Exploitation with strategic alliances

Within Elektor International Media

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UNIVERSITY OF TWENTE.

elektor international media bv

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In cooperation with Elektor International Media

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Management summary

In this study three forms of strategic alliances to exploit the Elektor Wheelie are explored: joint venture, outsourcing, and licensing. The management team of Elektor is questioned about what implications will occur for the organization and what the consequences for costs are, when following the created forms of alliances. A model is created where is indicated where investments, costs, and savings will occur when following a certain form of strategic alliance per business function.
The information presented in the results and the model require that Elektor should invest in most business activities when following the created form of alliance for outsourcing. The created form of alliance joint venture requires fewer investments in business activities than outsourcing. Licensing requires the least investments in business activities.
When Elektor engages in the joint venture form of alliance, the main implications for the organization are the need for employees, it-systems, buildings, and extra knowledge for different business activities. Within the outsourcing form of alliance these implications also apply, in addition to this, promotional channels should be created and a dedicated product manager that manages the exploitation should be recruited.
Main implication for the organization when following the form of alliance for licensing is that legal and management capabilities must be acquired to manage the license contract(s).

This study explores how business activities and functions related to the Elektor Wheelie are performed currently, and how they will be performed when following a certain form of strategic alliance. This information delivers the implications for the organization and consequences for costs per form of alliance. However, before Elektor can create a strategic alliance to exploit the Elektor Wheelie, it should create a competitive strategy and choose in which markets it wants to engage. The overall strategy should direct the choice for a form of strategic alliance. Elektor should be able to determine which form(s) of strategic alliance(s) fit their strategy. As a result of this selection, Elektor can create more specific information in relation to implications for the organization and consequences for costs based on the created model. The model will guide Elektor's search for specific implications and consequences, because a first explorative step in determining the implications and consequences is done in the existing model. Following the model, Elektor should indicate specific implications for the organization per business activity and, as a result of that, create specific information about consequences for costs. After creating a specific picture per business activity Elektor could compare the specific information per form of alliance to determine rates of investments, costs, and savings.
Currently, the information in the model does not represent specific information about investments, costs, and savings in monetary terms, but only indicates in which business activities and functions investments should be made, costs will arise, and savings made, when following a certain form of alliance.

When Elektor has determined their strategy for exploiting the Elektor Wheelie it should also create understanding about how revenue can be created. Literature about revenue creation states three ways of creating revenue. First, revenue can be created through directly selling the Elektor Wheelie to customers. Second, Elektor could license some other party to exploit the Elektor Wheelie and agree a royalty to create revenue. Third, ownership of the technology can be transferred from Elektor to an other party where a royalty and/or a lump-sum can be agreed.
When Elektor has established its strategy to exploit the Elektor Wheelie and determined which forms of strategic alliances fits the strategy, it should also create information about how much revenue can be created with a certain form of revenue creation that fits the preference for certain forms of alliances.
When Elektor has specific information about investments, costs, savings, and potential revenue per form of strategic alliance it could decide which form will create the most benefits for Elektor.

In appendix two a practical tool fur further steps is created and in appendix three a business case is worked out to show the working of the model when following further steps.

Preface

This research is performed to conclude my Master in Business Administration, track Innovation and Entrepreneurship. The Master is performed at the University of Twente, at the faculty Management and Government. The study is about exploiting with a strategic alliance. Elektor International Media BV is used as case study for this subject.

During my graduation I received support from different people whom I want to thank. First, I want to thank Wisse Hettinga who made the graduation assignment possible within Elektor International Media BV and gave advice, feedback, and direction. Second, I want to thank first mentor dr. Rik van Reekum and second mentor dr. Joris Heuven from the University of Twente for their mentorship, feedback, advice, direction, and guidance during the study.
Third, I want to thank the management team of Elektor for their time and valuable information.

A final word of thanks goes to my girlfriend, parents, colleagues, and friends for their support and feedback during the graduation period.

Kind regards,

Bart W.R. Baeschnitt
Amsterdam, September 2010

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1. Introduction

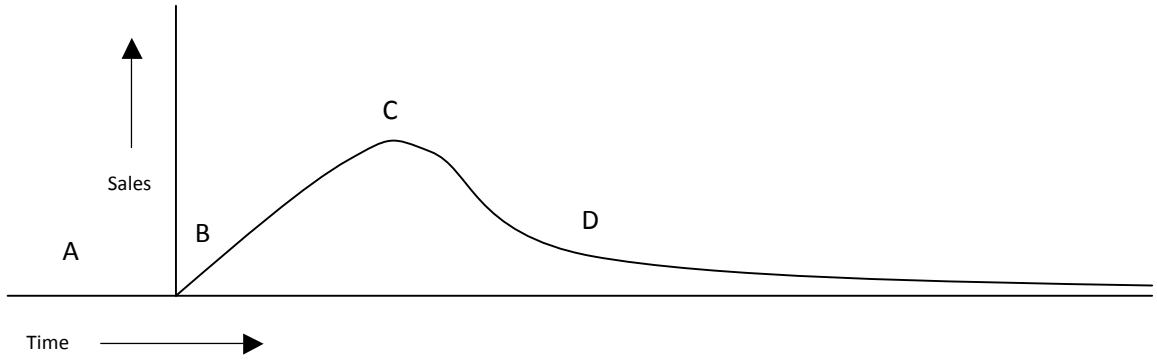
This research is performed at Elektor International Media BV (Elektor). Elektor is a publisher, which publishes the Elektor magazine. With the magazine, Elektor aims to inspire people to learn about electronics by presenting building descriptions of electronic products and through identifying trends and developments in the electronics and information technology field.
Elektor also has its own research and development department where it develops (new) electronic products and/or (new) ideas for electronic products as well as a small exploitation department that sells the products (through the internet) to the readers of Elektor magazine.

In The Netherlands, Elektor has its headquarter in Limbricht and has approximately 50 employees. The Elektor magazine is distributed worldwide in 50 countries, Elektor also has some small offices in other countries. The magazine is produced in Dutch, English, German, French, Spanish, Portuguese, Brazilian, Swedish and Italian.

Practical background and relevance

Elektor sells in-house developed products to its customers, the readers of Elektor magazine. After a product is developed, Elektor publishes an article in its magazine about the product. Interested customers can buy the product in Elektor's web shop.
Elektor states that its main problem is that it only sells products to its own readers, whereas it develops products with potential for other target groups according to the management team. However, the products it develops at the moment are not very consumer friendly. As customers have to 'build' the products themselves, some extended knowledge of electronics to 'build' the products is required.

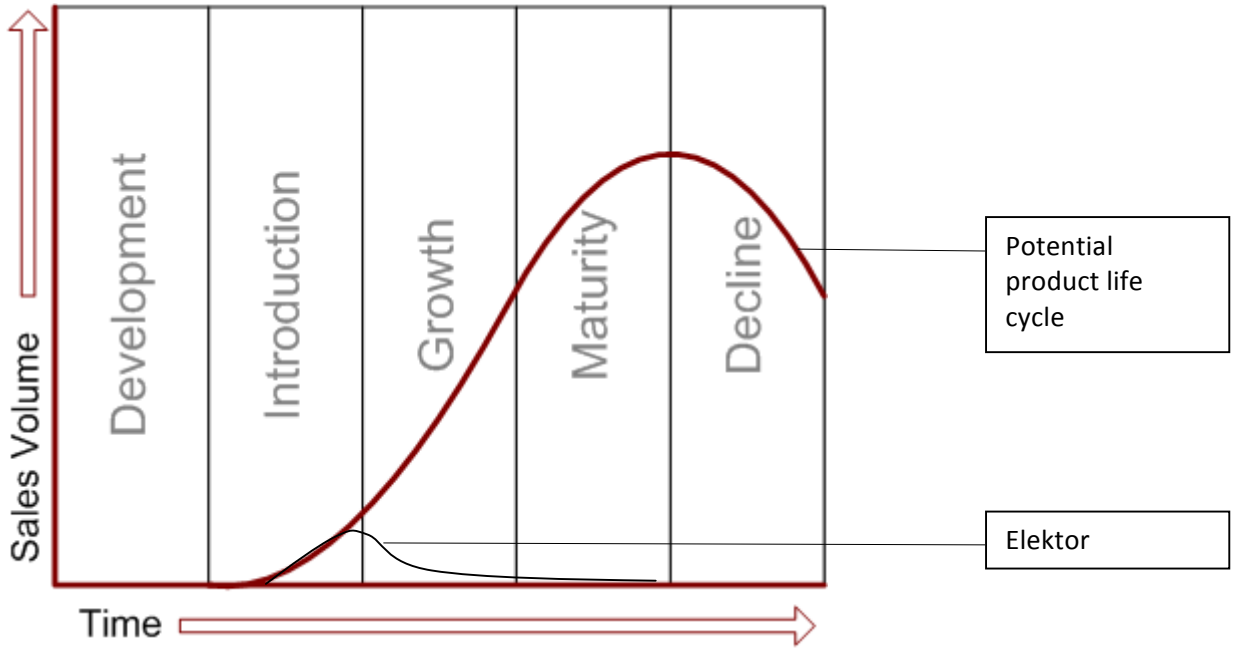
Elektor describes its problem as pointed out below:



A: This is the research and development phase that Elektor uses to create new products;
B: When the research and development phase is completed, Elektor publishes an article;
C: As result of the article, Elektor sells some of its products to its readers;
D: After publishing and selling to readers, sales drop and the process starts over again for a new product.

Elektor states that the potential of some developed products is high and that these could be sold to more target groups. Currently, the target group is too small and the product lifecycle too short. Elektor wants the 'sales line' to continue growing at point C, although they are unsure how this is to be reached. This is Elektor's main problem.

Elektor wants to expand the product life cycle of its products. The current product life cycle is too short. When comparing the current product life cycle to a 'potential' product life cycle that Elektor pursued it will look like the image below.



In this figure it becomes clear that when 'real' growth could start, Elektor's products decline in sales. Elektor's management states that in order to be able to grow some changes are necessary in the organization. Currently Elektor's focus is on exploration. Elektor's management suspects that if the company becomes more open to exploitation, sales could grow.

To give an idea about the kind of products Elektor develops and wants to exploit, an outline is given. Elektor identifies two types of products it wants to exploit. The first type is a technological product that Elektor develops in-house. The second type is a technological product that is already produced by other companies. Elektor buys, improves, and then sells the products. In the second group Elektor changes an existing product into a new (and better) one.

Theoretical background and relevance

Different researchers state that when exploration and exploitation are balanced, an organization thrives at its fullest potential (see chapter two). When following the literature, Elektor could become more exploitation minded if it could sell more of its products while making the product life cycle grow.

Elektor aims to create a strategic alliance to increase exploitation. Elektor states that its products can be very interesting for a broader target group. In order to enter into other markets, or create new ones, Elektor wants to exploit more.
The literature about exploration and exploitation is in line with the assumption of Elektor. March (1991) states that maintaining an appropriate balance between exploration and exploitation is a primary factor in system survival and prosperity. Other researchers support this indication (see also chapter two). When Elektor exploits more, the organization will be more in line with the literature about balancing exploration and exploitation. This in turn will create an organization with better survival chances and higher prosperity on the long-term.

After mentioning relevant theory and literature it becomes clear that if organizations balance exploration and exploitation this will improve their long-term performance. When relating this information to Elektor it becomes clear that Elektor could pay more attention to exploitation, although Elektor is very exploration minded already. Elektor states that their explorative mindset comes from the publishing aspect of the company. Elektor has its own research and development department that explores new electronic functions and, as a result of this, publishes the product in its magazine. This process repeats itself.
The research and development department is set to develop products that are used in the magazine. The department is not set up as an organization that develops new products that could be exploited.

The management of Elektor supports the statement that they have to increase the combination of exploration and exploitation. They decided to search for a form of a strategic alliance. The reason for this is that, according to the management, Elektor does not have enough capacity to start an exploitation function itself, enough money to invest in an totally owned exploitation function, and not enough experience with other target groups.
Elektor also thinks that its role as publisher can be a bit dubious because they should, seen from the customer's point of view, publish about electronics and not sell them. Elektor is afraid that its credibility will be doubted if the company becomes a direct seller/exploiter as well.
Besides customer opinion, Elektor should also take its advertisers into account. When focusing more on exploitation Elektor could become the competitor of an advertiser. The advertiser could see that as an 'attack' and stop advertising in the Elektor magazine. As a result of this, the income of the magazine will drop.
Taking all this information into account Elektor thinks that forming a strategic alliance is the best option to exploit more because exploitation related activities could then be more separated from the publishing function.
To form an exploitation strategy Elektor wants to know more about different strategic alliances. Elektor has already determined that it should find a partner or partners in exploitation, but it does not know how it should form this relationship. Elektor wants to know which way of partnering fits the company best. The decision for a specific form of an alliance will depend on risks, potential revenue, and investments according to the management.

Strategic alliances are cooperative arrangements between two or more firms to improve their competitive position and performance by sharing resources. Strategic alliances are designed to allow partners to share risk and resources, gain knowledge, and obtain access to markets (Ireland, Hitt, Vaidyanath, 2002; Hitt, Dacin, Levitas, Arregle & Borza, 2000; Jarillo, 1988).
In this study three forms of strategic alliances will be approached, namely joint ventures, outsourcing, and licensing. In chapter two the different forms of alliances are worked out in detail.

Elektor should take into account that if it has a patent on a technique or product its position is much stronger in the alliance than if it does not have a patent. At this moment Elektor does not have any patents on new techniques or products. If Elektor wants to exploit new techniques with partners it should take into account that if it will exploit with patents their business pay-of is much stronger then if it does not. Although this is not the scope of this study it is important to mention for future development of techniques.

Research goal

The goal of this research is to create more knowledge and to propose recommendations about implications for the organization when engaging in a strategic alliance, which form of strategic alliance Elektor could implement to achieve more balance between exploration and exploitation, and how to create revenue. This is done through a literature review of strategic alliances related literature and an empirical case study on this subject.

Central research question

Based on the goal of the research the following central research question can be formulated:

What are the implications of different forms of strategic alliances on costs, organization and revenue at Elektor when we follow Elektor's goal of creating more exploitative capabilities using a certain form of strategic alliance?

Research sub questions

To answer the central research question sub questions are stated. The answers to these sub questions lead to an overall answer to the central research question.

What does Elektor want to attain in the future with more exploitation?

What are relevant exploitative forms of strategic alliances for Elektor?

What will the effects on costs be of each form of strategic alliance for Elektor?

In which functions of business activities should Elektor invest to create a specific form of strategic alliance?

How can revenue be created with the selected forms of strategic alliances?

Which form of a strategic alliance fits Elektor best to create a better exploitative channel?

Costs/investment model

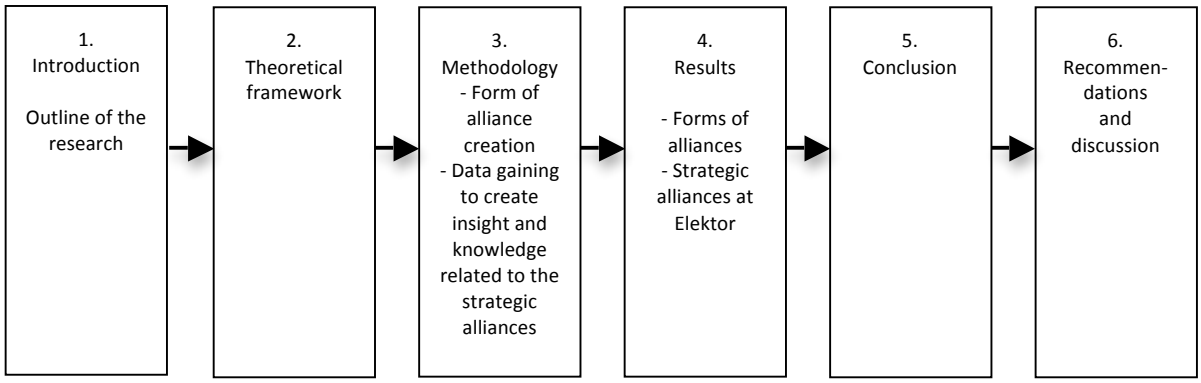
In this study a model is created which Elektor can use in their search to determine which exploitation strategy/form of strategic alliances fits best, when exploiting a certain product or product group on costs level. The different forms of alliances will be considered on the need for investment per business function of different business activities derived from Porter (1985). The model will give an insight if Elektor should invest in a certain business function. The determination of investments coupled to a certain strategic alliance will determine the need for total investment per strategic alliance and, in the end, creates a general cost picture for a certain alliance.
Implications for the organization will become apparent, when forms of strategic alliances are discussed within Elektor. Information gained out of the theory provides support when determining implications and costs.
The business activities and functions are put into the model with the information of the value chain of Porter (1985). Porter's (1985) business activities and functions are explored in chapter two. The model is explained in more detail in chapter three.

Costs and revenue

In this study the focus is on costs and revenue. Elektor wants to know what the feasibility is of a certain form of strategic alliance on this level. From this perspective a decision for a certain form of strategic alliance will especially depend on investments, costs, risks, and potential revenue according to Elektor's management. When determining implications for the organization per business function following a certain form of alliance, it will be possible to create an overview where costs will occur. The appearing of costs is dependent on how the organization fulfils its business functions currently and what the form of strategic alliance will be.
When discussing implications and costs that result from the choice for a form of strategic alliance, it will be clear what happens to the organization when it starts exploiting more.
Revenue will be approached more generally because this will not directly effect the organization when starting a strategic alliance. Costs, on the other hand, will deliver these implications directly and vice versa.
When the information related to costs and revenue is obtained, Elektor can compare the cost structure of certain forms of strategic alliances to different ways of creating revenue. As a result, more knowledge is created about the feasibility of a certain form of strategic alliance.

Research structure

In this paragraph each part of the research is outlined in more detail. Every chapter has a specific contribution to the research that will be explained.



1. Introduction
In chapter one (this chapter) it is stated why this study is necessary and what the practical and theoretical background is. Elektor's problem is outlined, and by describing the further process of this study clarity about the research is created. When describing the process conditions are created on which the study will focus and state how necessary information is obtained.

2. Theoretical framework
In the theoretical framework the foundation of the model is created. With theoretical literature the forms of strategic alliances are defined and explored, and with practical oriented literature the business activities and its functions are defined. In this part it becomes clear what the strategic alliances and business activities are, what they contain, and how they are interconnected.
When this is clear the strategic alliances and business functions and activities can be put into the model. Revenue creation is also described in this chapter.

3. Methodology
In this chapter it is outlined how the information needed to answer the research questions is acquired. It is described how the chosen forms of strategic alliances are created and how empirically all the information needed to determine the implications and costs per alliance is acquired.

4. Results
In chapter four the created forms of strategic alliances, as a result of the information acquired from theory and a interview, are introduced.
Also, the findings of the empirical study are provided in this chapter. The model is filled in as a result of the empirical study.

5. Conclusion
In the conclusion relevant exploitative forms of strategic alliances are pronounced. It is made clear what the effects of costs will be when following a certain form of strategic alliance. An image of where Elektor should make investments is created. Also different ways of creating revenue will be treated. Pros and cons of forms of alliances are taken into account to determine which form of strategic alliance could be most suitable for Elektor.

6. Recommendations and discussion
Based on the findings of the empirical research and the conclusion, recommendations are made that Elektor could use when forming an exploitation strategy based on a strategic alliance.
Useful information for further study is stated.

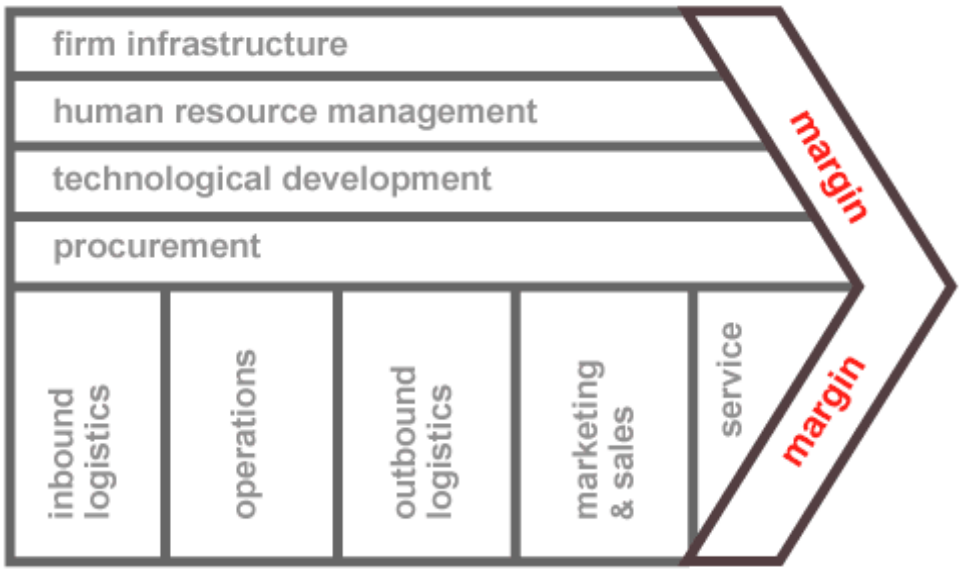
The research focuses solely on exploitation, not on exploration. However, it is possible that the explorative part of Elektor will change also as a result of a better balance between exploration and exploitation. This should be mentioned but is not the scope of this study.

Research methodology

In chapter three the research methodology is worked out in detail.

Research material (literature)

In chapter two theoretical literature is used to define 'strategic alliances' and to define and describe the three forms of alliances that the focus is on. Also the business activities and functions are treated in detail. The business activities and functions as Porter (1985) describes them in the value chain are used for this.



Value chain, Porter (1985)

Porter (1985) states some general business functions coupled with a business activity. These business functions are used in the model. With practical orientated literature the business activities and functions are defined (chapter two and appendix four). (Practical) textbooks and articles are used because the activities and functions must be defined in general.
Theories about certain strategic alliances and methodology to construct the forms of strategic alliances are used. As a result of these different forms, the members of the management team know what position Elektor takes in a certain alliance and can determine the implications for the organization and its need for investment in the alliance.
Specific types of strategic alliances are formed together with Elektor. Semi-structured interviews will be used to create these types; therefore, all business activities and functions are examined with the international editor in chief of Elektor, which is the project leader of this research. In the interview it is determined how business activities are performed per form of alliance (appendix one). As a result, the management team of Elektor are interviewed and the need for investments or creation of cost savings is determined.

2. Theoretical framework

In this chapter strategic alliances, joint ventures, outsourcing, and licensing are approached and defined. It is made clear why these forms of alliances are used, what partnerships generally look like, what the advantages and disadvantages are of the specific alliances, and how revenue can be gained. In appendix four the different business activities and functions are defined, using the value chain model of Porter (1985).

With a part of the information acquired in this chapter, the left column and upper row of the model are filled. The model is created to outline if investments should be made related to the business functions. The results are an overview of what Elektor should invest in per form of alliance.
Next to the basic framework of business activities and forms of strategic, a more extensive understanding on strategic alliances is also created.

