually sequential move

games are solved by incorporating backward induction (Rabinowicz 1998), meaning that the game is solved by working backwards from the game tree to arrive at the most likely solution, therefore taking a look at Player 2's options at the second node, and the outcomes of these options. Player 2 as a rational decision-maker should always choose option "accept" as it provides higher utility than option "decline", 4 compared to 0. Now it is time to take a look at player 1's options, he can either choose to opt out and gain 0 utility, or make a bid assuming player 2 is a rational decision-maker who will always choose option "accept" compared to decline, due to the resulting gains in utility. Therefore the most common solution to the game according to backward induction should be for Player 1 to make a bid, and Player 2 to accept. However this will not always be the solution, even though it is the most logical, sometimes it is not always possible to predict the behavior of players and in some cases they simply "do what they do" (Aumann 1987), and it is only possible to study some factors that are believed to impact their behavior. In Figure 2 the game contains only two nodes, however in a typical M&A case the game will likely involve more than two nodes, representing that there will be more than two rounds of negotiation (Jiang et al. 2016).

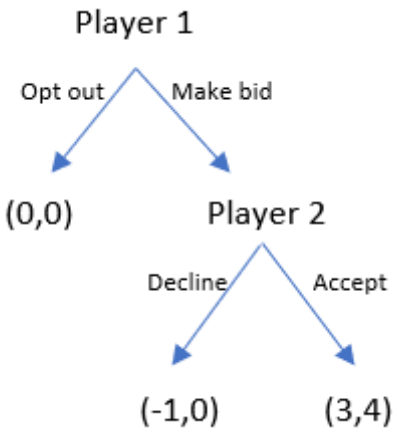

Figure 2. A Dynamic game with complete information in extensive form

Games of incomplete information

Games of incomplete information can be either static or dynamic. A simple example of a static incomplete information game is a sealed bid auction, where each bidder can bid once and knows the amount they themself are bidding, but they do not know the bids of the other bidders, or players involved, the options for the other players are endless, and anybody participating in the auction can enter a bid of any value that they please. An example of a dynamic game with incomplete

information is a signalling game, a more specific example of a signalling game is a situation where Player 1 is a freshly graduated student who is looking for a job, Player 2 is the employer. Player 1 has private information about his own real abilities pertaining to the job and whether they are up to the task or not, however Player 1 uses their education as a signal to show that they are of high ability. Player 2 can then decide to offer Player 1 the job based on the signalling of Player 1, however Player 1 is not aware of the actual outcome of hiring Player 1, which in this case would be the actual ability and performance of Player 1 in the job. (Levin 2001)

2.3. Game theory usage in M&A analysis

Game theory has been used in previous literature to study M&As, with some even claiming that when analysing mergers game theory must be considered (Coate, Fischer 2012). Game theory has been used to study the most important elements to account for in international mergers, excluding competition as a motivating element, the most important elements identified were efficiency gains, absolute and relative market sizes, referring to a firms higher willingness to participate in an international merger when the foreign market is more sizeable in relative comparison to the domestic market (Garcia-Gallego et al. 2006). The importance of behavioral biases, in contrast to economic forces and the usage of financial analysis has been studied as well, with conclusions indicating that a reason for many failed M&A cases are these exact behavioral biases, which cloud judegement. Game theoretic models have been used to take behavioral biases out of the equation and improve chances of success. (Dhir, Mital 2012) Previous studies have also mentioned the importance of qualitative methods to study M&As (Straub et al. 2012). empirical cases such as RJR Nabisco's acquistion by KKR in 1988 have been used to construct game theoretic models for general use in M&As, the empirical case has been used as a framework for the game and to help understand the game (Jiang et al. 2016). Jiang et al. (2012) also suggest that similar research should be done including other empirical M&A cases. Therefore due to the importance of qualitative methods mentioned (Straub et al. 2012), the importance of analysing mergers with game theory (Coate, Fischer 2012), and the suggestions made by Jiang et al. (2012). It is deemed necessary to take a further look at constructing a general game model involving an empirical M&A case.

3. Analysis Valmet-Neles-Alfa Laval and Game model.

In this section of the thesis background infomation is given on the three companies involved. The Valmet-Neles-Alfa Laval empirical case is shown as a timeline of events. Document analysis and interviews were performed. Based on these a general game model is constructed for use in M&A cases.