Exploration and exploitation

In the literature there is much going on in relation to exploration and exploitation. In 1991 March wrote an article that launched the terms exploration and exploitation. March (1991) stated that exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, and innovation. March (1991) stated that exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, and execution.
'Maintaining an appropriate balance between exploration and exploitation is a primary factor in system survival and prosperity' (March, 1991). This sentence indicates that when there is no balance between exploration and exploitation, an organization cannot survive and prosper at the highest level.
Other researchers confirm the indication that an appropriate balance between exploration and exploitation is important for an organization. Jansen, Van den Bosch and Volberda (2005) argue that organizational ambidexterity is crucial to firm survival. They define organizational ambidexterity as the ability to pursue exploratory and exploitative innovation simultaneously.
When firms seek to adapt to environmental changes, explore new ideas or processes, and develop new products and services for emerging markets they also (at the same time) need stability to leverage current competences and exploit existing products and services (Benner & Tushman, 2003).
Also Uotila, Maula, Keil and Zahra (2008) argue that the argument that organizations need to balance their exploration and exploitation activities is widely accepted in the literature.
Soosay and Hyland (2008) state that the exploration for new ideas, technologies and knowledge and the exploitation of existing and new knowledge is essential for continuous innovation. *'Firms need to decide how best to allocate their scarce resources for both activities and at the same time build dynamic capabilities to keep up with changing market conditions'* (Soosay and Hyland, 2008).
Raisch, Birkinshaw, Probst and Tushman (2004) even title their research: *'Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance'*.
Koza & Lewin (1998) state that the intent for an alliance comes forward out of explorative or exploitative objectives.

Strategic alliances

Strategic alliances are defined as cooperative arrangements between two or more firms to improve their competitive position and performance by sharing resources. Strategic alliances are designed to allow partners to share risks and resources, gain knowledge, and obtain access to markets (Ireland, Hitt, Vaidyanath, 2002; Hitt, Dacin, Levitas, Arregle & Borza, 2000; Jarillo, 1988).
The above stated definition is used throughout this research. The definition is a general approach to strategic alliances and looks like many other definitions of strategic alliances. For example, the definition according to Spekman, Forbes, Isabella & MacAvoy (1998) is; a strategic alliance is a close, long-term, mutually beneficial agreement between two or more partners in which resources, knowledge, and capabilities are shared with the objective of enhancing the competitive position of each partner.
When reading the two definitions one recognizes the main items in them.
Ireland, Hitt and Vaidyanath (2002) summarize the findings of other authors why strategic alliances are used. A first finding is that alliances' flexibility and potentially lower levels of risk and, as a result of that, make alliances a preferred growth alternative (Harrison, Hitt, Hoskissen & Ireland, 2001). Another finding is that strategic alliances facilitate knowledge integration where knowledge flows between firms (Madhaven, Koka & Prescott, 1998).
Strategic alliances offer scale economies, effective management of risks, cost efficient market entries and learning from partners (Alvaraz & Barnley, 2001; Kogut, 1988). Alliances help firms minimize transaction costs, cope with uncertain environments, reduce their dependence on resources outside of their control, and successfully reposition themselves in dynamic markets (Das & Teng, 1996, 2000; Spekman, Forbes, Isabella, MacAvoy, 1998; Young-Yberra & Wiersema, 1999).

In this study three forms of strategic alliances will be explored: joint venture, outsourcing, and licensing. In the next sections the three forms are described in more detail.

Joint ventures

Definition

Kogut (1988) has done a review of existing literature related to joint ventures. Kogut (1988) defines a joint venture as something that occurs when two or more firms pool a portion of their resources within a common legal organization. This means that a joint venture is an organization created by other organizations where every 'creator' has a fixed share.

Why joint ventures are used

Kogut (1988) argues that most statements on the motivation for joint ventures can be reduced to three factors: evasion of small numbers bargaining, enhancement of competitive positioning (or market power), and mechanisms to transfer organizational knowledge.
Kogut (1988) describes these three theoretical approaches as especially relevant in explaining the motivations and choice of joint ventures. One approach is derived from the theory of transaction costs, which is developed by Williamson (1975, 1985). This theory is motivated by considerations of cost reduction. Parts of the theory include the production and transaction costs. The scale of the operation, learning and proprietary knowledge influences the production costs. Transaction costs are influenced by the expenses for writing and enforcing contracts, haggling over terms and contingent claims, deviating from optimal kinds of investment in order to increase dependency on a party or to stabilize relationships, and administering a transaction (Kogut, 1988).

The second approach is related to strategic behaviour and motivations. This approach is driven by the competitive position and the impact of this on profit. There are a lot of strategic reasons to form a joint venture (Kogut, 1988).
What is obvious here is the difference between the transaction cost theory and the theory of strategic behaviour. The transaction cost theory lowers the total costs within a joint venture, whereas the theory of strategic behaviour focuses on increasing profit.
Kogut (1988) states that the primary difference between transaction costs and strategic behaviour is that transaction costs address the costs specific to a particular economic exchange, independent of the product market strategy, whereas strategic behaviour addresses how competitive positioning influences the asset value of the firm.
Above is stated that if the reason to start a joint venture comes from strategic behaviour it's goal is to increase profit. But a joint venture can also be created to deter (potential) competitors and defensive investments. Vickers (1985) shows that a joint venture is an effective mechanism to guarantee the entry deterring investment. Vernon (1983) sees joint ventures as a form of defensive investment by which firms hedge against strategic uncertainty.
The most important differences in the implications of a transaction cost and strategic behaviour analysis are the identification of the motives to cooperate and the selection of partners (Kogut, 1988).
The third approach relevant in explaining the motivations and choice of joint ventures is the organizational theory approach. This theory views joint ventures as organizations that learn or seek to retain their capabilities. The joint venture bases on organizations theory is a vehicle where tacit knowledge is transferred (Kogut, 1988).
Kogut (1988) states that this perspective is frequently identified with a transaction cost argument, even though the explanatory factors are organizational and cognitive rather than derivatives of opportunism under uncertainty and asset specificity.
The choice for a joint venture in this situation is motivated by the difference in the value of options to exploit future opportunities across market, contractual, and organizational modes of transacting. In this case a joint venture is encouraged under two conditions (Kogut, 1988):

- one or both firms desire to acquire the other's organizational know-how;
- one firm wishes to maintain an organizational capability while benefiting from another firm's current knowledge or cost advantage.

The perspectives explained above provide distinct, but also overlapping, explanations for why joint ventures are used. The theory of transaction cost analyses joint ventures as an efficient solution to the hazards of economic transactions. The theory of strategic behaviour places joint ventures in the context of competitive rivalry and collusive agreements to enhance market power. The organizational theory views joint ventures as a vehicle by which organizational knowledge is exchanged and imitated (Kogut, 1988).

Berg and Friedman (1978) have done research into the reasons for joint ventures. The top ten are:

1. To acquire skills and technical know-how;
2. To acquire distribution facilities;
3. To acquire production facilities;
4. Joint venture is a customer of a parent;
5. Joint venture is a supplier of a parent;
6. To research and develop new products of processes;
7. To acquire capital;
8. To produce for government contract;
9. To purchase government owned facility;
10. To exploit product or licensed process.

Cooperation

The definition of a joint venture already gives information on what cooperation looks like in a joint venture: two or more firms pool a portion of their resources within a common legal organization where every 'creator' has a fixed share (Kogut, 1988).
McConnell and Nantell (1985) state that in a joint venture the management of parent organizations is combined and forms the management of the joint venture. The original management of parent firms remain intact under the joint venture.
It is clear that the cooperation under a joint venture is between all the partners in the joint venture and that there are different reasons for starting a joint venture.

Advantages

Kogut (1988) states that, in case of a horizontal integration, transaction costs will decrease for both partners within the joint venture. Other advantages of a joint venture that Kogut (1988) quotes are the shareing of technologies, guarantee of performance, and superior monitoring mechanism and alignment of incentives to reveal information.
Hagendoorn (1990) states some other advantages of joint ventures as being the spreading of risks, sharing of fixed costs, capturing of economies of scale, and access to new markets.
Elimination of the duplication of effort is an advantage mentioned by Kamien, Muller & Zang (1992).

Disadvantages

Disadvantages mentioned are the share of costs and profits, mutual investment in dedicated assets and change of assets, image, resources and culture (Kogut, 1988). Hagendoorn (1990) states reduction of actual competition, possibility of foreclosure of particular markets and the ability to reduce potential competition as disadvantages. The possibility to 'free-ride' on a partner is mentioned as a disadvantage by Kamien, Muller & Zang (1992).

Outsourcing

Definition

Outsourcing can be defined as the process of transferring the responsibility for a specific business function from an employee group to a non-employee group (Zhu, Hsu & Lillie, 2001).
Outsourcing is approached by relevant literature to a situation where a make or buy decision has to take place (Arnold, 2000).
Traditionally, outsourcing is an abbreviation for 'outside resource using' (Quinn & Hilmer, 1994).
Arnold (2000) analysed the three parts of this construct. 'Outside' means creating value external to the own organization. 'Resources' become external and are 'used' by and for the organization which is outsourcing (Arnold, 2000).
According to Moskalev & Swensen (2006) outsourcing in the form of a contract is the simplest form of an alliance.

Why outsourcing is used

Bendor-Samuel (1998) states that outsourcing provides certain leverage that is not available to a company's internal departments. Leverage can have many dimensions, for example: economies of scale, process expertise, access to capital and access to expensive technology (Zhu, Hsu & Lillie, 2001).
The combination of above stated dimensions create the cost savings inherent in outsourcing. The organization that performs the outsourced activities is often specialized in a particular non-core business function and has the economy of scale, expertise and the capital investments in the leading technology to perform the same tasks more efficiently and better than the outsourcing-organization (Zhu, Hsu & Lillie, 2001).
Focusing on core competences is also a reason to outsource. Increased ability to compete is the main subject to focus on core competences (Quinn & Hilmer, 1994).
Bryce & Useem (1998) mention a study under 55 major American companies where cost savings and business performance are the main reasons for outsourcing.

Cooperation

When an organization has outsourced activities, the cooperation between the outsourcer and the supplier looks different in every instance. Each organization determines what is outsourced, to whom, and how. A seller-buyer relationship arises when outsourcing is used within a company. Under an outsourcing agreement, one organization purchases the ongoing provision of a product or service from another without taking a direct financial stake (Bryce & Useem, 1998).
Quinn & Hilmer (1994) state that organizations, which outsource activities, must not forget to manage what is outsourced. They state that managers often forget to manage an outsourced activity properly.

Advantages

Quinn & Hilmer (1994) mention a lot of advantages of outsourcing. The first mentioned is; maximisation of returns on internal resources by concentrating investments and energies on what the enterprise does best. Well developed core competences provide formidable barriers against present and future competitors that seek to expand into the company's areas of interest is the second advantage mentioned by Quinn & Hilmer (1994). The third advantage that Quinn & Hilmer (1994) mention is the utilisation of external suppliers investments, innovations, and specialized professional capabilities that would be prohibitively expensive or even impossible to duplicate internally.
Fourth, in rapidly changing marketplaces and technological situations, this joint strategy decreases risks, shortens cycle times, lowers investments, and creates better responsiveness to customer needs (Quinn & Hilmer, 1994). Also a greater flexibility, lowering of long-term investments, risk spreading among a few suppliers and not limited to own innovation capabilities are mentioned as advantages of outsourcing by Quinn & Hilmer (1994).
Bryce and Useem (1998) mention the reduction of operating costs and the enlargement of shareholder value as advantages of outsourcing.

Disadvantages

Windrum, Reinstaller and Bull (2008) state that long-term loss of firm productivity growth is a disadvantage of outsourcing. Bryce and Useem (1998) mention that too many activities lose innovative skills as a result of outsourcing.

Most supplier markets are imperfect and do entail some risks for both buyer and seller with respect to price, quality, time or other key terms (Quinn & Hilmer, 1994). Also the loss of critical skills or the development of wrong skills are mentioned as a disadvantage by Quinn and Hilmer (1994).

Licensing

Definition

A licensing agreement regulates technology transfer in return for a fee (Hagedoorn, 1990). The licensing of technology constitutes the external mode of technology exploitation in addition to internal technology application in a firm's own products (Fosfuri, 2006).
Licensing contracts are the less integrated, more market-based alternatives allowing firms to profit from their innovations (Fosfuri, 2006).

Why licensing is used

Licensing is one of the most important methods of technology transfer (Anand & Khanna, 2000). Most licensing transactions are carried out for a combination of several reasons. In particular, licensing provides monetary and strategic benefits (Lichtenthaler, 2009). Monetary benefits are gained out of license revenues and strategic benefits are expressed in competitive position, which indirectly affects financial performance (Lichtenthaler, 2009).
A major market-related motive for (technology) licensing is entry to national and foreign markets (Lichtenthaler, 2009) as well as selling products in addition to developing technology as a motive for licensing (Lichtenthaler, 2009).
Fosfuri (2006) states that smaller companies license because they do not have manufacturing, distribution and marketing capabilities.
The standard framework in which licensing is analysed is provided by transaction cost theory. This approach suggests that licensing would be the most direct way to capture profits from a firm's intellectual asset. However, a licensing agreement might not take place if it does not fit within the firm's overall strategy. The net balance of a firm is the important variable in deciding whether to license or not. The decision to license or not should be based on the effects for the whole value chain (Fosfuri, 2006).

Cooperation

Cooperation may not be the right term in relation to licensing. At the end it is more a one-way process than cooperation between parties. What is important within this 'cooperation' is that the organization that would license, writes and executes reliable contracts for the use of technology. Adequate specification of property rights, monitoring, and enforcement of contractual terms may be problematic and should be managed actively (Fosfuri, 2006).

Advantages

An advantage of licensing is that revenue can be created through royalty's (Fosfuri, 2006). Next to licensing there are also other ways of creating income (Byrne, 1994) (see also the next paragraph). For the licensor an advantage is the ability to influence the extent of the licensee's revenue because of the ability to create the licensing agreement (Fosfuri, 2006).

Disadvantages

A disadvantage of licensing is that a lower price-cost margin is created (Fosfuri, 2006). When the licensor and licensee are both active on the same market the market, share and profit of the licensor (related to the product) will decrease because of more competition of the licensee (Fosfuri, 2006).

Revenue creation

In this study it is identified whether Elektor should invest, could save money, or remain the same on business function level within a certain form of strategic alliance. Here, focus lies on costs, but it should also be known how a form of strategic alliance could create revenue for Elektor.

There are a few ways to exploit (protected) technology (Byrne, 1994). Here theory assumes that the technology is protected through a patent.
The first way to exploit technology is to acquire the necessary (missing) business activities, and then produce and sell the product through the organization itself. With the patent the organization excludes every competitor that can or wants to exploit the same product/technology (Byrne, 1994). Second, if the organization cannot produce, or decides not to produce and sell the product, it could license some other party to produce and sell the product (Byrne, 1994). Third, ownership of the technology could be transferred to another organization for a lump sum or a royalty, a lump sum and a royalty, or some other valuable consideration (Byrne, 1994).
In the ways to exploit stated above, the forms of strategic alliances described earlier can be recognized.
The first way to exploit is clear: an organization exploits itself, without using resources of others.
Within the second way to exploit, licensing, there are different manners to license.
There are exclusive, sole and non-exclusive licenses (Byrne, 1994). When a licensor licenses with an exclusive license he cannot license any other person/organization to exploit the licensed product then the licensee and can not exploit the product by itself or by its agents in the defined territory (Byrne, 1994).
Within a sole license the licensor (and his agents) also has the right to make, use of sell the licensed product or use the licensed process (within the licensed territory) (Byrne, 1994). A non-exclusive license is a license where the licensor could also license other parties within a certain territory to make, use or sell a certain product (Byrne, 1994).
An addition to the forms of licensing stated above is label licensing. Within this form of licensing the proprietor can attach a label, or other notice, to the product package or invoice (Byrne, 1994).

When ownership of a technology is transferred, the organization could acquire a lump sum and/or a royalty. A royalty is a consideration in terms of money for the right to exploit or commercialise technology. It is a share of the profit or saving that a licensor derives from the licensee through using technology made available by the licensor (Byrne, 1994). Commonly used methods related to royalties are the going-rate (or market) method, the 25 percent rule, the profit-sharing method and the investment-risk factor method (Byrne 1994).
The going-rate method assumes that a certain fixed percentage of the net selling price is transferred from the licensee to the licensor. Often an industry norm for the going-rate applies. For mechanical and electrical product mostly 6 percent is applied as going-rate. This method is a relatively uncomplicated way to assess money for a license, though it can be deficient. The licensee is enabled to gain a fair return on his investment in the technology, but the method has no regard to changing economic conditions and the profitability of the venture (Byrne, 1994).
The 25 percent rule looks like the going-rate method but here is the royalty based on 25 percent of the licensee's gross profit, before taxes, earned by using the licensed technology (Byrne, 1994).

The profit-sharing method has a more substantiated approach. Here the licensor calculates the additional profit that the technology is likely to bring to the potential licensee's business. Based on the information gained by the licensor he could demand an upfront payment and an annual percentage of additional profit provided by the licensee (Byrne, 1994). With this method it should be taken into account that this form of alliance must be a win-win situation for licensee and licensor (Byrne, 1994).
The investment-risk factor method assumes that the profit generated by the licensee is divided by the licensee en licensor in a way that reflects the investment each side makes to secure the technology and make it commercial and to the risks each side will be exposed to (Byrne, 1994).
A lump sum is a fixed rate that a licensee pays to the licensor to gain a technology. Here an advantage for the licensor is that he does not risk income compared to the arrangements related to the different forms of royalties. For the licensee, it is an advantage that he knows the costs for the technology beforehand. Also, the licensee does not have to open his accounts to the licensor for royalty auditing and he does not have to share the benefits of any increase in de selling price with the licensor (Byrne, 1994).
A disadvantage is that the licensor may, in time, lose interest in the fate of the licensee. The licensor cannot share in additional income, and could lack an important incentive to improve the technology (Byrne, 1994). This could be a disadvantage for the licensee as well licensor because both could benefit from improvements.
Bai, Tao and Wu (2004) state that revenue sharing across firms, which are engaged in a joint venture, vary. This could be a result of the different forms of exploiting technology as explained above.

How much revenue is created is dependent on the chosen form of strategic alliance and revenue model. A general rule is that the investment must be paid back within a certain period (payback time). After this period more cash will return than was invested (Hayes et al., 2005). So, when investing more, payback and return should be higher then investing less.

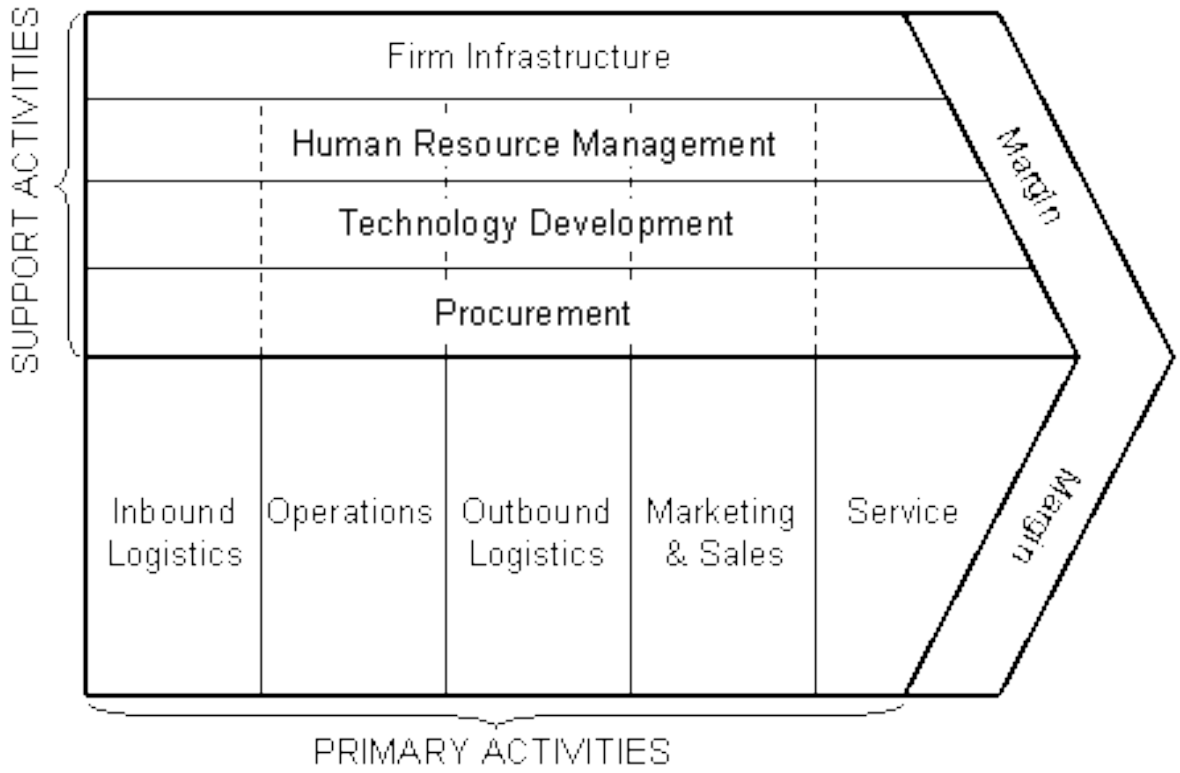
Strategic choices

Now we know what different forms of strategic alliances and what different ways of creating revenue are, we should also know how to choose a certain alliance and revenue model.
Choosing a certain form of alliance and revenue model is based on (chosen) strategy (Johnson et al., 2008). Johnson et al. (2008) state that there are three strategic choices to be made which influence the organization's future and the way it needs to respond to external pressures and influences. The first strategic choice is concerned with the choice how an organizations wishes to position itself in relation to competitors. The second strategic choice is concerned with the choices of products and markets for an organization. The third strategic choice is concerned with the choice of how strategies are to be pursued (Johnsen et al., 2008)
The last strategic choice is concerned with the choice for, in this research, a strategic alliance. The first two strategic choices will have an impact and should determine the third strategic choice.

Based on the steps in strategic choices of Johnson et al. (2008) I have created a practical tool in appendix two that can be used to determine the form of strategic alliance.

Business activities

Porter (1985) introduced the value chain as a basic tool to systematically examine all the activities a firm performs and how these interact to analyze the sources of competitive advantage. In this study the business activities that Porter (1985) describes are used to create the model that Elektor will use to base its strategic alliance form on.



Value chain, Porter (1985).

Porter's (1985) value chain represents a collection of activities that are performed to design, produce, market, deliver, and support a firm's product. Porter (1985) defines the value activities as the physically and technologically distinct activities a firm performs. They are the building blocks by which a firm creates a product valuable to its buyers. Value is measured in total revenue. Margin is the difference between total value and the collective cost of performing the value activities.

The value chain is divided in primary and support activities. Porter (1985) defines primary activities as the activities involved in the physical creation of the product and its sale and transfer to the buyer as well as after sale assistance. Porter (1985) states that support activities support the primary activities and each other by providing purchased inputs, technology, human resources, and various firm wide functions.

Primary activities

Porter (1985) has described the primary activities of the value chain. Below each activity is described, possible functions are mentioned and a definition is given.

The *inbound logistics* activity is associated with receiving, storing, and disseminating inputs to the product. Business functions of this activity are material handling, warehousing, inventory control, vehicle scheduling, and returns to suppliers.

Logistics includes the organization, planning, steering and the implementation of the flow of goods from the development and purchase, via production and distribution to the end customer with the purpose to keep costs low and the use of capital fulfil the needs of the market. Inbound logistics concerns the management of the goods and the information flows from the producers of raw and intermediate materials up to the start op the production process (Visser & Goor, 1999).
The *operations* activity is associated with transforming inputs into the final product form. Business functions of this activity are machining, packaging, assembly, equipment maintenance, testing, and facility operations.
Slack, Chambers & Johnston (2007) state that the operations activity is the arrangement of resources that are devoted to the production and delivery of products and services. Operations are all the activities necessary for the fulfilment of customer request (Slack, Chambers & Johnston, 2007).
The *outbound logistics* business activity is associated with collecting, storing, and physically distributing the product to buyers. Business functions of this activity are finished goods warehousing, material handling, delivery vehicle operation, order processing, and scheduling.
Logistics includes the organization, planning, steering and the implementation of the flow of goods from the development and purchase, via production and distribution to the end customer with the purpose to keep costs low and the use of capital fulfil the needs of the market (Visser & Goor, 1999). Outbound logistics concerns the management of the goods and the information flows from the end of the production process to the customer.
The business activity *marketing and sales* is associated with providing a means by which buyers can purchase the product and inducing them to do so. Examples of functions of this activity are advertising, promotion, sales force, quoting, channel selection, channel relation, and pricing.
Marketing can be defined as a social and managerial process by which individuals and groups obtain what they need and want through creating, offering, and exchanging products of value with others (Kotler, 1997).
Sales is the organization's selling and promotion effort. Consumers/customers will ordinarily not buy enough of the organizations' product and needs motivation to buy (Kotler, 1997). The sales function of an organization helps to motivate and sell products and/or services.
Service is a business activity associated with providing service to enhance or maintain the value of the product. Examples of functions of this activity are installation, repair, training, parts supply, and product adjustment.
Service can be defined as a process consisting of a series of more or less intangible activities that normally, but not necessarily always, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems (Grönroos, 2000).

Porter (1985) states that each of the primary activities are vital for a firm, but one could be a more critical one then another. For example, for a restaurant the primary activity 'service' is more critical then 'outbound logistics'.

Support activities

Porter (1985) has also described the support activities of the value chain. Each activity is described below and possible functions are mentioned.

The activity *firm infrastructure* supports the entire chain and not individual activities. Functions of this activity are general management, planning, finance, accounting, legal, government affairs, and quality management.
The firm infrastructure is a basic and usually permanent framework, which supports each business activity. The underlying business functions are or can be applied in every other business activity.

Human resource management supports both individual primary and support activities and the entire value chain. Business functions of this activity are recruiting, hiring, training, development, and compensation of all types of personnel.
Human resource management can be defined as all those activities associated with the management of work and people in firms and in other formal organizations (Boxall & Purcell, 2008).
The business activity *technology development* consists of a range of activities that can be broadly grouped into efforts to improve the product and the process. The business functions of this activity are research, product design, process equipment design, and servicing procedures.
Procurement is the activity that refers to the function of purchasing inputs used in the firm's value chain, not to the purchased inputs themselves. Functions of this activity are purchasing of raw materials, supplies, and assets such as machinery, laboratory equipment office equipment, and buildings.
Procurement can be defined as the activities that are processed to gain products and services from external sources (Gelderman & Albronda, 2003).

Now we know what the business activities and functions are. Every firm deals, consciously or unconsciously, with the primary and support business functions (Porter, 1985). But not every firm exhibits the same business functions.
To determine the need for investment (or not) in business activities a model is created. The business functions given by Porter (1985) are used in the model. These general business functions should be used because Elektor wants to create an alliance, as a result of which new business functions will appear. If specific business functions are used the model cannot determine, on a general level, what impact of the different forms of alliances will be on the investment rate.

In appendix four the business functions are defined.

3. Methodology

In this chapter the methodology that is used to obtain information about implications for the organisation, costs, to put in the created model, and to create the specific forms of strategic alliances will be outlined.

The research that was performed at Elektor is qualitative research because the needed information is non-numerical (Babbie, 2007). An advantage of qualitative data is that it can be richer in meaning than quantified data, although these verbal descriptions can also be a disadvantage because everyone interprets expressions differently (Babbie, 2007). Within this research qualitative information is needed in order to create an understanding of how the management team thinks investments should be made (or not) to create a certain form of alliance. In-depth information is needed to determine whether Elektor should invest, could save money, or remains the same per business activity/function.
Qualitative research is effective for studying subtle nuances in attitudes and behaviours and for examining social processes over time (Babbie, 2007). Other advantages of this type of research are the flexibility and that this method is relatively inexpensive (Babbie, 2007). Disadvantages are that it is not possible to create statistical descriptions of large populations (Babbie, 2007). As it is not necessary to create statistical descriptions of large populations in this study, this is not a disadvantage.

Case study

In this study information is gathered, that will give an in-depth view of the organisation. Because of its in-depth approach a case study is the most suitable research strategy (Verschuuren & Doorewaard, 2007). Within a case study, qualitative research approaches are used (Verschuuren & Doorewaard, 2007).
The study that was performed at Elektor is a case study because it contributes to the gaining of knowledge of an organizational phenomenon (Yin, 2003). Also it is in line with the description of a case study of Yin (2003): ''*A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and a another result benefits from the prior development of theoretical propositions to guide data collection and analysis.*''
The willingness of Elektor to exploit more and its problem of not knowing which form of a strategic alliance to use, are the contemporary phenomena where boundaries are not clearly evident. The results of the study are based on multiple sources within Elektor (management team) and the prior development of theory clearly contributes to guide data collection and analyzation (the created model).
Yin (2003) mentions five different applications for which case studies are used (explain, describe, illustrate, explore and meta-evaluate). The performed study is to explore what impact a certain situation (form of strategic alliance) will have on the organization and investments.
Case study research is especially useful if there are one, or only a few instances of a social phenomenon. One of the main disadvantages of case study research is the limited generalizbility (Babbie, 2007). As it is not the goal of this study to generalize; this is not a disadvantage.
The case study that is performed at Elektor is a single case study. All the members of the management team (the decision making units, DMU's) were interviewed on this subject to exclude to chance on coincidence.

Interviews

To collect data, create specific forms of strategic alliances, gain information about implications, and fill in the model, qualitative semi-structured interviews were used to find out where Elektor should invest in per form of strategic alliance.
Qualitative interviews are used because this method of interviewing is based on a set of topics that are discussed in depth (Babbie, 2007). In depth information is needed to determine if Elektor should invest (or not) in certain business functions.
In qualitative interviews the interviewer has a general plan of inquiry, including the topics to be covered, but not a set of questions that have to be asked with particular words and in a particular order (Babbie, 2007). Three specific forms of strategic alliances will be created together with Elektor and, per form, it was questioned how a particular business activity and function is fulfilled currently, and should be fulfilled assuming a specific form. The goal of the interviews is to determine if Elektor should invest, could save money, or to leave the business activity/function as it is currently, per created form of alliance.

The specific forms of strategic alliances will be created using a semi-structured interview. Elektor's international editor in chief was asked, if certain business activities are performed internally or externally regarding a certain form of strategic alliance. Beforehand, and with the information gained in the theoretical framework, it will be outlined what the different forms of strategic alliances are. The forms of strategic alliances are created to be able to gain information about implications for the organization and consequences for costs when following a certain form. It is necessary to create these forms because otherwise information about consequences cannot be obtained. The management team should know how business activities would be performed when following a certain form of alliance, to provide information about implications for the organization and the consequences for costs.

To determine implications for the organization and where Elektor should invest or could save money per form of alliance, each member of the management team of Elektor was questioned separately. The study is a single case study with multiple units of observation. The management team was questioned because they are the only people that can provide the necessary information about implications for the organization and the consequences for costs. The management knows everything about the fulfilment of the business activities as it is now. By making the current situation of business activities visible with the management team and explaining the created forms of alliances, they could indicate what the implications for the organization and consequences for costs are.
Each member of the management team was interviewed because each team member has their own specialisation that corresponds with certain business activities/functions. However, all the business activities were discussed with each member, because this could result in interesting insights, which other team members do not have. The management team members were interviewed separately in order to avoid discussions and distractions and if it was necessary to provide someone with more or specific information this was possible. Also it should be avoided that team members influence each other's answers to the questions.
The management team (units of observation) consist of Elektor's chief executive officer, the chief financial officer, the international editor in chief, the marketing manager and the book and product publisher/manager.
During the interviews the specific strategic alliance forms and the business activities and functions were explained to the interviewee. Per business activity questions were asked that gave information on how the underlying business functions are performed currently and if Elektor should invest, can save or not change anything in this function to fulfil the created form of alliance.

The interview process of Babbie (2007) was followed so as to describe by means of information of Kvale (1996):

1. Thematising: clarification of the purpose of the interviews and the concepts to be explored;
2. Designing: lay out of the process through which the purpose is accomplished;
3. Interviewing: doing the actual interviews;
4. Transcribing: creation of a written text of the interviews;
5. Analysing: determinations of the meaning of the material gathered in relation to the purpose of the study;
6. Verifying: check of the reliability and validity of the materials;
7. Reporting: report of the findings.

In the interviews the focus is on the Elektor Wheelie. The focus is on one product to create the most reliable and valuable information for the optimal way of exploiting this product. The product is chosen because Elektor states that this product is a product with high exploitation expectations; Elektor thinks that this product has high sales potential.
So, in the empirical part different forms of strategic alliances are created, but all with the goal to exploit the Elektor Wheelie, and investigate the implications for the organization and investment needs/ability to save costs within a certain form of alliance.
After the interviews a statement can be made about the form of strategic alliances (exploitation) related to the Elektor Wheelie and other products findings can be generalised to.
In appendix seven the Elektor Wheelie is explained in more detail.

Plan of inquiry

Prior to the interviews the interviewee's were informed why the interviews are needed, what the interview process and the goal of the interviews is. This information was provided beforehand, so that the interviewee's understands why the interviews are needed, what the subjects of the interviews are, and what the subjects mean. In appendix five the prior information is shown.

During the interviews the information provided beforehand was treated first. It was determined if the information is clear and if the interviewee understands it.
Second, it is explained in more detail what will be done in this interview: obtain information about the specific forms of strategic alliances versus the business functions to, at the end, rate them and determine what is needed (invest, nothing or save) for a business function to fulfil the form and determine implications for the organization.

After the detailed explanation the interview started. Every specific form of strategic alliance was treated separately and the business activities and functions were explained. So, when determining the investment needs for the joint venture form it was explained first what a joint venture is in this research and what the specific form of alliance looks like when Elektor starts a joint venture. After that a business activity and its functions were defined and questions were asked that must give information about whether Elektor should invest in these functions, leave the functions the same or could save on this functions. When enough information to rate the business functions is obtained, the next business activity was treated until all business activities were treated.
When it was possible to rate all the business functions within a certain form of alliance the next form was explored. At the end of the interview all the business can be rated with + (invest), * (stays the same), - (save money) of ? (interviewee doesn't know) and general implications for the organization were recognized. The business functions were rated in the model after the interviews and during the interview it was checked with the interviewee whether suggestions of a rating fits. This to avoid discussion after the interviews and to obtain clarity for the interviewee and the interviewer.

The interviews were recorded to be able to transcribe the interviews. When transcribing the interviews one can review, analyze and code the data obtained.

The specific forms of strategic alliances are created using semi-structured interviews. Elektor's international editor in chief is questioned if certain business activities are conducted internally or externally regarding a certain form of strategic alliance. Beforehand, and with the information gained in the theoretical framework, it was outlined what the different forms of strategic alliances are. As a result of this interview, and the information gained in the theoretical framework, specific forms of strategic alliances were created that were questioned in the interviews with the rest of the management team and should deliver the necessary information.
The forms are shown in appendix one.

Validity and reliability

In general, construct validity within qualitative interviewing is greater than with survey and experimental measures. The availability of depth and the better information can deliver a higher degree of validity (Babbie, 2007).

Construct validity

In case study researches there are often too little operational sets of measures and measures are frequently judged subjectively which reduces construct validity. To meet the test of construct validity a researcher must select the specific types of changes that are to be studied and demonstrate that the selected measures of these changes do indeed reflect the specific types of change (Yin, 2003).
In this study this is done through creating the three specific forms of strategic alliances ('types of changes') and specifically question management team members separately about that type of alliance to create specific measures/information.

Internal validity

Internal validity is used in causal research and in order to determine if a causal relationship exists (Yin, 2003). For case study research it is especially important to known if the inference (in this case the interview) is done correctly (Yin, 2003).
In this study the interview was tested on and reviewed by someone who is familiar with interview methodology. As a result, it was possible to determine, whether the interview strategy is biased or not.

External validity

External validity deals with the problem of knowing whether a study's findings can be generalised(Yin, 2003). Because the study within Elektor only focuses on Elektor and because the outcome is really specific to the organization, external validity is low. Also, the focus of this study is not to generalise, so this is not a problem within this study.

Reliability

Reliability refers to the fact that, if a later researcher follows the same procedures as described by an earlier researcher and conducts the same case study all over again, the later investigator should arrive at the same findings and conclusion (Yin, 2003).

This study is made reliable by making the many steps of this study visible and by making the conduction of information as transparent as possible. As a result of this, it is likely, that another researcher would gain the same information.

Data collection

As mentioned earlier semi-structured interviews were used to collect data. Questions related to the form of strategic alliance and business activity/function were asked to create insights if investments should be made in certain business functions under a certain form of strategic alliance or that Elektor could save money or leave the function in its current structure.

The answers given were labelled, per form of strategic alliance and business functions, with:
+, which means: invest money in this function;
-, which means: save money on his function;
*, which means: leave function the same;
?, which means: not sure in this case.

Above stated labels are used to give an indication on the need for investment or the possibility to save money related to a certain form of alliance. This labelling has been chosen because the labels give Elektor a clear insight. It is not the scope of this study to determine how much should be invested or could be saved per business function and per form of strategic alliance. This is very hard to determine and very dependent on the situation.

Data processing

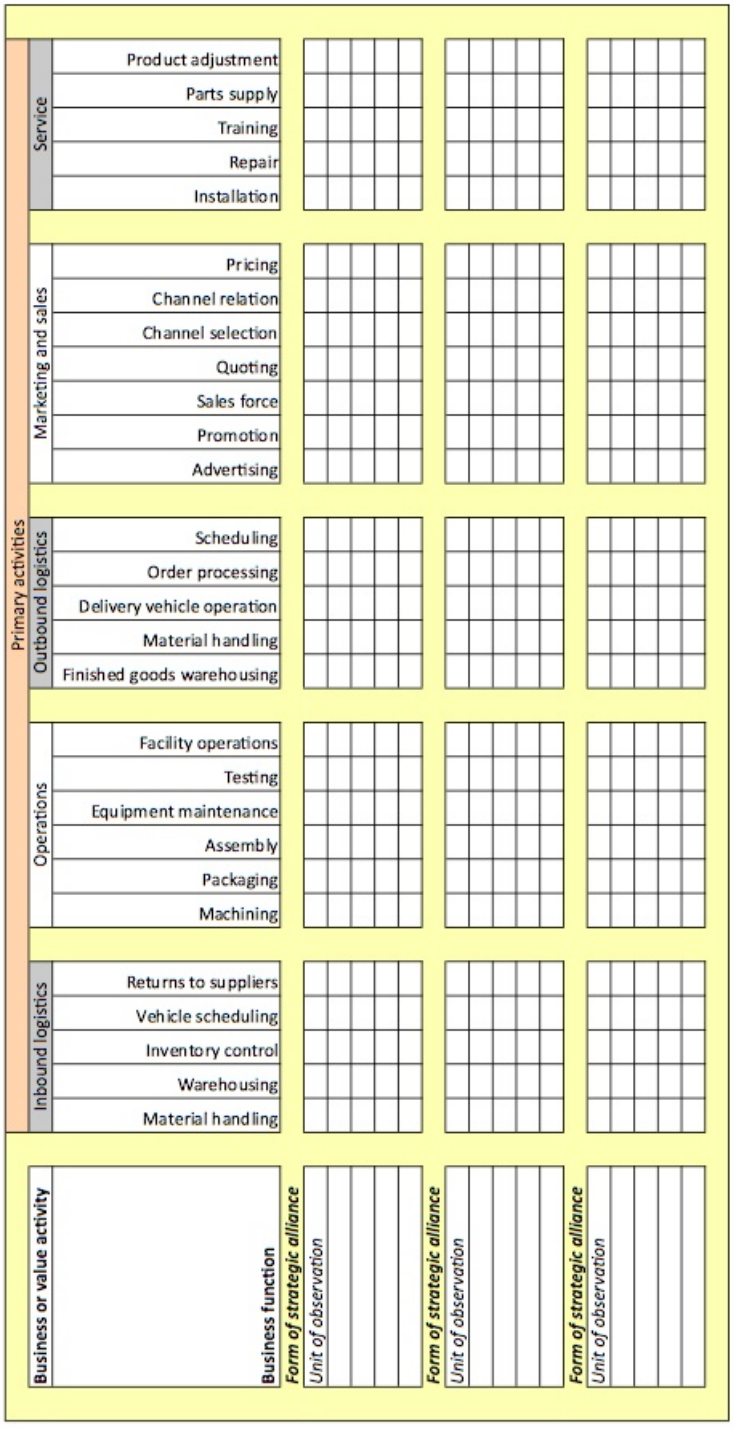
Babbie (2007) warns that there are no cut-and-dried steps in data processing that guarantee success. Coding classifies and categorises individual parts of data (Babbie, 2007).
In this research open coding is used as a way to classify and categorize data. In open coding the codes are suggested by the researcher's examination and questioning of the data (Babbie, 2007). The data is categorized according to the construction of the created model. Data is processed per form of strategic alliance and business activities . The classification of the data is on business function level and was labelled after the interviews with +, -, * and ? as explained in the previous paragraph.

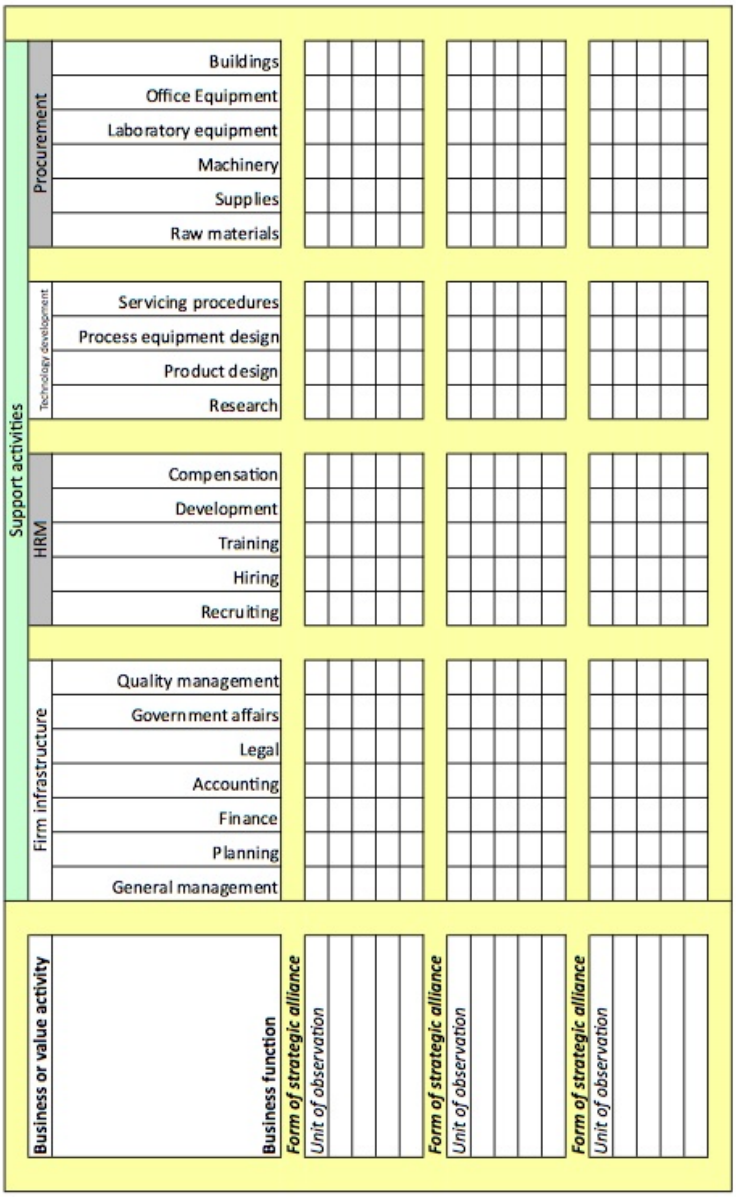
Model

The model that indicates if there should be investments, could be savings, or nothing will happen, is created to obtain a clear overview per business activity and function and form of alliance. In the model the primary and secondary business activities adapted from the value chain of Porter (1985) are used to classify and are shown on the horizontal axis. The activities are used because every firm deals, conscious or unconscious, with the primary and support business activities and functions (Porter, 1985). Using the business activities and functions provides a detailed and organisation-wide representation of the need for investment, cost savings, or none-changes per specific form of strategic alliance.

Every created form of alliance was classified + (invest), - (save), * (remains the same), or ? (unknown), per business function, per member of the management team. This design/format is applied to create a detailed and organization-wide picture of the requirements Elektor should apply when following a certain form of strategic alliance. Also classifications per management team member can be compared, so that deviations are easy to indentify. The forms of strategic alliances are shown at the vertical axis of the model.

The components of the model are the business activities and functions, specific created forms of strategic alliances, management team members and the classification.
Through posting the business activities and functions on the horizontal axis and the created forms of alliances on the vertical axis, a clear comparison can be made in the classifications per management team member, form of alliance, and business activity and function. Through this comparison a general picture is created on costs level that Elektor can use in their search for a strategic alliance to exploit. Below the created model is shown.





Data analysis

After filling in the model for each unit of observation the models can be compared with each other. Data can be analyzed with the given label to a certain alliance versus business function. When comparing the information in the model it is checked if outcomes per unit of observation vary strongly. If this is the case, it could mean that a) the interviews are done incorrectly, of b) the members of the management team do not agree and base its individual outcomes on other information then others.
Beforehand problem A can be avoided beforehand, by creating a clear and operationalised interview format. Then, only problem B could occur. If this would be the case it is taken into account in the results.

When, after comparing, answers are examined it can be determined in which areas Elektor should invest, or not, to create a specific form of strategic alliance.
This knowledge can be compared to the information of the theoretical framework to determine which advantages and disadvantages the forms of alliances have, compared to the investment rates

and how revenue can be created with the different forms of alliance. In the end this results in recommendations for further steps to create a certain form of alliance.

4. Results

In this chapter the results of the semi-structured interviews are explored. The created forms of strategic alliances, the current situation, and the implications for the business activities when following the created forms of alliances are stated at unit of analysis level. At the end of the chapter the model, as a result of the interviews, is shown.

Created forms of strategic alliances

With Elektor's international editor in chief and with the existing theories and literature (chapter two), three specific forms of strategic alliances, which Elektor could use to exploit more, are created. The forms are related to (and named) a joint venture, outsourcing, and licensing.
In appendix one the created forms of alliances are worked out. Within the forms it is determined where business functions are performed (internally/externally) and, within a joint venture, which party delivers input for internally performed business functions.
The created forms of alliances are used in the semi-structured interviews with the management team of Elektor.

Current situation

Before something is stated about the need for investment or potential costs savings when following a certain form of strategic alliance, it should be determined how business activities and their functions are performed currently. Each member of the management team was questioned on how activities and functions are currently performed. As a result of the interviews the current situation (how business activities and function are currently performed within Elektor) is established.
Below the current situation is worked out in detail per business activity.