3.1. Background of companies

Valmet

Valmet Corporation was the result of a demerger of Metso Corporation on January 1 st , 2014. Valmet is a world leading company providing technology, automation and services for companies that manufacture packaging boards, tissue paper, printing and writing paper, pulp and renewable energy. Out of the world's packaging board, tissue, paper and pulp more than 40% is produced with machines manufactured by Valmet. Valmet has done seven acquisitions since 2014 and it's M&A team studies around 50 companies every year regarding the prospect of acquiring them. Valmet's acquisition strategy is to make selective acquisitions with a clear industrial logic that supports organic growth. Out of Valmet's business traditionally 50% is project business that typically is cyclical and 50% is stable business that is typically less cyclical. Valmet's net sales in 2020 was 3,7 billion EUR.

Neles

The merger of Metso and Outotec was announced on July 4, 2019. At the same time it was announced that the resulting company of the merger will be listed at the Helsinki Stock Exchange on July 1, 2020 and that the new company would be called Neles. Neles is a high quality company providing valves. 30% of Neles' sales go to pulp and paper and 70% of Neles' sales is recurring. This means that the clear majority of Neles' sales is not cyclical. Valmet was very interested in Neles' business as it would fit in well with Valmet's acquisition strategy. Valmet announced on June 17, 2020 that it had acquired 14,9% of the shares of Neles. Neles' net sales in 2020 was 576 million EUR.

Alfa Laval

Differing from Valmet and Neles, Alfa Laval is a Swedish company, publicly listed on Nasdaq Stockholm. Alfa Laval is a global provider of products in the areas of fluid handling, heat transfer, and separation, with subsidiary companies in over 35 countries. Alfa Laval mainly serves customers in the energy, environment, food, and marine industry. Alfa Laval places an emphasis on local market presence, Alfa Laval's main form of expansion is through internal growth, however acquisitions are used as a secondary alternative for expansion. Alfa Laval employs a multi-brand strategy for acquisitions and expansion to different geographic areas. Alfa Laval's net sales in 2020 was 4 billion EUR.

3.2. Document analysis and interview process

The documents analysed concerning the case can be found in Appendix 1. On June 17, Valmet agreed to acquire 14,88% of Neles' shares from Solidium at a purchase price of EUR 8,00 per share. Alfa Laval issued a PTO on July 13, 2020 at price EUR 11,50 per share that was recommended by the Neles board. On the same day, July 13, 2020 Valmet put out a statement regarding the Alfa Laval PTO, "Valmet does not consider Alfa Lavals tender offer to be beneficial for Neles. Valmet will continue as an active shareholder of Neles", said Pasi Laine, President and CEO of Valmet, this is where the signs of a competition starting were observed. Between July 13, 2020 and September 17, 2020 Valmet increased their ownership in Neles to above 25%, all the while communicating outward that their share in Neles is growing. On September 29, 2020 Valmet proposed a meeting discussing a statutory merger to Neles, by this time Valmet's share in Neles had risen to 29,5%. The meeting was altogether rejected by the Neles board."The negative response from the Board of Directors of Neles effectively deprives its shareholders of the possibility to evaluate an alternative to Alfa Laval's offer", Valmet press release October 12, 2020. On October 15, 2020 it was announced in a Neles stock exchange release that the acceptance threshold for the original Alfa Laval PTO had been dropped from over 2/3 shares to over 50% shares, and the acceptance period had been extended from October 22, 2020 to October 30, 2020. On October 28, 2020 Alfa Lavals share in Neles had reached 8,46%. On November 4, 2020 the result of the Alfa Laval PTO was made public, Alfa Laval did not complete the tender offer with a final result of 32,82% of shares. As a result of analysing the documents, clear signs of competition between Valmet and Alfa Laval can be seen, this is further reinforced with Finland's national public

broadcasting company, YLE, going as far to even claim that the competition for Neles between Valmet and Alfa Laval is a “Finland-Sweden National team match”. Table 1 is composed to display these events in chronological order, from up to down.