The functions of *inbound logistics* are all conducted externally. Nolo Design, a company owned by Chris Krohne, performs this activity.
Except for the packaging function for packages with a destination outside the European Union (EU), an external supplier performs all functions of activity *operations*.
An external supplier performs all of the *external logistics* activity, except sending packages outside the EU. Elektor is more experienced and capable with packaging for destinations outside the EU. This is because Elektor controls the administrative function exporting outside the EU better than Nolo Design.
Marketing and sales functions are currently performed internally. Advertising takes place in own media (Elektor magazine) and promotion is made by online banners on the Elektor website, articles in the Elektor magazine and online newsletter, press releases, and live promotion (for example ElektorLive-tradeshow). The sales force is not really a sales force at the moment. Sales consists of the product manager and customer service department, which both are not ‘sales driven’. Quoting is done by the product manager and marketing manager. The product manager does channel selection and relation.The product manager is also responsable for pricing and the management team decides, at the end of the pricing process, if pricing is correct.
The business activity *service* is performed internally and externally. Customers assemble the Elektor Wheelie by themselves at the moment. Elektor supports its customers with manuals, online videos, web forums, print articles, live demonstrations, and a helpdesk (phone). The function installation is performed internally and externally (customers assemble). Training and installation are coupled, because customers are trained with the same resources installation is supported by (manual, online video, web forum, print articles, live demonstrations and a helpdesk).

Elektor coordinates the functions repair and parts supply (customer service department) and, if necessary, practical related activities are performed externally by Nolo Design. Product adjustment does not take place currently.
All functions of the business activity *firm infrastructure* are performed internally. Occasionally legal advice is obtained externally.
Human resource management functions are performed internally. The HR-department consults the department managers and executes.
Within the business activity *technology development,* Elektor performs research and product design internally. Sometimes Elektor hires external resources to acquire extra knowledge or insights related to these functions. The functions process equipment design and servicing procedures is performed by the same party as the business activity operations (Nolo Design).
Procurement functions are performed internally and externally. Raw materials and machinery are purchased through the party who is also responsible for the operations activity. Elektor purchases supplies, laboratory equipment, and office equipment for their activities. Buildings are purchased by Elektor to fulfil the activities it performs. External parties (like Nolo Design) purchase buildings for themselves.

Joint venture

After questioning every management team member on how business activities and functions are performed currently, they are questioned about the consequences for the organization and how costs will evolve if a certain form of alliance is followed. In appendix six the data is coded, as explained in detail in chapter three, per management team member.
Below the consequences are worked out per business activity and functions.

Following the form of strategic alliance created for a joint venture it is very clear that Elektor should invest in *inbound logistics*. All management team members indicate this. The main reason for this is, that the business activity is currently outsourced and if the joint venture and Elektor would create this activity, Elektor should invest in every function because these do not exist yet.
Because currently, an external party performs the *operations* activity, and the created form of alliance is the same as the current situation, each of the management team members indicate that this activity will not change when following the created form of alliance.
At business activity *outbound logistics* the picture is the same as at inbound logistics. Because the activity is currently performed by an external organization, and the created form of alliance states that the joint venture and Elektor must perform the activity, the management thinks that investments occur. Main investments are buildings, people, and resources (like administrative systems).
Within the created form of alliance, party X will be responsible for *marketing and sales* within the joint venture. As a result of this, the management team indicates that there are cost savings for every function. Some team members indicate that these cost savings are purely theoretical since the cost savings won't be apparent directly in practice, as the current marketing and sales activities are a small part of Elektor's much larger marketing and sales function.
Savings on costs occur because the joint venture and party X take over the marketing and sales functions that are currently performed by Elektor.
The created form of alliance for the business activity *service* is that the joint venture performs this, while Elektor gives the input for this activity. The management team states that they expect a heavier workload for the service related functions. As a result of more exploitation (and more target groups), Elektor should create a better installation and training function to inform its customers to the best extend.
It is expected that the business functions repair and parts supply will have more business when selling a lot more Elektor Wheelies, and Elektor also has to invest to settle up this functions.

The function product adjustment does not exist at the moment. The joint venture and Elektor should invest in different resources to create this function.
Elektor's CEO and the product manager think that the current capacity on installation and training is enough for when the joint venture will exploit. However, based on the statements of the other management team members, I think this will not be the case because there will be different target groups (even consumers) who need other installation and training material then is available at the moment.
Within business activity *firm infrastructure* the Elektor management team is divided on the consequences of the created form of alliance. The marketing manager, CEO, and product manager think that Elektor can save money on this activity because activities can be divided between Elektor and party X in the joint venture. Also the CEO states that Elektor will always save money because activities that are performed for the joint venture must be charged. However, this is dependent on the form of collaboration between Elektor and the joint venture. Also if the joint venture will be charged, Elektor and party X should take care that the joint venture has enough money. It is hard to state if this will work directly.
The international editor in chief and the CFO state that Elektor should investment in finance, accounting, legal, government affairs, and quality management (and also general management according to the international editor in chief). They expect work pressure will increase, and that there should be a dedicated person to coordinate the project, and the Elektor Wheelie should consequently improve.
Also within the activity *human resource management* the management of Elektor is divided about consequences if the created form of alliance is followed. The marketing manager states that the created form of alliance looks like a saving because the collaboration with party X, but because the organization/joint venture becomes larger, work pressure on the functions becomes higher. The marketing manager expects that the activity remains the same.
The CEO states that activities that Elektor performs for the joint venture can be charged, although this will be dependent on the situation and Elektor should 'pay' itself beforehand for performing an activity.
The other management team members state that an investment should be made, because the joint venture and Elektor must look for new employees, hire, train and develop their skills (this is also true for current employees).
At the business activity *technology development* investments should be made in the functions research and product design, because when the joint venture and Elektor are going to exploit more, more people are necessary for work dedicated to the Elektor Wheelie project. The joint venture and Elektor should develop more types to satisfy different customer needs.
The party who performs the operations function, in this case an external organization, also performs process equipment design and servicing procedures. These functions remain the same.
Elektor's CEO also states that Elektor could charges the joint venture for its work, so that this would save costs for Elektor. But this depends on how arrangements between Elektor and the joint venture are made and these arrangements are not the subject of this study. Elektor should pay itself beforehand, because the joint venture cannot dispose of a lot of capital immediately.
Here, the management team is roughly on the same level. Every member states that the *procurement* activity related to the Elektor Wheelie is a very small operation and that, if the created form of alliance is followed, Elektor will not notice that the joint venture and party X have taken over this activity. Theoretically there can be a cost saving on supplies, laboratory equipment, office equipment and housing because these functions are taken over. The functions raw materials and machinery will by purchased by the organization that is in charge of the operation.
In conclusion, one can state that internal functions remain the same, although theoretically there could be savings.

Outsourcing

In same way as the created form of alliance joint venture, a form of alliance related to outsourcing is created (see appendix one). In the model shown at the end of this chapter, the data is coded as explained in detail in chapter three. Below consequences are worked out per business activity and functions.

The management team is clear about *inbound logistics*. Following the created form of alliance the cost structure of this business activity remains the same. The entire management team states that this function is already outsourced at the moment and that, following the created form of alliance, nothing will change for Elektor in this structure.
The business activity *operations* is outsourced currently as it is within the created form of alliance. According to the management, the two situations do not differ from each other so, the activity remains the same when following the created form of alliance.
The *outbound logistics* activity also remains the same when the created form of alliance is followed, according to the Elektor's management. Currently, this business activity is outsourced and in the created form of alliance this is also the case. Only the CEO thinks that Elektor currently performs this activity, but the other team members state that the activity is outsourced already. The CFO states that a small saving can be made on the functions delivery vehicle operation, order processing, and scheduling because of the savings that could occur on the shipments outside the EU. The CFO also expect that this potential saving will be very small.
The main implication for the business activity *marketing and sales* when Elektor follows the created form of alliance is to invest. Because of the exploitation and (larger) target groups, activities related to the business functions increase. The management of Elektor states that more people, resources, knowledge, and promotion will be able to fulfil the growing marketing and sales functions. According to the management Elektor should also buy external advertisement space and needs a dedicated product manager to run the Elektor Wheelie exploitation,.
Investments should also be made in the business activity *service* when following the created form of alliance. Because Elektor will exploit more, this will result in more target groups and more sales. This brings about other needs (per target group), and more (different) installation guides and trainings opportunities are needed. For the functions repair and parts supply following the created form of alliance means more sales, leading to an increase in repairs and the supply of parts. Work pressure on these functions will increase, which means that more people or a software system are needed, to coordinate and perform the activities. Because of the growth, investments should be made, to perform the business functions to the best extend, according tot the management team. The function product adjustment would have to be started up because this function does not exist currently. This means another investment.
Within the business activity *firm infrastructure* the management team is somewhat divided on the consequences for Elektor when following the created form of alliance. In general the management team states that investments should be made in the functions legal and government affairs because they expect that liability will change when selling the Elektor Wheelie to more target groups and when selling end products in stead of Wheelie construction packages.
It is also recognized that investments should be made in the functions finance and accounting. Because Elektor will sell a lot more Elektor Wheelies, transactions, invoices and the number of customers will increase. This, in turn, will increase employment. In order for this to work, a system must be in place that can handle all the aforementioned activities.
The management team is somewhat divided regarding general management and planning. Some members expect that these functions will not increase work pressure because the number of sales does not influence the workload. Others state that these functions will increase and that an investment must be made, in order to fund hiring a general manager for the Elektor Wheelie project alone, since the project needs more management and control.

In quality management an investment should be made because four (of five) management team members expect this function to grow as a result of more control moments and the constant process of creating a better Elektor Wheelie.
Four of the five management team members state that an investment should be made in the functions recruiting and hiring, which are business functions of *human resource management*. The main reason for this is that the other business activities need more employees to be able to perform their functions. As a result of this, Elektor should recruit and hire more people.
Also four management team members state that an investment should be made in training and development when following the created form of alliance. It becomes more important that personnel know everything about the Elektor Wheelie technique. When there are more different types of Wheelies, personnel must learn about different techniques applied in different Wheelies. It is stated that the compensation function is a simple process that can remain the same. However, other team members state, that this function will create a heavier workload compared to the current situation because there will be more employees and more to compensate.
Within the business activity *technology development* there is a consensus that investments should be made in the functions research and product design. When Elektor exploits more, a bigger demand is expected on the research/product design department as a result of different demands from the market. The department must respond to the growing demand for different types of the Elektor Wheelie, and design these types. At the technology development department a dedicated project leader is needed, which currently is not the case.
The functions process equipment design and servicing procedures can remain the same because the operations party performs these functions. Within this created form of alliance the operations are outsourced.
The functions raw materials and machinery of the business activity *procurement* remain the same according to the management team, because the external operations supplier performs these functions. Also the function supplies can remain the same, because Elektor should not buy extra products used during the normal business function immediately.
Also the function laboratory equipment can remain the same because Elektor's laboratory already has all the material needed in-house.
Investments should be made in office equipment and housing if Elektor follows the created form of alliance, according to the management team. Because Elektor needs more employees when exploiting more, it also needs more office equipment and housing facilities.

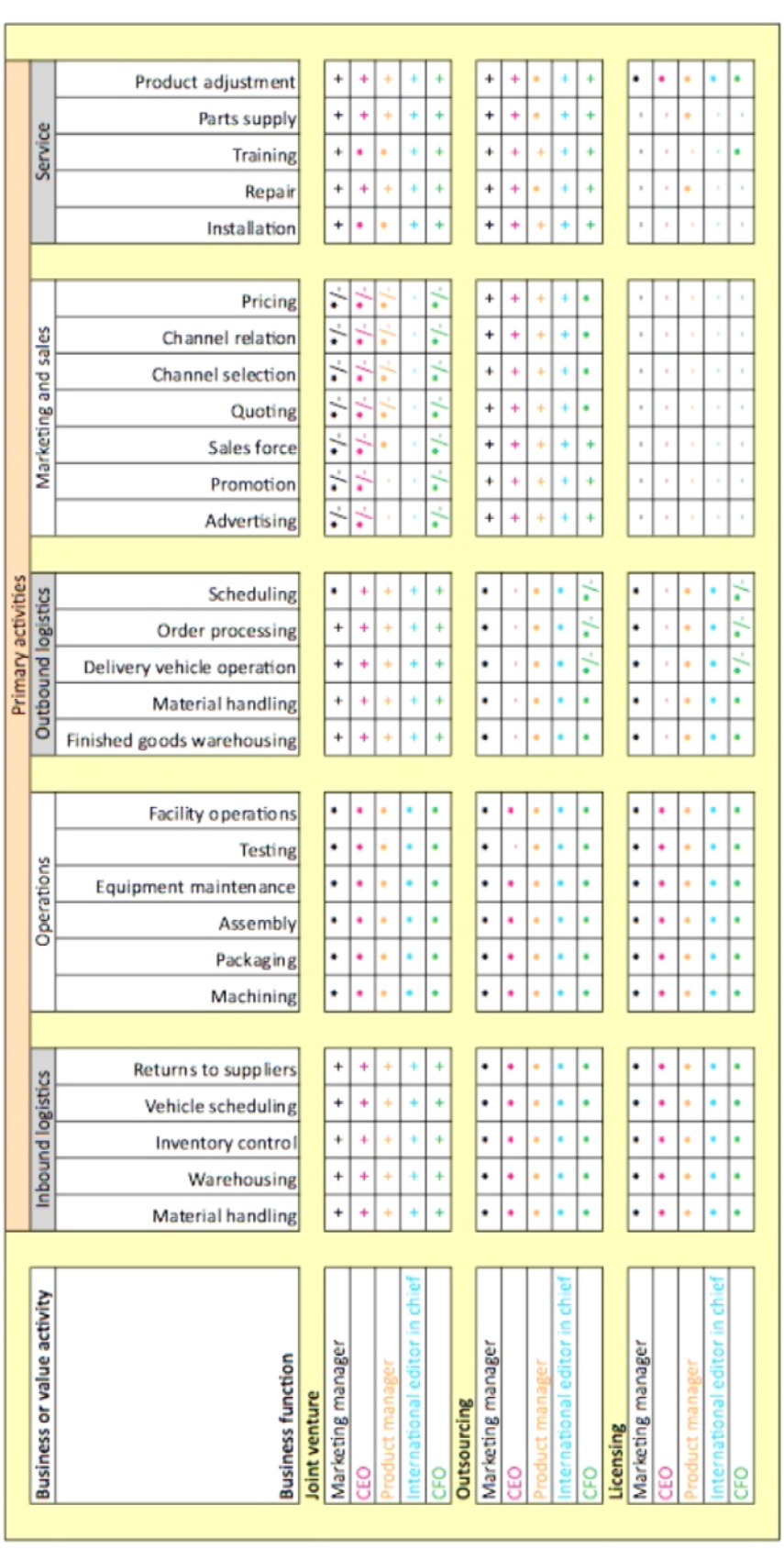
Licensing

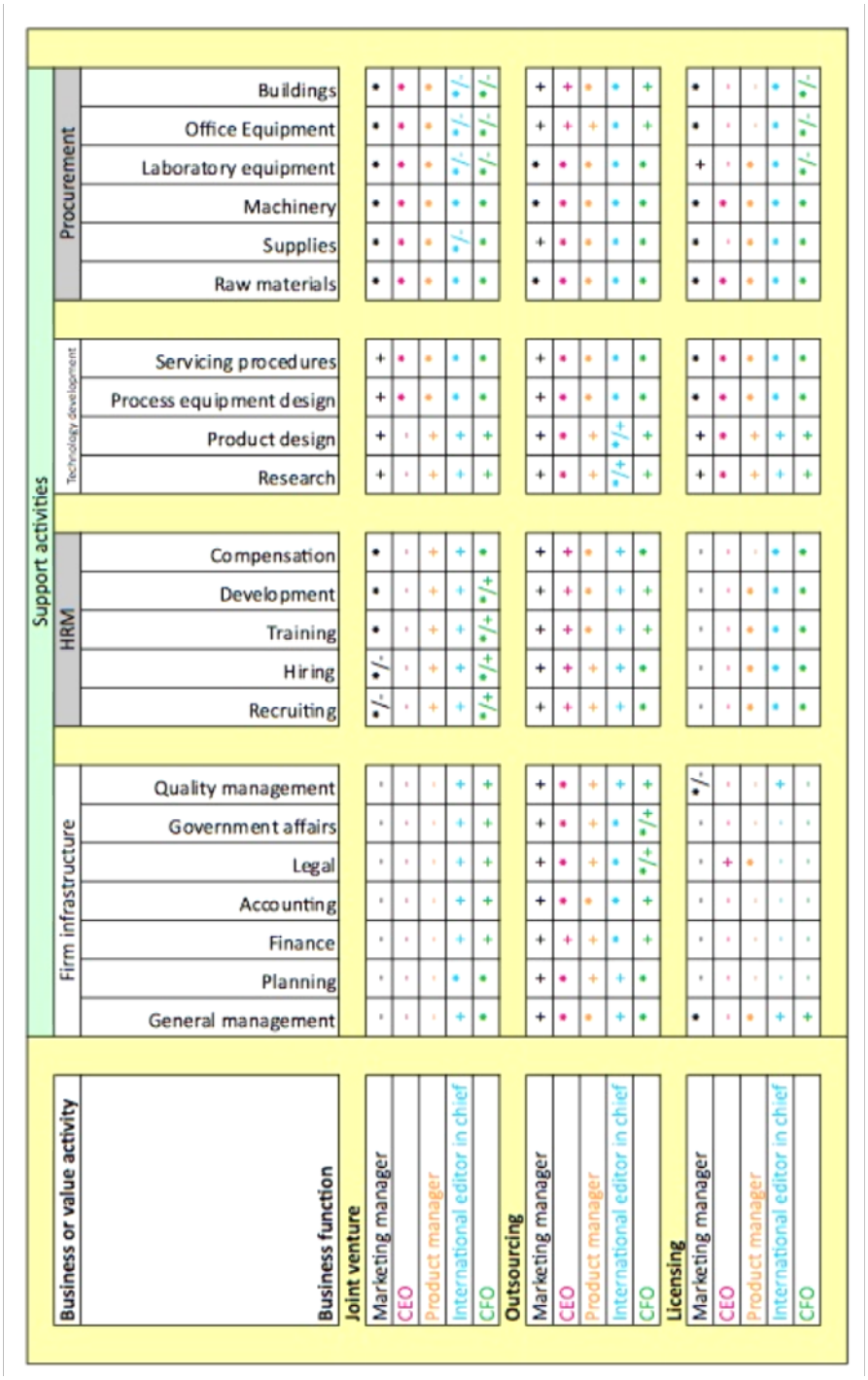
In the same way as the created forms of alliances joint venture and outsourcing, a created form of alliance related to licensing is created (see appendix one). In the model shown at the end of this chapter, the data is coded as explained in detail in chapter three. Below the consequences are worked out per business activity and functions.

The management team is unanimous on the business activities *inbound logistics* and *operations*. Both the activities are currently performed through an external partner and when Elektor follows the created form of alliance this will also be the case. For this reason the management unanimously states that nothing related to costs will change for these business activities.
Also for the business activity *outbound logistics* the management team more or less agrees. Only Elektor's CEO thinks that savings are possible here, because he thinks that Elektor currently performs the business activity. But, the business activity is already performed by an external organization currently. For this reason, the activity stays the same. The current situation is the same as the situation within the created form of alliance.
Within the business activity *marketing and sales* the entire management team states that there can be savings. Elektor currently performs all marketing and sales functions on its own. The work that

Elektor currently performs for marketing and sales will, when following the created form of alliance, be performed by the licence partner. As a result of this, Elektor can save money on the reduced deployment of personnel and costs that are associated with promotion and software/systems according to the management.
At business function *service* savings can be made on the functions installation, repair, training, and parts supply. Because the licence partner will perform these functions, Elektor can save on work that is performed by the laboratory and customer service department currently. The function product adjustment does not exist at the moment; here the structure stays the same for Elektor.
At the business function *firm infrastructure* the management team members have slightly different opinions when determining what implications the created form of alliance will have on Elektor. However, it is clear that the management team members will all invest in a coordinator for the licence contract. When combining the answers given, this will be a combination of the functions general management and legal. At all other functions the management team members state that money can be saved because the functions will be performed, but by the licence partner, not by Elektor, when following the created form of alliance.
The coded data related to the business activity *human resource management* shows a clear distinction between two management team members who state that there will be cost savings and three management team members who state that the functions remain the same. However, in working out the interviews, it becomes clear that all management team members think, that when the created form of alliance is followed, a theoretical saving results, while in practice this will not be noticed by Elektor because currently there is less work related to the human resource functions and the Elektor Wheelie.
The functions process equipment design and servicing procedures, part of the business activity *technology development*, remain the same as these functions are currently also performed by an external organization.
Four management team members state that investments should be made in research and product design because Elektor must continuously improve the Wheelie, design new Wheelie's, satisfy needs from the licence partner, and stay in dialogue with the licence partner to, at the long term, maintain a good relationship (product orientated) with the licence partner and try to make work of continuously improving and discovering new Wheelie's that the licence partner can sell again to its (potential) customers.
Within the business activity *procurement* the functions that are already performed by an external partner (raw materials and machinery) remain the same according tot the management team. Because supplies, office equipment and housing are a small part of the total operation of Elektor the management does not expect that the potential savings here will be directly recognized when the functions is performed by the licence partner.
The management states that laboratory equipment can stay the same because all the equipment needed for the functions research and product design (business activity technology development) is in-house. The business activity procurement stays reasonable the same.

On the next two pages the created model is shown. On the horizontal axis the business activities and functions are situated. On the vertical axis the created forms of strategic alliances are shown. Per form of alliance, per business function, and per unit of observation, the costs effects are coded in the model. + means: investment, * means: stays the same, and – means: save money.


Primary activities
Inbound logistics
Material handling
Warehousing
Inventory control
Vehicle scheduling
Returns to suppliers
Operations
Machining
Packaging
Assembly
Equipment maintenance
Testing
Facility operations
Outbound logistics
Finished goods warehousing
Material handling
Delivery vehicle operation
Order processing
Scheduling
Marketing and sales
Advertising
Promotion
Sales force
Quoting
Channel selection
Channel relation
Pricing
Service
Installation
Repair
Training
Parts supply
Product adjustment
Business or value activity
Business function
Joint venture
Marketing manager
CEO
Product manager
International editor in chief
CFO
Outsourcing
Marketing manager
CEO
Product manager
International editor in chief
CFO
Licensing
Marketing manager
CEO
Product manager
International editor in chief
CFO


Support activities
Procurement
Buildings
Office Equipment
Laboratory equipment
Machinery
Supplies
Raw materials
Technology development
Servicing procedures
Process equipment design
Product design
Research
HRM
Compensation
Development
Training
Hiring
Recruiting
Firm infrastructure
Quality management
Government affairs
Legal
Accounting
Finance
Planning
General management
Business or value activity
Business function
Joint venture
Marketing manager
CEO
Product manager
International editor in chief
CFO
Outsourcing
Marketing manager
CEO
Product manager
International editor in chief
CFO
Licensing
Marketing manager
CEO
Product manager
International editor in chief
CFO

5. Conclusion

Elektor states that some of its products have potential to be sold to a broader target group and more revenue can be created when exploiting more. One of these products is the Elektor Wheelie. Currently, the Elektor Wheelie is a building kit and is sold to the readers of the Elektor magazine. Elektor's management team has decided to exploit the Elektor Wheelie more than it does at the moment. They want to exploit the Elektor Wheelie using a form of strategic alliance.

In this study three forms of strategic alliances were examined: joint venture, outsourcing, and licensing. Based on the business activities of Porter (1985) and with the use of relevant theories about joint venture, outsourcing, and licensing, and a semi-structured interview, three relevant exploitative forms of strategic alliances are created (appendix one).
These forms of strategic alliances are relevant for Elektor because Elektor hesitates which of these forms of strategic alliances it could use to exploit the Elektor Wheelie.
The created forms of strategic alliances were presented to each of Elektor's management team members individually. Per business activity and function, given by Porter (1985), questions are asked that result in information that determines if Elektor should invest, could save money, or that nothing would happen to costs following the created form of alliance. The information obtained was coded and processed to a model (chapter four). The model creates an overall picture of what will happen to costs when a certain form of alliance is followed. If there are differences of opinion in the management team on the consequences for costs, it is determined how these differences could occur and processed in the results (chapter four). The results deliver insights on the consequences for costs and the implications for the organization per form of alliance.
If Elektor would start a joint venture as the created form of alliance, it must invest in inbound logistics, outbound logistics, service, and technology development. Savings can be made at the business activity marketing and sales. The operations and procurement activities remain the same when following the created form of alliance. At business activities firm infrastructure and human resource management, the management team is divided on the consequences for costs, so it is hard to state something about these.
The main implications for the organization are need for employees, it-systems, housing, and extra knowledge when following this form of strategic alliance.
If Elektor decides to exploit more using the form of alliance that is created for outsourcing it must invest in the business activities marketing and sales, service, firm infrastructure, human resource management, and technology development. Elektor's management states that no savings can be made using this form of strategic alliance. The business functions inbound logistics, operations, outbound logistics, and procurement can remain the same.
When following the created form of alliance the main implications for the organization are need for employees, it-systems, housing facilities, promotional channels, and extra knowledge. Elektor should become more consumer-orientated and a dedicated product manager must manage the exploitation.
Within the form of alliance licensing, Elektor should invest only in the business activity technology development. Savings will occur at marketing and sales, service, and firm infrastructure. Business activities inbound logistics, operations, outbound logistics, human resource management, and procurement remain the same when following the form of alliance.
Also an investment should be made in a manager for the licensing contract(s) according to the management team of Elektor. The main implication for the organization is that legal and management capabilities must be acquired.

The information created in the results and model requires that Elektor should invest in most business activities when following the created form of alliance for outsourcing. The created form of alliance joint venture requires fewer investments in business activities than outsourcing. Licensing requires

the least investments in business activities. However, this information only indicates where investment should be made, not how much the investments should be in monetary terms.
To create more specific information about investments, Elektor should first create a strategy where the competitive position of the Elektor Wheelie and the choice for markets are determined. With this information Elektor could pre-select the forms of strategic alliances explained in this study that still fit its stated strategy. Strategy could indicate a certain preference for a certain form or forms of strategic alliances.
When the above stated information is available, Elektor should create more specific information about implications for the organization and consequences for costs, using the created model in this study as a foundation. Potential forms of alliances can be made more specific by Elektor, so that specific implications and costs for the organization can be determined. The created model is the foundation in making information more specific. In this study an exploratory step is made by showing the general implications and areas of costs and savings as a starting point for Elektor to create more balance between exploration and exploitation.
In appendix three a business case is provided that creates understanding about the steps Elektor should make to come to an exploiting strategic alliance. In appendix two a practical tool is viewed that Elektor could use to create a strategic alliance.

When Elektor has indicated its potential forms of alliances to exploit, and has made clear the implications and costs for the organization, it should also indicate potential revenue. When determining potential revenue per form of alliance Elektor can compare costs and (potential) revenue per form or alliance, so that it can determine the form of strategic alliance that will create the most benefits for Elektor.
Revenue can be created in different ways. The first option is for Elektor to exploit the Elektor Wheelie itself. Second, Elektor could license some other party to exploit the Elektor Wheelie, and third Elektor could transfer the ownership of the technology.
The first way of creating revenue fits the outsourcing form of alliance where Elektor will exploit the Elektor Wheelie by itself. The second way fits the joint venture and licensing form. Elektor could create a new organization with party X (joint venture) and license the joint venture to exploit the Elektor Wheelie. Also Elektor could license another organization in which it does not have any shares. When Elektor licenses an organization to exploit the Elektor Wheelie it could agree a royalty to create revenue. Third, Elektor could transfer the technology to an external organization and agree on a royalty and/or lump sum. This could also be the joint venture where technology is transferred.

A main advantage for Elektor when using a joint venture to exploit is that another organization can perform the activities that Elektor does not control well or lacks the resources for. But when Elektor starts a joint venture it should also share profits, which is a disadvantage. This disadvantage does not occur when Elektor exploits the Elektor Wheelie itself using outsourcing.
A main advantage mentioned in the outsourcing literature is that by using outsourcing, an organization can concentrate on core competences and, as a result of that, creates competitive advantage. But Elektor's core competence is more of an explorative nature, so this advantage is only true if Elektor changes or switches its core competence. However, the explorative nature of Elektor could also be an advantage when exploiting itself. A disadvantage mentioned is that too many activities can lead to loss of innovative skills as a result of outsourcing. Because Elektor is already innovative, this disadvantage can turn into an advantage.
When Elektor licenses another party to exploit the Elektor Wheelie or transfers technology of the Elektor Wheelie it could create revenue, relatively simple and without big investments, through royalties and/or a lump sum. When Elektor only license an organization to exploit the Elektor Wheelie is has the advantage that it has the ability to influence the extent of the licensee's revenue because Elektor create the licensing agreement. The main disadvantage for Elektor is that a lower price-cost margin is created using licensing.

It is very hard, at this stage, to determine which form of strategic alliance fits Elektor best to create a better exploitative channel. If Elektor wants to engage in licensing, it should gain a patent on the technology of the Elektor Wheelie to exploit that technology to the best of it's ability, and to protect itself from parties who will exclude Elektor when they know the technology.
The created forms of strategic alliances joint venture and outsourcing both have their pros and cons. As explained earlier, a decision for the form of strategic alliance to exploit must be based on more specific information.
In this study the first step to exploitation is made by gathering greater knowledge about the different forms of strategic alliances, how they will influence costs, and how revenue can be created.
With the use of this information, Elektor can create a general strategy and determine to which extent it is willing to invest when creating a strategic alliance. In appendix two a practical tool is created that helps Elektor make a decision on a specific form of strategic alliance to exploit. The business case performed in appendix three is based on the tool in appendix two.
When Elektor has completed all steps, and has gathered more specific information on costs and revenue, it can make a decision for a strategic alliance to exploit the Elektor Wheelie.

6. Recommendations and discussion

Before Elektor can start to exploit the Elektor Wheelie it should create a strategy as explained in the conclusion. Elektor should determine its competitive position and in which markets it wants to be active to exploit the Elektor Wheelie.
After the strategy creation phase, Elektor can pre-select the forms of strategic alliance explained in this study that still fits its strategy. After the selection, Elektor should obtain more specific information about the implications for the organization and consequences for costs, using the created model in this study as a foundation. In appendix two a practical tool for the next steps is created and in appendix three a business case is worked out to show how the model can be used.
In this study, the main implications for the organization and indications for investments, costs, and savings per created form of alliance are created. The next steps in de model are steps to gather more specific information about implications and costs. As a result of these steps, detailed information about a certain form of alliance should be generated. With the information about revenue creation provided in this study, Elektor can determine its preferred manner of creating revenue and compare it with the costs of a certain form of strategic alliance to determine, in the end, the form of strategic alliance that will create the most benefits for Elektor.

This study provides Elektor with a clear direction in their search for costs and revenue when using a certain form of strategic alliance. In this study a first impression of investments, savings, and revenue creation is created, when following a certain form of strategic alliance.
Determining where specific costs and savings arise when exploiting with a certain form of strategic alliance will be more straightforward, because on a general level this is already made clear in this research.
As a result of this study it is less complicated to measure the impact on the organization of a certain form of strategic alliance, because now it is known where and at what functions, investments should be made, or cost savings can arise when following a certain scenario.
Besides of all these specific created value there is also more knowledge, in relation to exploitation with a form of strategic alliance, created in this research. Advantages and disadvantages are made clear, and are applied to Elektor.
Furthermore, knowledge is gained about the ways in which revenue can be created when engaging in a certain form of strategic alliance.

Because this research is a single case study its generalizability is low. However, other explorative organizations with the same sort of dilemma as Elektor, could use the same method as is applied in this study to take their first steps in determining which form of strategic alliance fits them best and what the implications for their organization will be.
The approach of this research to create a better balance between exploration and exploitation in an explorative organization that wants to exploit more with a strategic alliance using business activities stated by Porter (1985), is a valuable addition to existing theories about balancing exploration and exploitation and strategic alliances, because this approach gives information that enables organizations to make their decision for a certain form of strategic alliance and couples theories of exploration and exploitation, strategic alliances and business activities. In further studies the model could be tested on more explorative organizations that want to exploit and, if necessary, improved. Further study could result in a best practice to determine the most suitable form of strategic alliance for explorative organizations that want to exploit more and, as a result of that, balance exploration and exploitation.

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Appendices

Appendix 1: Strategic alliance forms

Appendix 2: Practical tool for determining form of strategic alliance

Appendix 3: Business case: Elektor Wheelie

Appendix 4: Defining business functions

Appendix 5: Prior information interviews

Appendix 6: Elaboration interviews

Appendix 7: Elektor Wheelie information

Appendix 1: Strategic alliance forms

To create direction and clarity in the empirical part of this research three specific forms of strategic alliances, based on the theoretical framework and practice, are created. These forms are based on the definitions of the different strategic alliance forms and on possible alliance formation at Elektor. Below stated forms of alliances are created in consultation with Elektor using a semi-structured interview (see also chapter three).
In the interviews with all management team members the created forms of alliances are subject for the investment related questions and answers.

Joint venture

A joint venture is defined as something that occurs when two or more firms pool a portion of their resources within a common legal organization (Kogut, 1988).

Schematic it looks like below shown image. The black timeline is the process where business functions and activities, as described in chapter two, occur. The blue bar is the share of Elektor, the yellow bar of the partner. In this case the partner is unknown, I will call it 'party X'
The schematic picture is just to give an idea how a strategic alliance could look like using a joint venture.

If Elektor decides to start a joint venture this will be based on strategic reasons. This approach is driven by the competitive position and the impact of this on profit. Because Elektor wants to exploit more, and as a result of that are looking for a way to sell more, this is in line with the strategic behaviour theory. Also some aspects of the organizational theory are present because Elektor want to have a partner that haves the knowledge on how to sell the products more.

In the table below the business activities with the chosen form of alliance are stated. With respect to the form we determined if the fulfilment of the activity is within the joint venture (internal) or outside the joint venture (external). Also we have determined if the input must come from Elektor, party X or other parties.

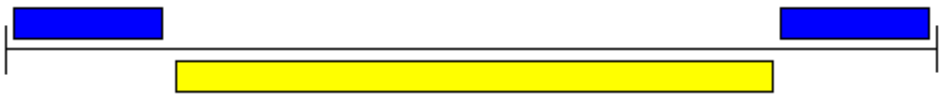
Activity	**Created form of strategic alliance**
Firm infrastructure	Fulfilment: internal Input: Elektor and party X
Human resource management	Fulfilment: internal Input: Elektor and party X
Technology development	Fulfilment: internal Input: Elektor (external for functions who are part of operations)
Procurement	Fulfilment: internal Input: party X (external for functions who are part of operations)
Inbound logistics	Fulfilment: internal

	Input: Elektor
Operations	Fulfilment: external Input: external supplier(s)
Outbound logistics	Fulfilment: internal Input: Elektor
Marketing & sales	Fulfilment: internal Input: party X
Service, including technical support	Fulfilment: internal Input: Elektor

Outsourcing

Outsourcing is defined as the process of transferring the responsibility for a specific business function from and employee group to a non-employee group (Zhu, Hsu & Lillie, 2001).
Outsourcing is approached by relevant literature to a situation where a make or buy decision has to take place (Arnold, 2000).

Schematic outsourcing looks like below shown image. The black timeline is the process where business functions and activities, as described in chapter two, occur. At the blue bar Elektor is performing activities internal, at the yellow bar external organizations supply Elektor. The schematic picture is just to give an idea how a strategic alliance could look like using outsourcing.



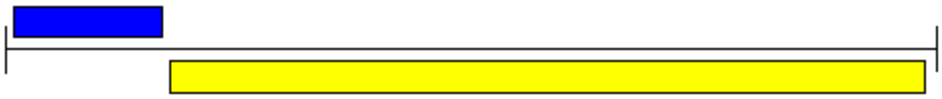
In the table below the business activities within the chosen forms of alliances are stated. With respect to the forms we have determined if the fulfilment of the activity is internal (by Elektor itself) of external (by a supplier).

Activity	**Created form of strategic alliance**
Firm infrastructure	Fulfilment: internal
Human resource management	Fulfilment: internal
Technology development	Fulfilment: internal (external for functions who are part of operations)
Procurement	Fulfilment: external (and internal for internal business activity related procurement)
Inbound logistics	Fulfilment: external
Operations	Fulfilment: external
Outbound logistics	Fulfilment: external
Marketing & sales	Fulfilment: internal
Service, including technical support	Fulfilment: internal and external

Licensing

Licensing is defined as an agreement that regulates technology transfer in return for a fee (Hagedoorn, 1990).

Schematic licensing looks like below shown image. The black timeline is the process where business functions and activities, as described in chapter two, occur. At the blue bar Elektor is performing activities internal, at the yellow bar an external organization (or more) produce and sell products licensed by Elektor. The schematic picture is just to give an idea how a strategic alliance could look like using licensing.



In the table below the business activities with the chosen form of alliance are stated. With respect to the forms we determined if the fulfilment of the activity is internal (by Elektor itself) of external (by a licensee).

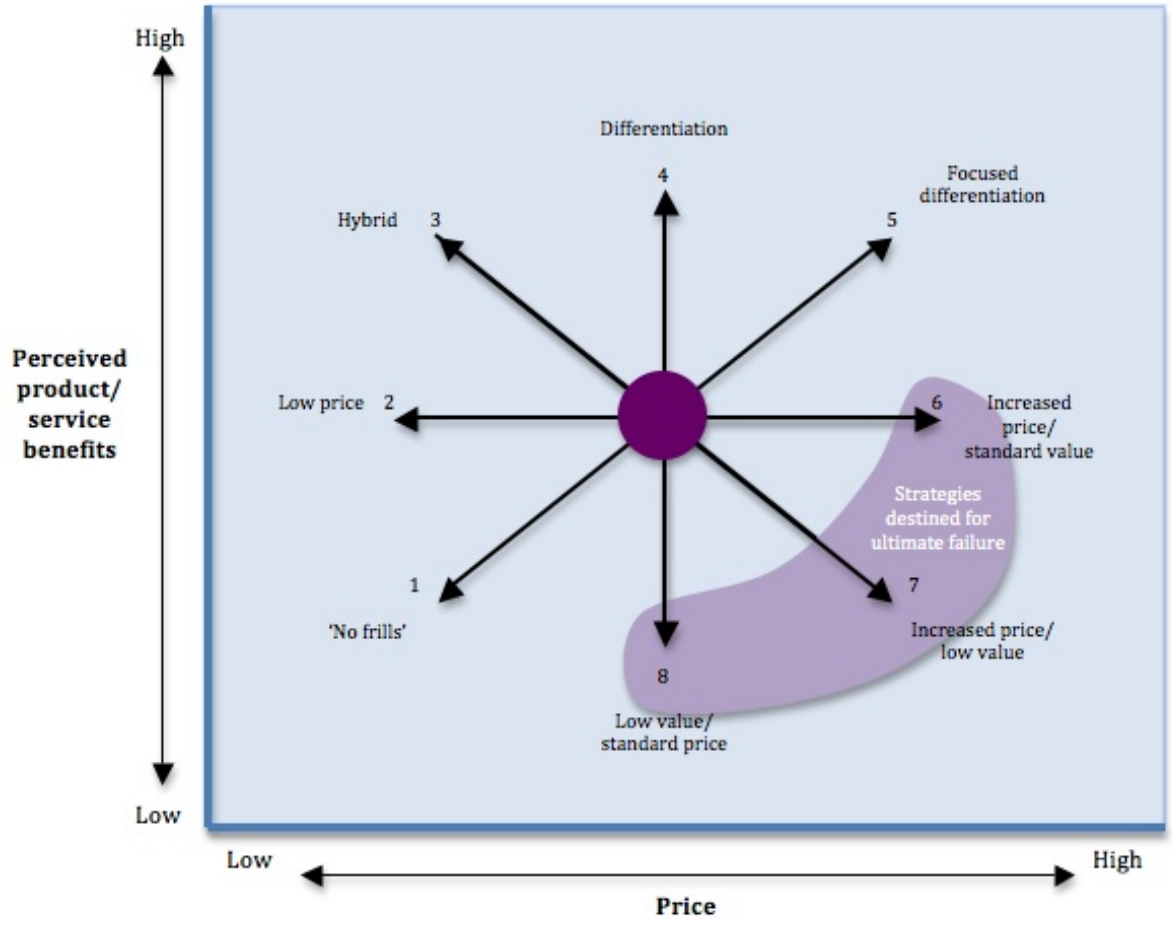
Activity	**Created form of strategic alliance**
Firm infrastructure	Fulfilment: external (internal only coordination)
Human resource management	Fulfilment: external
Technology development	Fulfilment: internal (external for functions who are part of operations)
Procurement	Fulfilment: external
Inbound logistics	Fulfilment: external
Operations	Fulfilment: external
Outbound logistics	Fulfilment: external
Marketing & sales	Fulfilment: external
Service, including technical support	Fulfilment: external

Appendix 2: Practical tool for determining form of strategic alliance

To determine the future of exploitation of the Elektor Wheelie with a strategic alliance I have created a practical tool, according to the literature of Johnson et al. (2008) and this research. They state that the future of an organization and the way it needs to respond to external influences is based on three strategic choices. As a result of treating the three choices and with the use of this research, Elektor could decide which form of strategic alliance it will choose to exploit the Elektor Wheelie.

Step 1: the choice how the Elektor Wheelie must be positioned in relation to competitors

Elektor should determine how its (potential) customers make choices on the basis of their perception of value for money. This is the combination of price and perceived product/service benefits. Faulkner and Bowman (1995) have created the strategy clock (see model below), which represents different positions in a market where customers have different 'requirements' in terms of value for money.



Strategy clock (Faulkner & Bowman, 1995)

The positions in the Strategy Clock also represent a set of general strategies for achieving competitive advantages. Elektor should investigate how much their (potential) customers would pay for an Elektor Wheelie and how much 'benefits' the product and service must contain.

When customers want a low price and low/mid product/service value Elektor could choose for a price-based strategy. The 'no frills' strategy is typically chosen if commodity markets exist, if there are price-sensitive customers, when buyers have high power, and to avoid major competitors (Johnson et al., 2008). The other priced-based strategy is the low-price strategy, which seeks a lower

price than competitors while maintaining similar value/benefits as the competitors and creating a higher value than the 'no-frill' strategy (Johnson et al., 2008).
Both price-based strategies should be pursued with a low-cost base (Johnson et al., 2008).

Elektor could also choose a broad differentiation strategy where products and services are provided that differ in the benefits in relation to competitors and are widely valued by customers. The aim is to offer better products at the same price (Johnson et al., 2008).
A hybrid strategy seeks simultaneously to differentiate and aid to the creation of a lower price than that of competitors. Especially for organizations that can produce greater volumes than its competitors and can create cost reductions outside of the differentiated activities this strategy will deliver competitive advantage (Johnson et al. 2008).
The focused differentiation strategy provides high-perceived product/service benefits for customers, often in a selected market segment and for a substantial price (Johnson et al., 2008). Products who follow this strategy are mostly premium brands and heavily branded (Johnson et al., 2008).

The strategies in the Strategy Clock that are labelled as failure-strategy are strategies that do not provide perceived value for money in terms of product features, price or both (Johnson et al., 2008). It is obvious that Elektor should not follow these kinds of strategies when exploiting the Elektor Wheelie.

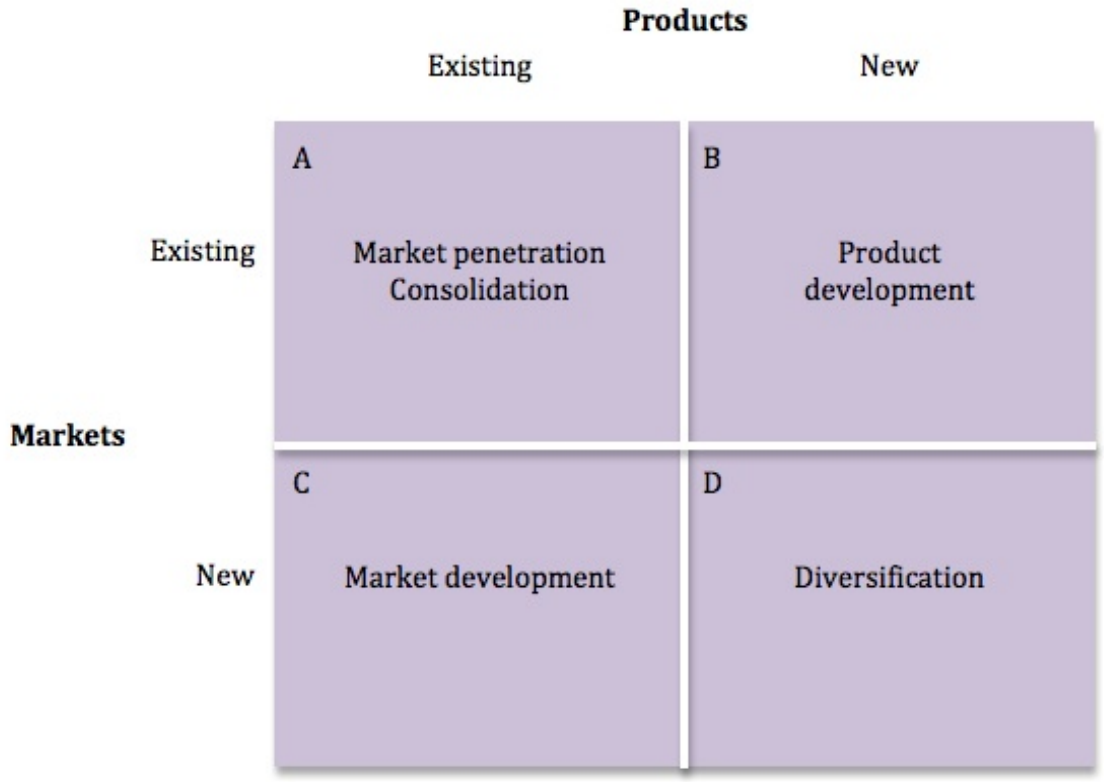
Based on customers' preferences Elektor should engage in a strategy that aims to a competitive advantage. These preferences can also have an impact on the decision for a certain form of strategic alliance. If, for example, (potential) customers indicate that the Elektor Wheelie should be an exclusive product that should follow a focused differentiation strategy, but this does not fit the overall strategy of Elektor, this could be a strong motive to create a joint venture or to license the technology.

Step 2: the choice of products and markets

With the goal to exploit the Elektor Wheelie, but not knowing (yet) how, Elektor must know which markets they enter and if they make the Elektor Wheelie part of their current portfolio or create an other channel.