Table 1. Timeline of events

Valmet	Alfa Laval
June 17, 2020 Valmet acquires 14,88% ownership in Neles	-
July 13, 2020 Valmet press release, “Valmet will continue as an active shareholder of Neles”, Pasi Laine, Valmet CEO	July 13, 2020 Alfa Laval issues PTO with over 2/3 shares threshold
July 14, 2020 Valmet’s holding in Neles has exceeded 15%	-
August 12, 2020 Valmet’s holding in Neles has exceeded 20%	-
September 7, 2020 Valmet’s holding in Neles has exceeded 25%	-
September 29, 2020 Valmet’s holding in Neles is 29,5%, a statutory merger is proposed to the Neles board	-
October 12, 2020 Valmet stock exchange release: “Valmet sustains it’s goal to merge Valmet and Neles”	-

-Neles board refuses to discuss the possibility of a merger with Valmet	
-	October 13, 2020 Alfa Laval stock exchange release: "Acceptance threshold lowered to over 50% and acceptance period extended"
-	October 28, 2020 Alfa Laval's holding in Neles has exceeded 5% (8,46)
-	November 4, 2020 Alfa Laval stock exchange release: "Alfa Laval will not complete the tender offer" -Result: 32,82% of shares

Source: Information based on documents from Appendix 1

The interviews were conducted on April 23, 2021 via a online video calls. The temporary transcription links to these interviews can be found in Appendix 2. The main questions asked in the interviews were derived from observations made as a result of analysing documents related to the case, the questions were mainly the same for both interviewees. To start off the interviews the reasons as to why the Neles deal is important for Valmet was inquired about, with both interviewees answering similarly in the sense that Neles would be a quality addition to Valmet's portfolio, the VP of Strategy & M&A also built on this answer to add that the comnbination of Valmet and Neles would create synergy and the output of this combination would be greater than the sum of what the companies could create on their own. The reasons as to why Valmet continued buying Neles stock between July 13th and September 29th 2020 were asked about, and if alternatives to this were considered. The interviewees main point in their answers was clear, Valmet still believed in the prospect of addding Neles as a part of Valmet, even after taking note of the July 13 Alva Laval PTO, and saw that buying stock was the correct way to create shareholder value in the long term and to drive this process forward. The VP of Strategy & M&A was not too

vocal about alternatives considered, however it was mentioned that in such a large case as this, all alternatives must be considered, they also added that the Alfa Laval PTO was different from normal cases, since the acceptance threshold was over 2/3% of shares in contrast to over 90% of shares, therefore Valmet's holding of 15% was not sufficient to stop the PTO from being completed. The General Counsel added that the main alternative considered was a competing bid to Alfa Laval's PTO, but that in the end increasing the share was a more suitable option. The major events in the case mentioned by the General Counsel all shared a theme for Valmet that was getting a message out to the public, this message was that Valmet is increasing their share in Neles, the major events listed by the General Counsel were exceeding 15%, 20%, and 25% holding in Neles, as there is a share holding notification everytime a 5% threshold in holdings is exceeded, other than increasing shares the major event mentioned by the General Counsel was a stock exchange release where Valmet mentioned that they had proposed a merger to Neles. The VP of Strategy & M&A's answers focused more on Alfa Lavals side, the first one being the July 13 Alfa Laval PTO, in connection to this it is mentioned that the VP of Strategy & M&A had never before seen a board of directors, such as Neles' that recommend a PTO merely eight days after receiving the offer. The next major event mentioned that was mentioned was when the PTO accpetance threshold was dropped to over 50%. The last major event mentioned by the VP of Strategy & M&A, which was mentioned by both interviewees, was when Valmet proposed a meeting to discuss the possiblity of a statutory merger with Neles, this meeting was ultimately declined altogether. The reason mentioned by both interviewees for proposing specifically a statutory merger to Neles, despite considering all other possible alternatives, was simply that this was believed to create the most shareholder value in the long term. Both interviewees mentioned that when making decisions concerning the case after Alfa Laval had issued the original PTO, Valmet took into consideration how Alfa Laval would react when making their own decisions, regarding this topic, the VP of Strategy & M&A also mentioned the importance of noting that Valmet and Neles shared many of the same shareholders. Considering the possibility of the Alfa Laval achieving the required acceptance rate of their PTO, both interviewees clearly viewed this as a possibility they were pleased to have not faced. To conclude it was mentioned how Valmet's original plan had always been to increase shareholding in Neles, however the Alfa Laval competition hastened the process.