Based on the 'Corporate Strategy literature' of Ansoff (1988) the Ansoff product/market matrix is created (see model below). This model provides four alternative directions for strategic development. Within the direction 'market penetration' the organization takes increased share of existing market(s) with its existing product range (Johnson et al., 2008). Elektor should explore if it is able to increase the penetration of the Elektor Wheelie in an existing market. Consolidation occurs when organizations focus defensively on the current markets with current products (Johnson et al., 2008).
Elektor could also decide to modify or create a new (kind of) Elektor Wheelie. When Elektor decides to do this, it will go into the 'product development' direction. Though, this strategic direction can be expensive and bring a lot of risks (Johnson et al., 2008).
Elektor could also create an extra revenue stream by introducing the Elektor Wheelie in new markets. 'Market development' might take three forms: new segments, new users and new geographics (Johnson et al., 2008).
Diversification is a strategy that takes an organization away from its existing markets and existing products. Here, an organization decides to create new markets with new products (Johnson et al., 2008). Diversification is the most radical strategy direction an organization could choose (Johnson et al., 2008). Value-creating reasons for diversification are gaining efficiency through the use of underutilized resources, stretching corporate parenting capabilities that otherwise would be neglected and increasing market power by having a diverse range of businesses. As a result of a

range of businesses it is possible to cross-subsidise one business from the surplus earned by another (Johnson et al., 2008).



Product / market matrix (Ansoff, 1988)

Elektor should decide on product and market level what they want to do with the Elektor Wheelie. These decisions will have an impact on the form of strategic alliance in which Elektor will exploit the Elektor Wheelie.

Step 3: the choice how strategies are to be pursued

If Elektor knows how to position in relation to competitors and has chosen with what kind of product and in what kind of market it will compete, Elektor should only decide which method it will choose to pursue their strategy. Johnson et al. (2008) distinguishes three forms, namely organic development, mergers and acquisitions, and strategic alliances. Organic development is where organizations develop own capabilities to build the chosen strategy. An acquisition is where the organization takes over another organization and a merger is a mutually agreed decision for joint ownership between organizations (Johnson et al., 2008).
The two above stated forms of pursuing a strategy are for Elektor not addressed, because it already have chosen to exploit with a certain form of strategic alliance. In this study you can read more about strategic alliances and, more specific, joint ventures, outsourcing, and licensing.
Based on step one and two Elektor should determine which form of alliance fits them most. In this study the different forms of strategic alliances are worked out in detail and different ways of creating revenue are explored. Also I have created an indication on the costs per business function/activity that are created when following a certain form of alliance.

Based on the competitive position, the strategic direction, potential revenue, and indicated costs, Elektor could make its decision for exploiting the Elektor Wheelie. Elektor should identify specific costs per form of alliance and implications for the organization as explained in the research. The

created model can be followed to assign costs to business activities and functions and measure implications for the organization. When Elektor also has identified potential revenue it could compare it to the costs and implications of the different forms of alliance and make a decision for exploitation.
In appendix three the use of the model is explained as a business case.

In short, further steps to create an exploitative strategic alliance are:

1. Strategy creation
1.1 The choice how the Elektor Wheelie must be positioned in relation to competitors
1.2 The choice of products and markets

2. Pre-selection of strategic alliances as a result of the created strategy.

3. Determination of specific costs and implications for the organization per form of strategic alliance based on the created model.

4. Indication of revenue creation per form of strategic alliance.

5. Comparison between costs and implications for the organization and revenue per form of strategic alliance.

6. Determination which form of strategic alliance is most valuable for Elektor to exploit the Elektor Wheelie.

Appendix 3: Business case: Elektor Wheelie

In appendix two a practical guide to determine a form of strategic alliance is set up. This business case serves as example of the use of this guide and to make the use of the created model clearer. It is illustrated how the model can be used in practice based on existing information, assumptions, fictitious information and knowledge and insights of the researcher. As a result of this business case it is the goal to create understanding about the use of the model. It is not the goal to advice Elektor which form of strategic alliance they should choose to exploit.
Focus is on exploiting the Elektor Wheelie with a joint venture, outsourcing or licensing.

Before starting to think about a form of strategic alliance that could be used to exploit the Elektor Wheelie, we should determine the desired competitive position and the choice for markets. This is stated in chapter six of this study and in appendix two a practical tool for determining a form of strategic alliance is given.

Competitive position

In 'step 1' of appendix two it is stated that Elektor should investigate how much their (potential) customers would pay for an Elektor Wheelie and how much 'benefits' the product and service must contain. First, we should determine who potential customers of Elektor are. Currently customers of Elektor are the readers of the magazine. A small group of these readers buys the Elektor Wheelie as a building kit. Because Elektor wants to exploit the Elektor Wheelie more, the target group should be made broader. Here we assume that the target group are inhabitants and organizations of/in The Netherlands that use own transportation for short distances. Second, we should investigate how much a potential customer would pay for an Elektor Wheelie. We assume that the target group cannot build the Elektor Wheelie itself. Because currently the Elektor Wheelie is delivered as a building kit to a customer we should hire someone or some organization that builds the Wheelie for the customers and delivers it. If we look at a competitor, Segway, they offer a comparable product with a comparable technique from € 5450,-[1] (excluding VAT). The Segway is delivered ready for use to the customer and is sold especially to other organizations. Not many consumers and organizations buy the Segway yet, because they are not familiar with the technique and the price is too high. Elektor can offer a same sort of product, the Elektor Wheelie, for a lower price. I assume that, including building and delivering, if the Elektor Wheelie costs € 2000,- (excluding VAT) more organizations and consumers will be interested in the Elektor Wheelie (building kit price is € 1343,70 (excluding VAT)). Benefits of the Elektor Wheelie are almost the same as those of the Segway. Differences are the design and the operational battery time. The design of the Elektor Wheelie is simpler and the battery time is shorter than the Segway.
When following above stated information Elektor will engage in a low-price strategy (see 'Strategy Clock', appendix two), which seeks a lower price than competitors while maintaining similar value/benefits as the competitors. In appendix two it is mentioned that this form of strategy should be pursued with a low-cost base.

Markets

In 'step 2' of appendix two it is stated that Elektor must know which markets they enter. According to the Ansoff matrix four alternatives are given (appendix two). Elektor currently sells the Wheelie to its own customers, readers of the Elektor magazine. When Elektor wants to sell the Wheelie to inhabitants and organizations of/in The Netherlands that use own transportation for short distances it should enter an existing market (where Segway also is active). Because the Elektor Wheelie is much cheaper than a Segway Elektor could also create new users that now has the ability to buy this kind

[1] Source: http://www.segway.nl/index.php?pagina_id=58, consulted on 5 August 2010

of product. Following this information Elektor follows the direction of 'market penetration' and 'market development'.

Elektor will follow a low-price strategy and must be active in existing and new markets when exploiting the Elektor Wheelie. Because of the low-price strategy Elektor should operate with a low-cost base. Elektor should also accompany that the Elektor Wheelie is exploited in existing markets and new markets. Based on this information we can state that Elektor must be very influential in exploiting the Elektor Wheelie. Licensing as form of strategic alliance is not suitable for the strategy of Elektor because technology will be transferred to other organizations when engaging in licensing. Other organizations can determine their own strategy for exploiting. Based on this information we assume that Elektor will engage in outsourcing or a joint venture to exploit the Elektor Wheelie.

Implications and specific costs

In this research a first picture is created about the implications and costs per business function per form of alliance in the model. If we maintain the created forms of strategic alliances Elektor already knows, in outline, what the implications on organizations and costs are per business activity/function (chapter four). What we should do at this stage is making implications and costs more specific per business activity. Elektor should make an inventory about the specific costs of investments of the functions marked with + in the model. Elektor should create a clear view of current costs of the functions marked with * in the model. Also Elektor should create a clear overview of the savings it could create when following a certain mode of strategic alliance (marked with -).
To determine the specific costs, specific information of Elektor (potential) partners and suppliers is needed. In this business case it is impossible to gain all the needed information so we will be working with fictitious amounts of money to explain the use of the model. I will use the created forms of strategic alliances of joint venture and outsourcing (appendix one).
Below the main implications for the organization (based on the interviews) and monetary consequences per business function per mode of strategic alliance (as worked out in appendix one) is made specific. Elektor should make the different variables more specific by them selves.

		Step 1	**Step 2**	**Step 3.1**	**Step 3.2**	**Step 4**
Business activity	**Business function**	**Interview label**	**Main implications**	**Investments**	**Savings**	**Annual costs**
Joint venture						
Inbound logistics	Material handling	+	Creation of total business activity, people, it, machinery, building	10000	0	10000
	Warehousing	+		50000	0	50000
	Inventory control	+		10000	0	10000
	Vehicle scheduling	+		1000	0	10000
	Returns to supplier	+		1000	0	10000
Operations	Machining	*	Stays the same	0	0	50000
	Packaging	*		0	0	10000
	Assembly	*		0	0	50000
	Equipment maintenance	*		0	0	5000
	Testing	*		0	0	5000
	Facility operations	*		0	0	10000
Outbound logistics	Finished goods warehousing	+	Creation of total business activity, people, it, machinery, building	50000	0	50000
	Material handling	+		10000	0	10000
	Delivery vehicle operation	+		5000	0	25000

	Order processing	+		10000	0	10000
	Scheduling	+		10000	0	10000
Marketing and sales	Advertising	-	Party X within the JV fulfils this activity	0	5000	0
	Promotion	-		0	25000	0
	Sales force	-		0	5000	0
	Quoting	-		0	1000	0
	Channel selection	-		0	1000	0
	Channel relation	-		0	1000	0
	Pricing	-		0	1000	0
Service	Installation	+	Increasing activities of functions, people, it, machining, set up product adjustment	10000	0	15000
	Repair	+		5000	0	15000
	Training	+		5000	0	15000
	Parts supply	+		10000	0	15000
	Product adjustment	+		25000	0	15000
Firm infrastructure	General management	-	Less work when combining with party X (management team is divided)	0	5000	5000
	Planning	-		0	5000	5000
	Finance	-		0	5000	5000
	Accounting	-		0	5000	5000
	Legal	-		0	5000	5000
	Government affairs	-		0	5000	5000
	Quality management	-		0	5000	5000
HRM	Recruiting	+	New employees, hire, train, develop (management team is divided)	5000	0	5000
	Hiring	+		5000	0	5000
	Training	+		10000	0	10000
	Development	+		10000	0	10000
	Compensation	+		5000	0	5000
Technology development	Research	+	People	5000	0	25000
	Product design	+		5000	0	25000
	Process equipment design	*	Performed by operations activity	0	0	5000
	Servicing procedures	*		0	0	5000
Procurement	Raw materials	*	None	0	0	50000
	Supplies	*		0	0	50000
	Machinery	*		0	0	5000
	Laboratory equipment	*		0	0	10000
	Office equipment	*		0	0	5000
	Housing	*		0	0	25000
Total joint venture				*257000*	*74000*	*675000*
		Step 1	**Step 2**	**Step 3.1**	**Step 3.2**	**Step 4**
Business activity	**Business function**	**Interview label**	**Main implications**	**Investments**	**Savings**	**Annual costs**
Outsourcing						

Inbound logistics	Material handling	*	Same as current situation	0	0	20000
	Warehousing	*		0	0	50000
	Inventory control	*		0	0	20000
	Vehicle scheduling	*		0	0	20000
	Returns to supplier	*		0	0	20000
Operations	Machining		Same as current situation	0	0	50000
	Packaging	*		0	0	20000
	Assembly	*		0	0	50000
	Equipment maintenance	*		0	0	10000
	Testing	*		0	0	10000
	Facility operations	*		0	0	20000
Outbound logistics	Finished goods warehousing	*	Same as current situation	0	0	50000
	Material handling	*		0	0	20000
	Delivery vehicle operation	*		0	0	25000
	Order processing	*		0	0	20000
	Scheduling	*		0	0	20000
Marketing and sales	Advertising	+	People, resources, knowledge, promotion, it.	10000	0	50000
	Promotion	+		25000	0	50000
	Sales force	+		25000	0	100000
	Quoting	+		5000	0	5000
	Channel selection	+		25000	0	5000
	Channel relation	+		25000	0	5000
	Pricing	+		10000	0	5000
Service	Installation	+	Increasing activities of functions, people, it, machining, set up product adjustment	10000	0	15000
	Repair	+		5000	0	15000
	Training	+		5000	0	15000
	Parts supply	+		10000	0	15000
	Product adjustment	+		25000	0	15000
Firm infrastructure	General management	+	People, it, (management team is divided)	5000	0	5000
	Planning	+		5000	0	5000
	Finance	+		5000	0	5000
	Accounting	+		5000	0	5000
	Legal	+		5000	0	5000
	Government affairs	+		5000	0	5000
	Quality management	+		5000	0	5000
HRM	Recruiting	+	New employees, hire, train, develop	5000	0	5000
	Hiring	+		5000	0	5000
	Training	+		10000	0	10000
	Development	+		10000	0	10000
	Compensation	+		5000	0	5000
Technology development	Research	+	People	5000	0	25000
	Product design	+		5000	0	25000
			Performed by			
	Process equipment	*		0	0	5000

	design		operations activity			
	Servicing procedures	*		0	0	5000
Procurement	Raw materials	*	None	0	0	50000
	Supplies	*		0	0	50000
	Machinery	*		0	0	5000
	Laboratory equipment	*		0	0	10000
	Office equipment	*		0	0	5000
	Housing	*		0	0	25000
Total outsourcing				*260000*	*0*	*995000*

When Elektor follows the joint venture form of a strategic alliance it:

- Should invest: € 257.000,-
- Saves: € 74000,-
- Have annual costs of: € 675.000

When Elektor follows the outsourcing form of a strategic alliance it:

- Should invest: € 260.000,-
- Saves: € 0,-
- Have annual costs of: € 995.000,-

Based on above stated information Elektor should make a net investment of 257.000 – 74000 = € 183.000 when following the form of alliance joint venture. Elektor should make a net investment of € 260.000 when following the form of alliance outsourcing. If Elektor wants to exploit the Elektor Wheelie by it selves using outsourcing it should invest € 77000 more than starting a joint venture to exploit. Also annual costs are higher (€ 320.000) for Elektor with the alliance mode outsourcing.

The table is divided is four steps that should be followed to create an understanding about implications for the organization and costs. In this business case steps three and four are not supported by actual information. The amounts of money are fictional and only provided to show how the model works. In step two, short information from the interviews is processed. Step one is the result of the interviews, the first step to create an understanding about implications and costs.
As a result of step one Elektor should create a clear view about all the implications per business activity/function. When implications are known Elektor should determine specific costs or savings per business function per form of strategic alliance.

Revenue

When costs are clear per form of strategic alliance, Elektor should determine potential revenue. Based on this information Elektor could determine which form of strategic alliance will have the best net result.
Earlier we have determined a price of € 2000,- (excluding VAT) for the Elektor Wheelie. Currently there are sold about 10 Wheelies per month. Because it is only sold to readers of the Elektor magazine and less marketing takes place I assume that monthly sales can grow to 75. Annually it means that Elektor could sell 900 Elektor Wheelies.
900 x 2000 = € 1.800.000,- annually revenue is created when selling 75 Elektor Wheelies monthly.

Above stated prediction is not based on actual information. Elektor should research itself how much Elektor Wheelies it could sell in the new target group.

Strategic alliance

When Elektor has determined specific costs and revenues it can determine the benefits and profits of a certain form of alliance.
When Elektor engages in a joint venture it has a net investment of € 183.000 and annual costs of € 675.000. In this costs approach we have calculated costs for Elektor, so we don't have to divide it by two to determine the costs per party involved in de joint venture. Party X make their own costs, which, I assume, are about the same as Elektor has.
When party X has about the same costs as Elektor, total costs for the joint venture will be 2 x 675.000 = € 1.350.000. Total revenue – total costs = 1.800.000 – 1.350.000 = € 450.000 = profit. If we divide the profit between Elektor and party X, Elektor will have an annually profit of € 225.000. From this profit Elektor could return its made investments.
When Elektor exploits the Elektor Wheelie on its own using outsourcing it has a net investment of € 260.000 and annual costs of € 995.000. Total revenue – total costs = 1.800.000 – 995.000 = € 805.000 = profit. From this profit Elektor could return its made investments.

Based on above stated information Elektor should exploit the Elektor Wheelie using outsourcing as form of strategic alliance. This form of exploiting will create the most value in monetary terms.

Appendix 4: Defining business functions

In this appendix the business functions of the value activities are explained and defined. To create 'hands-on' definitions that can be used as general definitions of the different business functionsin the empirical part, I have used especially practical literature like textbooks. The practical definitions give a clear vision on the business functions, are general and easy to apply when using the model within Elektor. Some business functions do not need an extra explanation by literature and are shortly explained.

Inbound logistics

When reading below stated definitions keep in mind that they refer to inbound logistics.

Material handling
Material handling is the activity that is performed to efficiently send raw and intermediate materials and the related information flow through the production process (Visser & Goor, 1999).

Warehousing
Warehousing refers to the operational work related to inventory control. Inventory control is defined below.

Inventory control
Inventory control deals with the management and control of stocks raw and intermediate materials, and auxiliary materials (Visser & Goor, 1999)

Vehicle scheduling
Planning vehicles that take care of the incoming inventory. If the planning is optimal the point of incoming materials is efficient used.

Returns to suppliers
Materials that neturn to supplier deals with coordinating the materials that the organization send back to a supplier because, for different reasons, the materials are not suitable to process in the production process.

Operations

Machining
The part of the operations process where machines transfer inputs into (end) products.

Packaging
Packaging includes the science and technology to, at the most efficient extent, condition products for transport and sale (Visser & Goor, 1999).

Assembly
Add together different resources and materials to form a product.

Equipment maintenance
Equipment maintenance can be defined as the activity of caring for physical facilities so as to avoid or minimize the chance of those facilities failing (Slack, Chamber & Johnston, 2007).

Testing
End inspection after a production process with the goal to filter iniquities (Bakker & Steenbergen-Meertens, 2002).

Facility operations
Facility operations are operations concerned with the housing, equipment, plant, and process technology of the operation (Slack, Chamber & Johnston, 2007).

Outbound logistics

When reading below stated definitions keep in mind that they refer to outbound logistics.

Finished goods warehousing
Warehousing refers to the operational work related to inventory control. In this case of finished products.

Material handling
Material handling is the activity that is performed to efficiently send raw and intermediate materials and the related information flow through the production process (Visser & Goor, 1999).

Delivery vehicle operation
Management, control and operation of the delivery vehicles.

Order processing
Order processing can be separated in three elements; order preparation, order picking, and order transportation (Visser & Goor, 1999). When an organization receives an order for a product the process begins.

Scheduling
Scheduling includes the planning of the above stated outbound logistics functions.

Marketing and sales

Advertising
Any paid form of non-personal presentation and promotion of ideas, goods, or services by an identified sponsor (Kotler, 1997).

Promotion
A variety of short-term incentives to encourage trial or purchase of a product or service (Kotler, 1997).

Sales force
The sales force is personnel that serve as the personal link of the company to the customers (Kotler, 1997).

Quoting
Quoting is the goal/forecast set for a product line. It is primarily a managerial device for forecasting and estimate and defining and stimulating sales effort (Kotler, 1997).

Channel selection
Marketing channels are sets of interdependent organizations involved in the process of making a product or service available for use or consumption (Kotler, 1997). Channel selection deals with selecting the organizations.

Channel relation
As stated above, marketing channels are sets of interdependent organizations involved in the process of making a product or service available for use or consumption (Kotler, 1997). Channel relation deals with the management of relations in a channel.

Pricing
Kotler (1997) defines price as the amount of money that customers pay for the product. Pricing deals with establishing prices and manage these.

Service

Installation
Installation is the service of installing a product for the customer. For example: the installation of a kitchen.

Repair
Repair in the service of repairing a product when it is broken.

Training
Training is the service of training customers to work with the bought product.

Parts supply
This function deals with providing (extra) parts to the customer (Slack, Chambers & Johnson, 2007).

Product adjustment
Product adjustment is the service of fitting a product to customer preferences.

Firm infrastructure

General management
The general management is the management on corporate level and is concerned with the overall purpose and scope of an organization and how value will be added to the different parts of the organization (Johnson, Scholes & Whittington, 2008).

Planning
Planning on the firm infrastructure level takes the form of systematised, step-by-step, chronological procedures to develop or coordinate an organization's strategy (Johnson, Scholes & Whittington, 2008).

Finance
The finance function of a firm deals with the incoming and outgoing cash flows, and with reporting and information providing about value adding processes (Keuning, 2003).

Accounting
Accounting can be defined as the process of collecting, grouping and providing of (finanancial) information for internal and external stakeholders (Heezen, 2002).

Legal
The legal function of a firm is the function that deals with the entrepreneurial law and regulations in a certain country and steers and controls the firm based on the laws and regulations (Loonstra, 2002).

Government affairs
The government provides the social-economical and legal framework wherein organizations fulfil their function (Keuning, 2003). The government affairs function of an organization deals with these points.

Quality management
Quality can be defined as the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs. The management of quality deals with continuously improving the quality of processes, products, and services to meet or exceed demand (Kotler, 1997).

Human resource management

Recruiting
Recruiting is concerned with attracting of possible candidates for certain functions within an organization (Keuning, 2003). Recruiting is typically a 'buy' functions (Boxall & Purcell, 2008).

Hiring
After the recruitment stage organizations should hire personnel. The hiring function of an organizations deals with the personnel policy and work conditions (Keuning, 2003).

Training
Training and development are typically 'make' functions where personnel is educated and motivated to learn through informal and formal learning (Boxall & Purcell, 2008).

Development
Training and development are typically 'make' functions where personnel is educated and motivated to learn through informal and formal learning (Boxall & Purcell, 2008).

Compensation
The compensation function of an organization deals with rewarding personnel. We can distinguish two different forms of compensation, intrinsic and extrinsic. Intrinsic compensation comes forward of work itself and are a result of work satisfaction. Extrinsic compensation is separated in direct and indirect compensation and non-financial rewards. (Keuning, 2003).

Technology development

Research
This function relates to all the research that is performed to improve the product and process or to create new ones.

Product design
Product design is the process of creating and capturing of the shape, the materials, and the manufacture method of a new product (Hultink & Schoormans, 2004).

Process equipment design
The process equipment design is the shaping or configuration of the resources and/or activities that comprise a product, or a service, or the transportation process that produces them (Slack, Chambers & Johnson, 2007).

Servicing procedures
Servicing procedures are the procedures of caring for physical facilities with the goal to avoid or minimize the chance of those facilities failing (Slack, Chambers & Johnson, 2007).

Procurement

Procurement can be defined as the activities that are processed to gain products and services from external sources (Gelderman & Albronda, 2003).

Raw materials
Raw materials are commodities. These serve as basic materials for production processes (Gelderman & Albronda, 2003).

Supplies
Supplies are products that are used during the normal business function (Gelderman & Albronda, 2003).

Machinery
Purchase of the part of the operations process where machines transfer inputs into (end) products.

Laboratory equipment
Laboratory equipment are single durable production resources (Gelderman & Albronda, 2003) that are used in laboratory.

Office equipment
Office equipment are single durable production resources (Gelderman & Albronda, 2003) that are used in the office.

Housing
Capital that facilitates the possibility to perform primary and secondary activities in.

Appendix 5: Prior information interviews

Beste NAAM,

Op DATUM om TIJD hebben wij een afspraak gepland waarin ik jou zal interviewen. Het interview neemt ongeveer twee tot drie uur in beslag.

Onderwerp
Het interview gaat in op de behoefte om vanuit Elektor meer aan exploitatie te doen. Tijdens het interview zullen we verschillende scenario's van strategische allianties bespreken waarmee Elektor meer zou kunnen gaan exploiteren. Mijn vragen gaan voornamelijk in op wat een scenario voor gevolgen voor kosten heeft voor bepaalde bedrijfsactiviteiten en onderliggende bedrijfsfuncties. Tijdens het interview zal ik alle scenario's en bedrijfsactiviteiten en –functies met je doornemen zodat het duidelijk is waar we op dat moment over praten.

Doel
Het uiteindelijke doel van het interview is om te kunnen bepalen waar (op bedrijfsactiviteiten en –functie niveau) investeringen noodzakelijke zijn, bespaart kan worden of geen extra investeringen of besparing noodzakelijk zijn om aan een bepaald scenario te voldoen.

Waarom?
Door het opdoen van deze kennis kan ik Elektor uiteindelijke inzicht geven in kosten/besparingen bij bepaalde scenario's en voorzien van een advies met extra informatie over de scenario's. Hierdoor is de stap naar exploiteren weer iets dichterbij en kunnen er gefundeerde beslissingen worden genomen.

Het interview wordt overigens in het gehele managementteam afgenomen en ik zal het gesprek opnemen.

Tijdens het interview zal ik je van meer detailinformatie voorzien. Voor het interview hoef je niets voor te bereiden.

Mocht je vooraf nog vragen hebben dan hoor ik het graag.

Groet,

Bart Baeschnitt

Appendix 6: Elaboration interviews

The interviews are performed and elaborated in Dutch.

Interviewees:
Marketing manager (Carlo van Nisterooy)
CEO (Paul Snakkers)
Product manager/book publisher (Ferdinand te Walvaart)
International editor in chief (Wisse Hettinga)
CFO (Alex Politis)

Wanneer er in deze bijlage gesproken wordt over een 'scenario' wordt hiermee de specifieke vorm van een strategische alliantie gecreerd in bijlage 1 bedoeld.

Huidige situatie

Inbound logistics

Material handling, warehousing, inventory control, vehicle scheduling en returns to supplier worden allemaal extern uitgevoerd op dit moment. De organisatie van Chris Krohne organiseert en is verantwoordelijk voor al deze activiteiten.

Alle functies worden extern uitgevoerd geeft Paul aan. Later in het interview geeft Paul aan dat dit wordt gedaan door Krohne.

Alle functies worden op dit moment extern uitgevoerd door Nolo Design.

Alle functies worden extern uitgevoerd door Chris Krohne.
EXTRA INFO: Wisse geeft ook aan dat inbound logistics, operations en outbound logistics de bottleneck van Elektor is. Deze activiteiten zullen ze zelf nooit zelf goed kunnen uitvoeren.

Alex geeft aan dat de functies van inbound logistics worden uitgevoerd door Nolo Design, een externe partner/leverancier van Elektor.

Operations

De gehele productie is op dit moment uitbesteed aan Chris Krohne. Hij is verantwoordelijke en organiseert de bedrijfsfuncties machining, packaging, assembly, equipment maintenance, testing en facility operations.

Alle functies worden extern uitgevoerd geeft Paul aan. Later in het interview geeft Paul aan dat dit wordt gedaan door Krohne.

Ferdinand geeft aan dat op dit moment alle functies onder operations worden vervuld door Nolo Design, een externe partij. Echter, packaging wordt door Elektor zelf gedaan als er producten buiten de EU worden verstuurd. Ferdinand geeft aan dat deze verzending betere verpakking eist en dat Nolo Design dit niet levert.

Alle functies worden uitbesteed aan Chris Krohne volgens Wisse.

Operations wordt ook uitgevoerd door Nolo Design. Elektor heeft in het verleden wel bijgedragen aan de functie packaging. Door oorspronkelijke verpakking die Nolo hanteerde voldeed niet aan de eisen van Elektor. Daarom hebben zij Nolo een dwingend verzoek gedaan de verpakking te gebruiken die Elektor heeft uitgezocht. Echter, is de functie nu onderdeel van Nolo.

Outbound logistics

Alle functies die onder outbound logistics vallen zijn op dit moment uitbesteed aan Chris Krohne. Hij organiseert en is hier verantwoordelijk voor. Elektor geeft opdrachten door, Chris verstuurd.

Paul geeft aan dat Elektor alle outbound logistics functies intern vervuld. Elektor slaat eindproducten op en verstuurd deze. Hierbij doet Elektor ook alle functies die dit proces begeleiden.

Alle functies worden extern uitgevoerd door Nolo design voor verzending binnen de EU. Voor verzending buiten de EU doet Elektor zelf de outbound logistics.
Bij order processing draagt Elektor bij aan de voorbereiding door orders te rangschikken, te verzamelen en opdrachten te versturen aan Nolo Design.

Op dit moment zijn alle functies uitbesteed aan Chris Krohne. Elektor geeft de bestellingen wel door aan Chris. Na deze stap doet Elektor niets meer en zorgt Krohne dat de Wheelies bij de klant terecht komen.

Deze activiteit is grotendeels uitbesteed aan Nolo Design. Een bestelling voor de Wheelie komt wel bij Elektor binnen (customer service). Deze afdeling verzamelt de bestellingen en stuurt dit periodiek naar Nolo Design. Nolo verzorgt vervolgens dat de Wheelie's die binnen de EU geleverd moeten worden bezorgt worden bij de klant. Elektor verzend zelfde Wheelie's aan klanten buiten de EU. Ze doen dit omdat zij de administratieve noodzakelijkheden beter benutten dan Nolo.
Bij een klant buiten de EU verzend Nolo dus een Wheelie aan Elektor, vervolgens stuurt Elektor de Wheelie direct door.
Finished goods warehousing en material handling worden dus vollegdig extern uitgevoerd. Delivery vehicle operation, orderprocessing en scheduling zowel in- als extern.

Marketing & sales

De functie advertising wordt door Elektor zelf gecoördineerd. Om de Elektor Wheelie te promoten plaatst Elektor advertenties in alleen eigen media. Hierdoor maakt Elektor in principe alleen kosten voor het produceren van de advertentie. De inkoop van media hoeft niet betaald te worden aangezien Elektor alleen gebruik maakt van eigen media.

De functie promotie wordt ook intern gecoördineerd en vervuld. Op dit moment wordt de Elektor Wheelie alleen gepromoot door advertenties in eigen media, redactionele uitingen en persberichten.

De functie sales force bestaat op dit moment voor de Elektor Wheelie niet. De product manager is de enige die zich bezighoudt met de Elektor Wheelie sales als dit nodig is. Hier ligt een duidelijke kans om meer te exploiteren volgens de marketing manager van Elektor.

Quoting wordt intern gedaan, door de product manager.

Channel selection en relation ligt voornamelijk bij de product manager.

Pricing gebeurt door de product manager in overleg met het gehele managementteam. Uiteindelijk bepaald de CEO wat de prijs is van de Elektor Wheelie.

Advertising, promotion en sales force wordt door de marketing afdeling vervuld. Quoting is voornamelijk een taak van de product manager ondersteund door de marketing manager. Channel selection en relation wordt gedaan door de marketing manager. Pricing is een tak van de product manager waarbij Paul (CEO) de uiteindelijke prijs bepaalt.

Alle marketing en sales functions worden door intern vervuld.

Advertising gebeurt in eigen media, zowel online als in print. Promotie is daarnaast ook op de beurs 'ElektorLive' en bij bevriende partijen (zoals een zusteruitgeverij).
De sales force en quoting functie wordt door Ferdinand gedaan met ondersteuning van personen die de order intake doen.
Channel selection en relation en pricing gebeurt ook intern, in overleg met marketing en CEO.

Alle marketing en sales activiteiten worden door Elektor zelf uitgevoerd. Advertisiing gebeurt alleen in interne media door het beschikbaar stelln van een stopper. Promotie doet Elektor door artikelen over de Wheelie in het magazine te zetten, online via een webshop, bannering op de homepage van Elektor, vermelding in de nieuwsbrief en op beurzen. Be product uitgever (Ferdinand) coördineert de inhoudelijke promotionele boodschap, de marketing afdeling (Carlo) de rest van de activiteiten.
Wisse geeft aan dat er niet echt een sales force aanwezig is voor de Wheelie. Verkopen worden ontvangen via de website en door customer service doorgezet aan Krohne.
Product uitgever Ferdinand is verantwoordelijk voor quoting en gebeurt dus intern. Channel selection en relation gebeurt nu nog niet echt, Ferdinand onderhoudt wel de relatie met Krohne.
Ferdinand is ook verantwoordelijke voor pricing, maar de uiteindelijke prijs wordt vastgesteld door het management team waarbij de CEO de doorslag geeft.

Alex geeft aan dat alle marketing en sales activiteiten intern vervuld worden. Advertising gebeurt alleen in eigen media. Promotie wordt gedaan doormiddel van een webshop met link op de homepage, artikelen in het tijdschrift en het ElektorLive event (jaarlijks).
The sales force wordt gevormd door de afdeling customer service. De afdeling behandelt vragen en geeft advies. De afdeling is niet getraind om te verzoeken. Mochten ze ergens niet uitkomen dan wordt een vraag/verzoek doorgezet aan de productmanagement of marketingmanager.
Quoting wordt gedaan door de productmanager op basis van de huidige verkoop en in samenwerking met de financieel manager wordt de voorraad van Nolo bepaald en overeengekomen.
Channel selection en relation vormen op dit moment weinig werk. De functies worden uitgevoerd door de product manager.
Pricing wordt ook uitgevoerd door de productmanager. Deze persoon stelt een prijs voor (met onderbouwing) en de CEO en financieel manager keuren het goed. De finance afdeling maakt na een periode ook een nacalculatie waarmee wordt bepaald of er voldoende marge wordt gehaald. Mocht dit niet zo zijn dan wordt dit besproken in het productoverleg.

Service

Installatie van een product gebeurt voornamelijk door de klant zelf aangezien het momenteel wordt geleverd als bouwpakket. Installation wordt ondersteunt door een handleiding, video (internet) en een forum. Op deze drie manier wordt de klant ook getraind.

Elektor krijgt een verzoek/aanvraag tot reparatie van de klant en zet dit dan uit bij Chris Krohne. Vanaf daar handelt Krohne het proces af.

Het leveren van extra onderdelen wordt gecoördineerd door Elektor, Krohne handelt weer af. Elektor is momenteel niet ingericht om extra onderdelen te leveren.

De Elektor Wheelies worden momenteel heel standaard geleverd. Product adjustment vindt niet plaats, dus deze functie wordt momenteel niet vervult.

Installation gebeurt extern. De Wheelie wordt geleverd als bouwpakket waardoor de eindgebruiker ook een gedeelte van de installation doet.

Repair wordt intern gecoördineerd, maar extern uitgevoerd. De partij die de Wheelies maak repareert ook.

De training functie m.b.t. de Wheelie wordt intern uitgevoerd. Elektor maakt en verspreidt handleidingen, geeft live demonstraties en heeft een online kanaal. Via deze drie informatie verspreiders 'traint' Elektor (potentiële) klanten hoe om te gaan met de Wheelie.
Product adjustment gebeurt nu niet.

Installation wordt intern vervuld. Er is een gedrukte handleiding bij de Elektor Wheelie als bouwpakket, formulieren en een telefonische helpdesk. Voor de functie training is er een video ontwikkeld en handleiding. Parts supply wordt afgehandeld door Nolo Design en door Elektor gecoördineerd.
De functies repair en product adjustment bestaan op dit moment niet en worden dus ook niet aangeboden aan de klant.

Installation en training worden intern vervuld. Elektor help met installeren en traing m.b.t. de Wheelie d.m.v. geprinte handleidingen die meegeleverd worden, artikelen met informatie (blad) en door persoonlijk contact bij onduidelijkheden.
Repair wordt ook intern vervuld. Wanneer Elektor een melding krijgt wordt deze verwerkt door customer service. Vervolgens wordt de melding doorgestuurd aan het lab welke het probleem eerst telefonisch probeert te verhelpen.
Parts supply wordt intern gecoördineerd en extern uitgevoerd. Wanneer er een verzoek voor een (extra) onderdeel komt stuurt Elektor dit naar Krohne die het vervolgend opstuurt.
De functie product adjustment bestaat nu niet.

Installation wordt intern vervuld. Elektor maakt/heeft een standaard geprinte handleiding die wordt meegeleverd bij een Wheelie en mocht iemand er niet uitkomen een telefonische helpdesk.
Repair wordt door Elektor gecoördineerd en door Nolo uitgevoerd.
Volgens Alex wordt er nu niets aan training gedaan.
Parts supply wordt ook intern gecoördineerd, Nolo verstuurt onderdelen.
Alec weet niet of de functie product adjustment wordt uitgevoerd.

Firm Infrasturcture

Alle functies die onderdeel zijn van de firm infrastructure worden nu intern uitgevoerd.

Alle functies die onderdeel zijn van de firm infrastructure worden nu intern uitgevoerd.

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Alle functies die onderdeel zijn van de firm infrastructure worden nu intern uitgevoerd. Echter wordt er wel eens legal advies ingewonnen van een externe organisatie wanneer dit nodig is.

Alle functies die onderdeel zijn van de firm infrastructure worden nu intern uitgevoerd. Ales geeft aan dat er wel eens juridisch advies extern wordt ingewonnen.

Human resource management

Alle functies die onderdeel zijn van de HRM activiteit worden nu intern uitgevoerd.

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De HRM functies worden intern uitgevoerd. Echter, geeft Alex aan dat HR meer op de achtergrond opereert en op dit moment de functies niet direct uitvoert.
Afdelingshoofden bepalen de beloning van medewerkers in overleg met HR.

Technology development

Research en product design worden intern vervuld, maar eigenlijk maar tot het bouwpakket wat het nu is. Elektor doet geen R&D voor een consumentenproduct. Elektor denkt mee over het process equipment design. Krohne vervuld servicing procedures.

Research en product design worden zowel intern als extern vervuld. Het lab van Elektor vervult deze functies in samenwerking met een freelancer.
Process equipment desing en servicing procedures worden extern uitgevoerd door de producent.

De functie research wordt nu door Elektor uitgevoerd in samenwerking met Nolo Design. De verdeling is ongeveer 50/50. De overge functies worden allen extern uitgevoerd door Nolo Design.

Research en product design vinden intern plaats, mocht het nodig zijn dan wordt er wel eens externe expertise ingehuurd. De functies worden uigevoerd door het Elektor-lab.
Process equipment design en servicing procedures worden uitgevoerd door dezelfde partij als de operations activiteit.

Het lab vervuld de functie research en product design, op dit moment tot aan de prototyping.
Process equipment design en serivicing procedures worden uitgevoerd door Nolo Design.

Procurement

Krohne koopt raw materials in t.b.v. de productie en koopt de benodigde machinery ook in. Elektor koopt supplies en office equipment in ter ondersteuning van het proces. Elektor heeft zelf de meeste laboratory equipment ingekocht, maar ook Krohne heeft een gedeelte hiervan in beheer. Elektor faciliteert een gebouw aan alle personen die iets voor de Wheelie doen behalve aan Krohne, hij heeft een eigen faciliteit.

Raw materials wordt extern vervuld door de producent. Supplies (bv. Software o.i.d.) wordt door Elektor zelf ingekocht. Machinery wordt extern ingekocht. Laboratory equipment wordt zowel intern als extern ingekocht: het eigen lab heeft materiaal nodig voor de research en development functie en de producent voor het optimaliseren van het productieproces.
Office equipment wordt door Elektor zelf ingekocht. Housing wordt voor de productie extern ingekocht, voor de kantoorfunctie en warehousing koopt Elektor in.

Raw materials, supplies en machinery wordt extern ingekocht door Nolo Design. Office equipment koopt Elektor zelf in.
Laboratory equipment en housing vervuld Elektor voor de interne activiteiten zelf, Nolo vervuld dit voor de activiteiten die zijn uitbesteed aan hen.

Raw materials en machinery worden extern ingekocht door Krohn. Supplies koopt Elektor zelf in voor de activiteiten die ze uitvoeren. Lab equipment voor R&D doeleinde koop Elektor ook zelf in, voor productie doeleinde koopt Krohne het. Office equipment koopt Elektor in voor intern gebruik. Housing koopt Elektor ook alleen voor zichzelf in, Krohne doet dit ook voor zijn eigen activiteiten.

Raw materials, supplies en machinery worden extern ingekocht. Laboratory equipment en office equipment worden door Elektor zelf ingekocht. Housing koopt Elektor in voor alle activiteiten die ze zelf uitvoeren, externe partijen kopen housing zelf in.

Scenario: joint venture

Inbound logistics

Het scenario gaat er van uit dat de JV alle functies binnen inbound logistics intern voltooid worden en dat Elektor hiervoor de input levert. Op basis van deze gegevens geeft Carlo aan dat in alle bedrijfsfuncties die onder de activiteit inbound logistics valt geïnvesteerd dient te worden. Als Elektor de Wheelie in grotere getallen gaat verkopen is de capaciteit niet aanwezig om dit te coordineren.

Conclusie:
- Alle bedrijfsfuncties: +

Paul geeft aan dat er bij dit scenario geïnvesteerd moet worden in alle functies omdat er mensen en middelen nodig zijn om deze functie te gaan vervullen. Op dit moment is de gehele activiteit uitbesteed aan een extern bedrijf.

Conclusie:
- Alle bedrijfsfuncties: +

Ferdinand geeft aan dat in alle functies geïnvesteerd moet worden. Er moeten nieuwe mensen worden aangenomen om de functies te vervullen en ook zal Elektor moeten investeren in diverse middelen. Het bestaande magazijn waar Elektor voor andere activiteiten gebruik van maakt moet uitgebreid worden of een nieuw magazijn moet gehuurd/gekocht worden.

Conclusie:
- Alle bedrijfsfuncties: +

Wisse geeft aan dat er in alle functies geïnvesteerd moet worden bij dit scenario. Er moet geïnvesteerd worden in mensen om de functies te kunnen uitvoeren en in m2 om de functie warehousing uit te oefenen.

Conclusie:
- Alle bedrijfsfuncties: +

Alex geeft aan dat er in alle functies geïnvesteerd moet worden om de activiteit te gaan uitvoeren. Er moet geïnvesteerd worden in mensen om activiteiten uit te voeren, in systemen om te registreren en

te communiceren met financiën. Communicatie met leveranciers neemt toe en dat betekent meer werk. Ook zal Elektor/JV moeten investeren in een pand om de functie warehousing te vervullen.

Conclusie:
- Alle bedrijfsfuncties: +

Operations

Het scenario gaat er van uit dat een externe partij alle functies binnen operations vervuld. Bij exploitatie van de Elektor Wheelie hoeft er volgens Carlo niet geïnvesteerd te worden in een functie onderdeel van bedrijfsactiviteit operations. De externe partij produceert, Elektor 'stuurt aan' met huidige middelen en mensen.

Conclusie:
- Alle bedrijfsfuncties: *

Omdat alle operations functies op dit moment zijn uitbesteed en dit binnen het scenario ook zo is hoeft hier niet geïnvesteerd te worden. Besparen kan ook niet omdat de functies op de huidige manier worden voortgezet. Dus de activiteit/functies blijven hetzelfde.

Conclusie:
- Alle bedrijfsfuncties: *

Omdat op dit moment alle functies al zijn uitbesteedt blijft deze activiteit hetzelfde.
(Opmerking Bart: verpakking buiten EU kan wellicht nog wel wat op bespaart worden, echter is dit nu maar een kleine tak)

Conclusie:
- Alle bedrijfsfuncties: *

Op dit moment zijn ook alle functies van Elektor uitbesteed aan een externe partij. Hierdoor verandert er bij dit scenario niets.

NB: Wisse geeft tijdens het interview nog aan dat hij Elektor niet ziet als partij die in de toekomst zelf de logistiek en productie op zich neemt.

Conclusie:
- Alle bedrijfsfuncties: *

Alex geeft aan dat er in deze functie niet geïnvesteerd hoeft te worden bij dit scenario omdat de operations op dit moment al zijn uitbesteed. Ook wordt er niet bespaart omdat de invulling gehandhaafd blijft.

Conclusie:
- Alle bedrijfsfuncties: *

Outbound logistics

Het scenario gaat er van uit dat de JV de outbound logistics activiteit vervuld en dat Elektor hiervoor de input levert. Elektor moet voor de functie finished goods warehousing investeren in ruimte en personeel bij dit scenario. Ook bij material handling, delivery vehicle operation en order processing

moet Elektor investeren in transport-/verzendkosten en komt er meer management kijken bij deze functies met als gevolg dat hier ook tijd (dus geld) voor uitgetrokken moet worden.
Carlo geeft aan dat bij scheduling gebruik gemaakt kan worden van huidige middelen maar voornamelijk huidige kennis en kunde hierin.

Conclusie:
- Finished goods warehousing: +
- Material handling: +
- Delivery vehicle operation: +
- Order processing: +
- Scheduling: *

Bij finished goods warehousing is een mogelijke investering afhankelijk van de toename van de verkoop. Bij een substantiële groei moet Elektor investeren in warehousing. In alle overige functie moet geïnvesteerd worden omdat er meer mensen en management nodig zijn om de verhoogde workload te kunnen behandelen.

Conclusie:
- Alle bedrijfsfuncties: +

Aangezien outbound logistics nu is uitbesteed en binnen dit scenario Elektor alle functies gaat doen komt er veel bij kijken. Er moet geïnvesteerd worden in ruimte om de functie warehousing te kunnen vervullen en er moet geïnvesteerd worden in meer mensen/middelen omde andere functies te kunnen uitoefenen. Op dit moment heeft Elektor niet de capaciteit om outbound logistics zelf te doen.

Conclusie:
- Alle bedrijfsfuncties: +

Wisse geeft aan dat er bij fineshed goods warehousing geïnvesteerd moet worden in m2 om producten die gereed zijn op te slaan. Bij de andere functies moet Elektor voornamelijk investeren in mensen om de functies te kunnen uitvoeren.

Conclusie:
- Alle bedrijfsfuncties: +

Net als bij inbound logistics moet hier geïnvesteerd worden in mensen die werk m.b.t de functies uitoefenen en systemen voor registratie en communicatie. Opslagcapaciteit moet ook in geïnvesteerd worden. De activiteit is goed te combineren met inbound logistics geeft Alex aan.

Conclusie:
- Alle bedrijfsfuncties: +

Marketing and sales

Het scenario gaat er van uit dat de JV de marketing en sales activiteit vervuld en dat partij X hiervoor de input levert. Carlo geeft aan dat wanneer de JV nieuwe markten gaat bedienen er geen veranderingen in kosten voor Elektor optreedt. Wanneer alle marketing en sales activiteiten overgaan naar de JV en partij X gaat hiervoor ook de input leveren dan kan Elektor besparen.

Conclusie:
- Alle bedrijfsfuncties: */-

Doordat partij X de input levert voor marketing en sales kan Elektor theoretisch gezien besparen. Intern valt deze activiteit en bijkomende functies weg. Maar Paul geeft aan dat de daadwerkelijke besparing heel klein zal zijn omdat de totale omzet en bijhorende werkdruk op de marketingafdeling een klein gedeelte is van de totale omzet en werkdruk. Hierdoor zal het niet direct merkbaar zijn dat er bespaart is/wordt.