3.3. Game model analysis based on Valmet-Neles-Alfa Laval case

Valmet and Neles began competing for Neles in June 2020, ending with Alfa Laval deciding to withdraw from their pursuit of a takeover of Neles in November 2020, the timeline consisted of multiple rounds of negotiations, with Valmet making moves to merge with Neles, and Alfa Laval aiming for a takeover. Valmet and Alfa Laval made their offers and Neles as the target then bargained with Valmet and Alfa Laval and these steps repeated themselves multiple times during the timeline, i.e. Valmet and Alfa Laval as acquiring companies go through multiple rounds of negotiation with Neles. Therefore the ideal model to depict this case is a dynamic game, meaning the players move in turns. The moves that were made by Valmet and Alfa Laval were public information to all players involved, with Valmet mainly buying stock, issuing stock exchange releases and press releases and Alfa Laval also issuing stock exchange releases, press releases and submitting a public tender offer (PTO). Although some elements of the game remain unknown, the basic options of the competing players are common information to each other. The basic options for both Valmet and Neles are to continue in the negotiations and improve upon their offer or opt out of negotiations, therefore ending the game on their part. Considering this information the game will be a complete information game, as each player is aware of the node that is being played meaning the previous moves made by other players are common information as are the basic options of the other player, however, the numerical utility value of the outcomes are not precisely known, although it is safe to make some basic assumptions.

3.3.1. Valmet-Neles-Alfa Laval specific model

The importance of simplicity and only including what is necessary to the game model was earlier mentioned (Osborne 2004), and the game models developed in this thesis with the Gambit software package, an open-source collection of tools for doing computation in game theory showcase that. In Figure 4 we can see an overly specific model relating heavily to the timeline of events. This model is shown to emphasize this importance of simplicity, and it is quite clear that this model would not be fit for general use as each M&A case is unique, and it would be rare to find an M&A case that fits into this template. The game depicts Valmet as light green, and Alfa Laval as dark blue, the game is played by moving along the branches and from left to right, and making decisions at the the decision nodes, in this model Valmet as a player has 5 turns, the first turn and turns 3-6, in contrast, Alfa Laval only has 3, the second turn and turns 7 and 8. The payoffs are represented

by numbers after all turns in which the game would end and in Figure 4 they have been left as zeros since this is only an example of what the game shouldn't be, and will not be the main model of the thesis. Hence the payoffs in Figure 4 are irrelevant, and their values should not be the focus of the model, the focus should be that overcomplicating the game will lead to rather peculiar models that do not provide anything significant of note for further research.

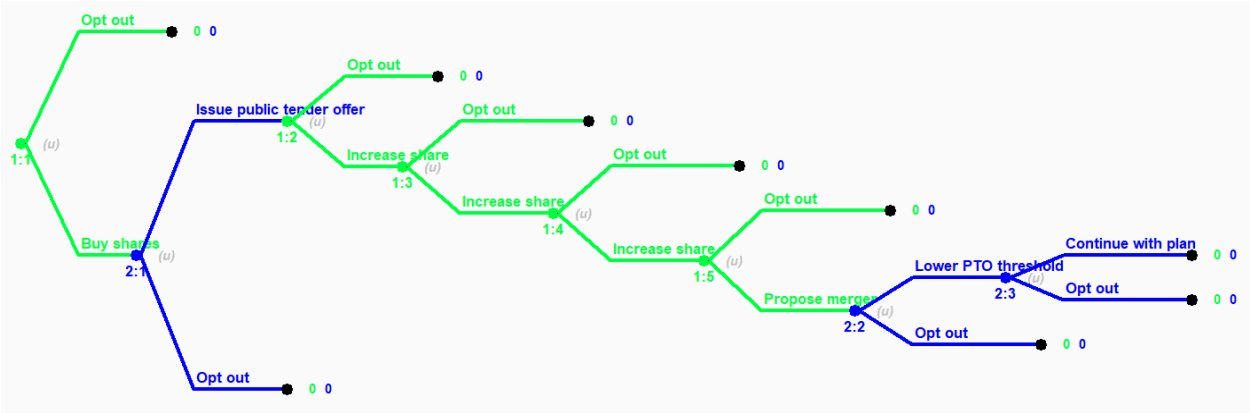

Figure 4. An overly specific extensive form game of the Valmet-Neles-Alfa Laval case

3.3.2. General game model

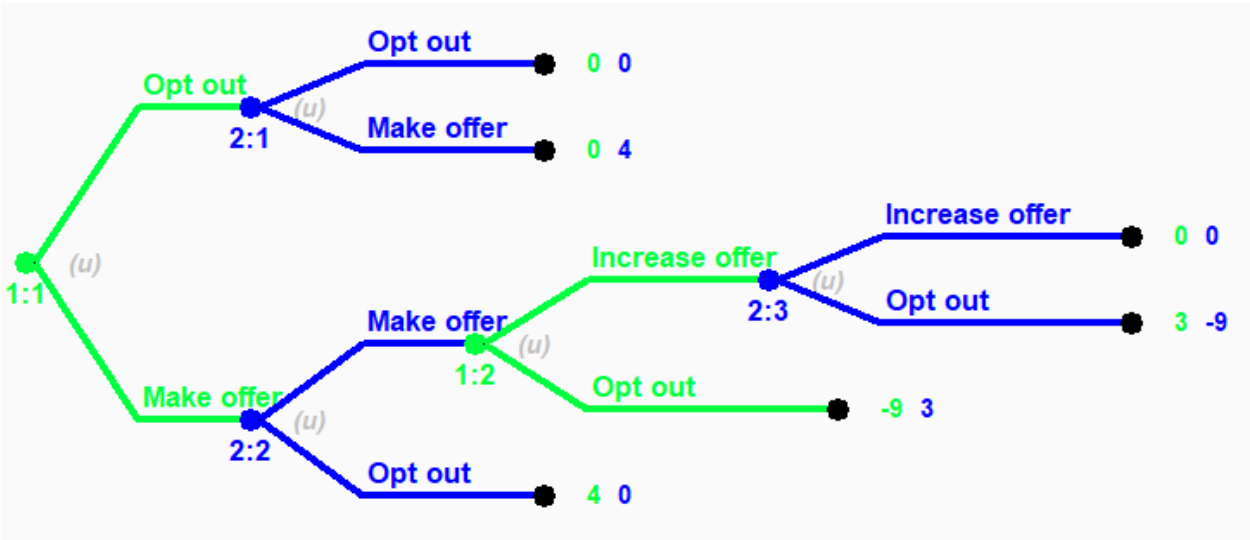

Figure 5. A general extensive form game model for M&As

In Figure 5. Is the general model that can also be implemented for other M&A cases. Interviews were conducted with 2/4 members of the core group of Valmet involved with decision making in the case, the General Counsel and VP of Strategy & M&A and the major events in the case were identified to construct the game model, these major events for Valmet include: To decide that Neles

is a company worth pursuing, and start increasing the share in Neles, this can be seen in the game model at node 1:1, Make offer. The second major event for Valmet, to keep increasing shares to near 30%, and propose a merger, this can be seen in the game model at node 1:2, Increase offer. The major events for Alfa Laval were identified as: issuing the original PTO, with 2/3 share threshold, this is seen in the game model at node 2:2, Make offer. The second major event for Alfa Laval was to lower the PTO threshold from 2/3 to 50%, observe the results, not complete the PTO, and to not take further action,this can be seen in the game model at node 2:3, Opt out. The reasons as to why Valmet pursued Neles were in line with previous research, with the goal of creating growth and shareholder value.

The payoffs are made considering prospect theory, which states that humans prefer positive outcomes at least two times more than negative outcomes (Khaneman, Tversky 1979). If Valmet is to make an offer at 1:1, and Alfa Laval decides to opt out at 2:2, then this positive outcome of Alfa Laval opting out, leaving Valmet as the lone competitor, or "winner" of the M&A battle for Neles will provide Valmet with 4 units of utility. However, if Valmet first makes an offer at 1:1, and opts out at 1:2, meaning they have showed intention of competing in the M&A game for the merger/acquisition of Neles, and not opting out at the first possible move, then the loss of utility will be at least two times more than the possible gain of 4 units, for this game the negative outcome is the product of multiplying 4 by -2,25, or -9. This same goes for Alfa Laval, and this outcome can be seen at node 2:3, where Alfa Laval decides to opt out. The highest possible utility (4) can be achieved when the other player instantly opts out, leaving no competition for the target company. The second highest (3), can be achieved when the other player makes their first offer, but after the first round of negotiations opts out. The reason for this is that the other player submits their first offer, which means that to compete, the player has to improve upon their original offer. It is also possible that neither player opts out, and keeps negotiating and increasing their offers, in this case the payoffs are shown as 0 and the game does not yet end.

The game can also be shown in the normal form, as seen in Table 2, however to play the game in accordance with normal form, each player only makes one choice regarding their strategy, meaning the game is now static and not dynamic, however, displaying the game in normal form can help to understand the different outcomes of the different choices made by the players. Valmet has their strategies shown in the far left column of the matrix, with the payoffs being shown as the first numbers before the commas. Alfa Laval's strategies are on the top row of the matrix, with their payoffs shown as the numbers after the commas. The way to interpret these strategies is by looking

at the numbers in the strategy boxes, for example the strategy box 112 for Alfa Laval shows that at node 2:1, Alfa Laval will always choose option 1, option 1 is always the branch going upwards, option 2 is always the branch moving downwards, at node 2:1 option 1 means opting out. At node 2:2 Alfa Laval will always choose option 1 (make offer), and at node 2:3 Alfa Laval will always choose option 2 (opt out). Studying Table 2 provides 5 different possible sub-game Nash equilibria, sub-game Nash equilibrium is simply a state of Nash equilibrium at a certain node, perhaps "node-specific equilibrium" would be a clearer term. These 5 different equilibria are: when Valmet picks strategy 1 and Alfa Laval chooses strategy 211, when Valmet picks strategy 21 and Alfa Laval chooses strategy 111, when Valmet chooses strategy 21 and Alfa Laval chooses strategy 12, when Valmet chooses strategy 21 and Alfa Laval chooses strategy 211, and finally when Valmet chooses strategy 21 and Alfa Laval chooses strategy 22. The expected utility outcomes calculated by the Gambit software package of the game are as follows: Valmet: 4, Alfa Laval 0, or Player 1, the player with the first turn: 4, and Player 2: 0.

Table 2. Game model in normal form

-	111	112	12	211	212	22
1	0 , 0	0 , 0	0 , 0	0 , 4	0 , 4	0 , 4
21	0 , 0	3 , -9	0 , 0	0 , 0	3 , -9	4 , 0
22	-9 , 3	-9 , 3	4 , 0	-9 , 3	-9 , 3	4 , 0

Source: Data from Figure 5

To conclude this chapter, Figure 5 provides a general extensive form model that can be used in the sense of a dynamic game, whereas Table 2 shows the same representation of the game in normal form, however the normal form version, when played, is a static representation of the game.

CONCLUSION

This research aimed to identify the type of game model to be used for M&A cases where the involved players are two acquiring companies competing with each other for the target company. Based on the analysis this game has been constructed, and the result is an extensive-form sequential move game. The hypothesis: “the competing company that shows interest and makes an offer to the target company second will have a higher chance of a favorable outcome.” is rejected, as this was shown to not be the case, as Player 1 had an expected utility outcome of 4, whereas Player 2 had an expected utility outcome of 0. Referring back to the timeline of events, the result of the Valmet-Neles-Alfa Laval case was for Alfa Laval to opt out (November 4, Alfa Laval will not complete the tender offer), whereas Valmet continued to increase their offer. Comparing the way the empirical Valmet-Neles-Alfa Laval case played out to the normal form game model, none of the five possible Nash equilibria was reached, as Valmet’s strategy was 21, whereas Alfa Lavals was 212, with the resulting utility outcome for Valmet (Player 1) as 3, and for Alfa Laval (Player 2) as -9. The game also did not reach the expected utility outcome of 4 for Valmet, and 0 for Alfa Laval. Therefore the empirical version of the game did not reach a logical solution, and we can go back to Aumann’s (1987) quote that sometimes players simply “do what they do”, and game theory can not always predict the behavior of the players. This is further reinfored by observations made from the interviews, that in the case of a PTO recommended by the board, such as the one issued by Alfa Laval, it is quite rare that the PTO will fail, meaning that Valmet continued to play the game despite empirical evidence leading them to believe that the Alfa Laval PTO would succeed. Therefore the importance of studying the factors and motivation for each decision a player makes is emphasized. It should be noted that this model should not be seen as a perfect instrument to predict how an M&A case will play out, rather as an instrument to aid in strategic decision making concerning an M&A transaction. To build on this research, a larger sample size of empirical M&A cases should be used to test the applicability of the game model, and how it would hold true when tested with a larger sample size. Also exploring the possibility of incorporating different types of game models, such as a static game, where each player chooses their strategy at the start of the game, and does not make further choices, in contrast to the dynamic game where turns are taken involving many different decisions. Observations made from the interviews, specifically that it was the plan of Valmet from the start to pursue a Neles merger, and they continued on with the plan even though empirical evidence pointed towards the Alfa Laval PTO succeeding further reinforces the applicability of a static game.

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APPENDICES

Appendix 1. Press releases and documents related to the case

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Appendix 2. Interview transcription links

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