Conclusie:
- Alle bedrijfsfuncties: */-

Omdat advertising en promotion bij partij X worden gelegd binnen de JV kan hierop bespaart worden omdat Elektor niets meer hoeft toe doen voor deze activiteiten.
Een minimale besparing is haalbaar bij quoting, channel selection en relation en pricing. De besparing is minimaal omdat deze functies ook minimaal werk opleveren op dit moment.
De sales force blijft hetzelfde omdat deze personen nu weinig voor de Wheelie doen en een potentiële besparing niet voelbaar is.

Conclusie:
- Advertising: -
- Promotion: -
- Sales force: *
- Quoting: */-
- Channel selection: */-
- Channel relation: */-
- Pricing: */-

Als alle functies worden 'aangeleverd' binnen de JV door partij X dan bespaart Elektor op alle functies. Omdat de functies worden overgedragen komt er minder marketing en sales werk bij Elektor te liggen en is dit dus een besparing.

Conclusie:
- Alle bedrijfsfuncties: -

Omdat de activiteit bij de partner van de JV komt te liggen valt er werk weg voor Elektor. Omdat er nu weinig tijd wordt besteed aan marketing en sales zal het wegvallen van de functies niet direct merkbaar zijn. Alex geeft aan dat de besparing theoretisch is (er komt wel tijd vrij) maar praktisch zal het nauwelijks merkbaar zijn.

Conclusie:
- Alle bedrijfsactiviteiten: */-

Service

Het scenario gaat er van uit dat de JV de service activiteit vervuld en dat Elektor hiervoor de input levert. Carlo geeft aan dat bij dit scenario Elektor moet investeren in alle onderliggende functies. Aangezien klanten nu het product zelf voor een groot gedeelte installeren moeten ze hiervoor mensen/middelen inkopen. Repair , parts supply en product adjustment doet Elektor nu al niet zelf, dus hier moet Elektor ook mensen/middelen voor aanschaffen. Training doet Elektor nu, maar bij het meer exploiteren zullen er meerdere trainingen nodig zijn en ook verschillende door de verschillende doelgroepen.

Conclusie:

- Alle bedrijfsfuncties: +

Paul geeft aan dat er bij het scenario JV niet geïnvesteerd hoeft te worden in installation en training. Met de bestaande middelen kunnen deze functies ingevuld worden. Wellicht is er bij training wat optimalisatie/verbetering nodig in bestaande middelen maar dit kan met de huidige capaciteit gedaan worden.
Wanneer Elektor verantwoordelijk wordt voor repair en parts supply moet er geïnvesteerd worden in mensen die deze functies kunnen vervullen. Met de huidige capaciteit kan Elektor deze functies niet vervullen. Product adjustment bestaat nu niet, hier moet Elektor dus iets nieuws voor creëren en dus investeren.

Conclusie:
- Installation: *
- Repair: +
- Training: *
- Parts supply +
- Product adjustment: +

Installation en training kunnen hetzelfde blijven. De huidige middelen volstaan om deze functies onder dit scenario uit te oefenen. Elektor moet investeren in repair en product adjustment omdat deze functies en volgens Ferdinand nu niet zijn.
In parts supply moet ook geïnvesteerd worden omdat deze functie nog gedeeltelijk extern wordt uitgevoerd.

Conclusie:
- Installation: *
- Repair: +
- Training: *
- Parts supply: +
- Product adjustment: +

Doordat er substantieel meer geëxploiteerd wordt binnen meerdere doelgroepen zijn er meer/verschillende handleidingen en trainingen nodig voor klanten. Hierdoor moet Elektor investeren in installation en training, er zijn meer mensen en middelen nodig om hierin te voorzien. Ook moet er geinvesteerd worden in mensen bij de functies repair en parts supply. Er zal meer druk komen te staan op customer service, het lab en de coördinatie, wat meer werk betekent.
Omdat de functie product adjustment nu niet bestaat zal deze moeten worden opgetuigd, dit betekent dus sowieso investeren.

Conclusie:
- Alle bedrijfsfuncties: +

Alex geeft aan dat er bij installation professioneler te werk moet worden gegaan omdat er bijvoorbeeld meerdere doelgroepen komen. Hierdoor moeten er meerdere handleidingen worden gemaakt en ook in verschillende formats, investeren dus.
Voor de functie repair is er een ander systeem nodig om de coördinatie te handhaven bij grotere exploitatie. Alex geeft aan dat de huidige personele bezetting deze functie aan kan bij meer exploitatie, maar er wel geïnvesteerd moet worden in het systeem.
Omdat er nu niet aan training wordt gedaan moet hier in geïnvesteerd worden om deze functie op te zetten.
Parts supply sluit aan bij repair. Er is een systeem nodig, maar waarschijnlijk geen extra mensen.

In product adjustment moet geinvesteerd worden. Bij Alex is het onduidelijk in welke mate dit nu gebeurt, maar bij grotere exploitatie moet er een configuratie (bijv. Online) module komen waarmee iemand zijn eigen Wheelie kan samenstellen.

Conclusie:
- Alle bedrijfsfuncties: +

Firm infrastructure

Het scenario gaat er van uit dat de JV de firm infrastructure vervuld en dat de input hiervoor door zowel Elektor als partij X wordt geleverd. Carlo geeft aan dat er altijd controle is vanuit Elektor binnen de JV, maar dat hiervan ook een gedeelte opgevangen kan worden door partij X. Hierdoor kan er op alle functies bespaart worden.

Conclusie:
- Alle bedrijfsfuncties: -

Een logische gedachte is dat Elektor bespaart omdat er firm infrastructure werk wordt overgenomen door partij X. Maar door de toename van verkoop van de Wheelie (door meer exploitatie) weet je dit niet zeker. Echter zal het voor Elektor altijd een besparing zijn omdat de uren die Elektor uitvoert binnen de JV doorbelast moeten worden. Dit betekent dat uren die bijvoorbeeld Paul binnen general managent vallen nu betaald worden door de JV. Hierdoor is het voor Elektor standaard een besparing. Het is daarnaast ook fiscaal verplicht om uren door te belasten.
Investeren is sowieso niet noodzakelijk.

Conclusie:
- Alle bedrijfsactiviteiten: -

Ferdinand geeft aan dat er op alle functies bespaart kan worden omdat er vanuit partij X capaciteit bijkomst om de functies uit te oefenen. Hierdoor vervalt er (gedeeltes van) werk voor Elektor.

Conclusie:
- Alle bedrijfsactiviteiten: -

Wisse denkt dat er geïnvesteerd moet worden in general management omdat er een persoon moet komen die ‘dedicated’ aan het Wheelie project moet zitten. Er moet iemand zijn die de motor aanjaagt.
Wisse denkt dat planning hetzelfde blijft omdat dit niet heel veel werk in beslag neemt.
Bij de overige functies geeft Wisse aan dat er geïnvesteerd moet worden omdat er op al deze functies meer druk komt te liggen. Bij het vergroten van de verkoop moeten er meer handelingen worden verricht voor deze functies (bijvoorbeeld: meer cashstroom is meer finance werk).

Conclusie:
- General management: +
- Planning: *
- Finance: +
- Accounting: +
- Legal: +
- Government affairs: +
- Quality management: +

NB: Wisse geeft hier nog aan dat wanneer mensen vanuit Elektor in de JV gaan werken het eigenlijk een besparing is voor Elektor, maar omdat Elektor hier weer (een gedeelte) betaalt van de kosten van de JV wordt het toch een investering voor Elektor.

Alex verwacht dat de functies general management en planning hetzelfde blijven. Hij geeft aan dat het aantal verkochte Wheelies waarschijnlijk geen impact heeft op de werkdruk op deze functies.
In de finance en accounting functie moet wel geïnvesteerd worden. Er moet een systeem voor de Wheelie worden aangeschaft en er moet een boekhouder komen die taken bij deze functies uitvoert.
Bij legal en government affairs geeft Alex aan dat er wellicht eenmalig advies ingewonnen moet worden bij meer exploitatie in de nieuwe situatie. Is in principe dus een investering.
Ook bij quality management moet er geïnvesteerd worden volgens Alex omdat het verbeteren van het product steeds belangrijker wordt. Er moet bijgehouden worden wat mensen willen in verschillende markten en verbeteringen moeten worden doorgevoerd.

Conclusie:
- General management: *
- Planning: *
- Finance: +
- Accounting:+
- Legal: +
- Government affairs: +
- Quality management: +

Human resource management (HRM)

Het scenario gaat er van uit dat de JV de activiteit vervuld en dat de input hiervoor door Elektor en partij X wordt geleverd. Net als bij de firm infrastucture lijken de functies een besparing te kunnen zijn omdat het gecombineerd wordt met partij X, echter geeft Carlo ook aan dat bij het begin van de JV wel geïnvesteerd kan worden in bijvoorbeeld recruiting en hiring doordat er wellicht mensen moeten worden aangenomen en daardoor de druk op deze functies kan toenemen.

Conclusie:
- Recruiting: */-
- Hiring: */-
- Training: *
- Development: *
- Compensation: *

Bij HRM geldt dezelfde redernatie als bij general management. Functies moeten doorbelast worden en daardoor bespaart Elektor.

Conclusie:
- Alle bedrijfsfuncties: -

Ferdinand denkt dat er in alle functies gerelateerd aan HRM geïnvesteerd moet worden. Meer exploiteren betekent meer mensen zoeken, aannemen en trainen. Ook al wordt deze functie samen met partij X uitgevoerd, t.o.v. de huidige situatie zullen er altijd meer mensen bijkomen die HRM in goede banen kunnen leiden.

Conclusie:
- Alle bedrijfsfuncties: +

Wisse denkt dat er in alle functies onder HRM geïnvesteerd moeten worden omdat er meet activiteiten ontplooid moeten worden bij het verhogen van de exploitatie. Er zullen mensen aangenomen moeten worden en bestaand (en nieuw) personeel moet getraind en ontwikkelt worden om aan de vergrote vraag te kunnen voldoen.

Conclusie:
- Alle bedrijfsfuncties: +

Bij grote groei moet de recruiting en hiring functie opgezet worden. Alex verwacht niet dat dit direct hoeft, maar geeft wel aan dat hierin geïnvesteerd moet worden bij grote groei.
Wanneer Elektor meer verschillende Wheelies gaat produceren zullen er verschillen optreden in techniek e.d. Hiervoor is het nodig dat er interne trainingen en development opgezet moet worden. Ook nieuwe technologieën vanuit de markt moeten worden bijgehouden (alhoewel Elektor dit natuurlijk al doet). Alex verwacht hierbij een kleine investering.
De compensation functie blijft hetzelfde volgens Alex omdat dit een relatief simpel proces is.

Conclusie:
- Recruiting: */+
- Hiring: */+
- Training: */+
- Development: */+
- Compensation: *

Technology development

Het scenario gaat er van uit dat de JV de functies research en product design door de JV worden vervuld en dat de input hiervoor door Elektor wordt geleverd. De functie servicing procedures wordt extern uitgevoerd als de operations ook extern wordt uitgevoerd en het process equipment design wordt in overleg met een eventuele externe operations leverancier besproken.
Carlo geeft aan dat er in alle functies geïnvesteerd dient te worden bij dit scenario omdat de JV investeert in de Elektor Wheelie waar van een ‘halfproduct’ een eindproduct gemaakt moet worden en Elektor/de JV dus bij alle functies betrokken is. Omdat er een stap bij wordt gezet (naar eindproduct) moet Elektor investeren.

Conclusie:
- Alle bedrijfsfuncties: +

Wanneer de JV de functies research en product design vervuld en Elektor hiervoor de input levert worden er vanuit Elektor weer uren doorbelast aan de JV. Hierdoor bespaart Elektor weer. Uiteindelijk betaald de JV (en dus eigenlijk ook Elektor) de doorbelasten uren, maar partij X draagt hier ook aan bij. Hierdoor bespaart Elektor.
De functies process equipment desing en servicing procedures worden extern uitgevoerd door de producent. Hierbij moet de JV wel een coördinerende rol vervullen omdat bijvoorbeeld verbetering door deze functies het totale (productie) proces ten goede kan komen. Elektor hoeft hier niet in te investeren. Wanneer Elektor hier werk voor uitvoert kan het doorbelast worden en is het dus in principe weer een besparing, maar omdat het meer bij de operations tak ligt zal dit niet groot zijn.

Conclusie:
- Research: -
- Product design: -
- Process equipment design: *
- Servicing procedures: *

Ferdinand geeft aan dat er bij dit scenario geïnvesteerd moet worden in research en product design. Er moeten meer mensen komen die ontwikkelen omdat er bijvoorbeeld ook meerdere doelgroepen komen voor de Wheelie met elk zijn eigen technische/design eigenschappen.
De functies process equipment design en servicing procedures kunnen hetzelfde blijven omdat deze voornamelijk bij de externe leverancier ligt (operations).

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

Bij dit scenario moet er geïnvesteerd worden in research en product design. Er moeten meer mensen komen om bijvoorbeeld meer modellen te ontwikkelen. Op dit moment draait deze afdeling nog om het blad van Elektor. Bij meer exploitatie moeten er mensen komen die zich puur bezig houden met de ontwikkeling van de Wheelie en niet ook nog eens met veel andere dingen.
Process equipment design en servicing procedures blijft hetzelfde omdat deze functies voornamelijk bij de partij liggen die ook de operations doet en in dit geval is dit een externe partij.

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

Bij de functies research en product design moeten er meer personen ‘dedicated’ met het project bezig zijn op R&D en design niveau. Hiervoor moeten mensen aangenomen worden en dus moet er geïnvesteerd worden.
Process equipment design en servicing procedures ligt bij de operations uitvoerder (extern) en blijft hetzelfde.

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

Procurement

Het scenario gaat er van uit dat de JV de activiteit vervuld en dat partij X de input hiervoor levert. Op basis hiervan geeft Carlo aan dat de functies hetzelfde kunnen blijven en er dus niet geïnvesteerd of bespaart hoeft/kan worden. Omdat de procurement functies die Elektor nu intern doet van kleine mate zijn zal deze post niet veel verandering brengen. Elektor heeft zelf voor andere activiteiten de interne functies en wat daaraan gekoppeld is nodig.

Conclusie:
- Alle bedrijfsfuncties: *

Aangezien de JV de functies verricht en Elektor hier geen input voor hoeft te leveren en de werkzaamheden m.b.t. de Wheelie op dit moment maar een klein gedeelte van het geheel vormen zal hier niet bespaart worden. De activiteit blijft hetzelfde voor Elektor.

Conclusie:
- Alle bedrijfsfuncties: *

Omdat partij X vanuit de joint venture de input voor de werkzaamheden levert hoeft Elektor niet te investeren. Besparen doet het ook niet omdat de Wheelie-procurement werkzaamheden zo'n klein geheel vormen binnen alle andere werkzaamheden van Elektor. Daarom denkt Ferdinand dat deze activiteit hetzelfde blijft zoals nu.

Conclusie:
- Alle bedrijfsfuncties: *

Raw materials en machinery blijft hetzelfde omdat deze worden ingekocht door de externe partij die ook operations doet. De andere functies kan marginaal op bespaart worden maar Wisse denkt dat dit erg zal meevallen omdat er vrij weinig weg valt als de JV dit overneemt.

Conclusie:
- Raw materials: *
- Supplies: */-
- Machinery: *
- Laboratory equipment: */-
- Office equipment: */-
- Housing: */-

Raw materials, supplies en machinery zijn nu al extern en hier zal Elektor niet op besparen. Bij lab equipment, office equipment en housing kan theoretisch bespaart worden omdat partij X dit overneemt. Praktisch gezien merkt Elektor hier weinig van omdat dit nu maar een klein aandeel is van de totale inkoop werkzaamheden.

Conclusie:
- Raw materials: *
- Supplies: *
- Machinery: *
- Laboratory equipment: */-
- Office equipment: */-
- Housing: */-

Scenario: outsourcing

Inbound logistics

Het scenario van deze bedrijfsactiviteit is dat het extern wordt vervuld. Aangezien dit in de huidige situatie ook zo is verandert er niets voor de kosten. Managementcapaciteit wordt nu ook al ingezet, hier verandert ook niets.

Conclusie:
- Alle bedrijfsfuncties: *

Aangezien het op dit moment ook al is uitbesteed verandert hier voor Elektor niets.

Conclusie:
- Alle bedrijfsfuncties: *

Omdat nu ook alles is uitbesteed blijft deze functie hetzelfde.

Conclusie:
- Alle bedrijfsfuncties: *

Wisse geeft aan dat er ten opzichte van de huidige situatie niets verandert en alle functies hetzelfde blijven.

Conclusie:
- Alle bedrijfsfuncties: *

Alex geeft aan dat nu alles is uitbesteed en er dus niets verandert.

Conclusie:
- Alle bedrijfsfuncties: *

Operations

Het scenario van deze bedrijfsactiviteit is dat het extern wordt vervuld. Aangezien dit in de huidige situatie ook zo is verandert er niets voor de kosten. Managementcapaciteit wordt nu ook al ingezet, hier verandert ook niets.

Conclusie:
- Alle bedrijfsfuncties: *

Omdat alle functies nu ook worden uitbesteed verandert er niets. Paul geeft wel aan dat er bespaart kan worden op de functie testing omdat Elektor dat dan niet meer zelf hoeft te doen.
(Opmerking Bart: is opvallend omdat Paul bij de huidige situatie nog aangeeft dat alles is uitbesteed op dit moment).

Conclusie:
- Machining: *
- Packaging: *
- Assembly: *
- Equipment maintenance: *
- Testing: -
- Facility operations: *

Omdat nu alle functies uitbesteed zijn verandert er niets bij dit scenario.
(Opmerking Bart: wellicht wel een kleine besparing bij packaging omdat buiten de EU dit nog zelf gedaan wordt?)

Conclusie:
- Alle bedrijfsfuncties: *

Wisse geeft aan dat het scenario hetzelfde is als de huidige situatie en dat dit bij meer exploitatie ook zo blijft.

Conclusie:
- Alle bedrijfsfuncties: *

Alex geeft aan dat nu alles is uitbesteed en er dus niets verandert.

Conclusie:
- Alle bedrijfsfuncties: *

Outbound logistics

Het scenario van deze bedrijfsactiviteit is dat het extern wordt vervuld. Aangezien dit in de huidige situatie ook zo is verandert er niets voor de kosten. Managementcapaciteit wordt nu ook al ingezet, hier verandert ook niets.

Conclusie:
- Alle bedrijfsfuncties: *

Bij de huidige situatie gaf Paul aan dat Elektor alle functies onder outbound logistics vervuld. Wanneer de functies worden uitbesteed bespaart Elektor op de directe kosten. Paul geeft hierbij wel aan dat de prijs die ze uiteindelijke bepalen voor het outbound logistics gedeelte wat ze uitbesteden bepalend is voor de daadwerkelijke besparing.

Conclusie:
- Alle bedrijfsfuncties: -

Omdat de activiteit momenteel ook is uitbesteed blijft deze hetzelfde. Er kan wellicht wat bespaart worden op de kosten die Elektor maakt voor verspreiding buiten de EU maar dit zal niet veel zijn.

Conclusie:
- Alle bedrijfsfuncties: *

Op dit moment is deze activiteit ook uitbesteed. Bij meer exploitatie zal er niets veranderen voor de invulling van de functies.

Conclusie:
- Alle bedrijfsfuncties: *

Alex geeft aan dat er niets verandert voor de functies die nu ook zijn uitbesteed. Voor het verzenden van Wheelie's buiten de EU bespaart Elektor wel wat als dit wordt overgedragen aan een externe partij. De besparing is echter niet van hele grote aard.

Conclusie:
- Finished goods warehousing: *
- Material handling: *
- Delivery vehicle operation: */-
- Order processing: */-
- Scheduling: */-

Marketing and sales

Binnen het scenario wordt de marketing en sales activiteit door Elektor vervuld. Carlo geeft aan dat dit grote gevolgen heeft voor de organisatie. Door het exploiteren van de Wheelie (wat andere doelgroepen benaderen inhoudt) met Elektor hiervoor ander soort personeel aannemen, kennis inkopen en meer plannen. Hierdoor moet er over alle functies onder de activiteit marketing en sales geïnvesteerd worden.

Conclusie:
- Alle bedrijfsfuncties: +

Paul geeft aan dat er zeker geïnvesteerd moet worden in alle functies bij meer afzet (exploitatie). Er moet meer geadverteerd worden, gepromoot, een grotere sales force en meer tijd en werk gaat naar channel selection/relation en pricing.

Conclusie:
- Alle bedrijfsfuncties: +

Ferdinand geeft aan dat er bij alle functies onder marketing en sales geïnvesteerd moet worden. Bij advertising moet er via meerdere kanalen worden geadverteerd met specifiekere advertenties. De Wheelie moet meer gepromoot worden, wat investeren in mensen en middelen betekent. Ook zal de sales force uitgebreid moeten worden en zal er een product manager moeten komen specifiek voor de Wheelie die de functies quoting, channel selection en relation en pricing.

Conclusie:
- Alle bedrijfsfuncties: +

Wanneer Elektor meer gaat exploiteren zal er meer aan marketing gedaan moeten worden volgens Wisse. Wanneer Elektor meer doelgroepen wilt bereiken moet er meer aan promotie gedaan worden en komen advertenties ook in externe media. Elektor moet investeren in advertising en promotion om een grotere doelgroep te bereiken en uiteindelijk meer de exploiteren.
Wanneer er meer verkoop is zullen er ook meer mensen komen die de schakel tussen Elektor en de klant vormen, dit betekent investeren in sales force.
Ook in de andere functies moet geïnvesteerd worden omdat er waarschijnlijk verschillende soorten Wheelies komen (voor verschillende doelgroepen) waarvoor meer werk nodig is voor quoting, channel selection en relation en pricing. Hiervoor zijn meer mensen en middelen nodig.

Conclusie:
- Alle bedrijfsfuncties: +

Bij een grote exploitatie is de rode lijn bij marketing en sales dat er geïnvesteerd moet worden in de functies waarmee vooral verkoop bevordert wordt. Er moet meer promotie komen en ook advertenties in externe media. Op de marketing afdeling moeten meer mensen komen te werken om marketing en sales taken uit te voeren, de sales force moet worden uitgebreid.
Alex verwacht dat de functies quoting, channel selection en relation en pricing hetzelfde blijven omdat dit geen lastige processen zijn en het te maken blijft hebben met de volumes.

Conclusie:
- Advertising: +
- Promotion: +
- Sales force: +
- Quoting: *
- Channel selection: *
- Channel relation: *
- Pricing: *

Service

Het scenario bij service gaat ervan uit dat functies gedeeltelijk intern en extern worden vervuld. Functies die direct te koppelen zijn aan inbound logistics, operations en outbound logistics (alle, behalve training) worden extern uitgevoerd maar intern gecoördineerd. Voor de functies die onder service vallen geeft Carlo aan dat het verband tussen kosten en groei exponentieel is. Meer verkoop van de Wheelie in meerdere markten via meerdere kanalen levert meer werk op en moeten er meer kosten gemaakt worden, ofwel geïnvesteerd.

Conclusie:
- Alle bedrijfsfuncties: +

Paul geeft aan dat er geïnvesteerd moet worden in alle functies bij substantieel meer afzet. Meer afzet betekent meer werk voor mensen en middelen bij de activiteit service.

Conclusie:
- Alle bedrijfsfuncties: +

Bij installation en training moet er geïnvesteerd worden in meer capaciteit op de helpdesk.
Ferdinand geeft aan dat er bij het uitbesteden van repair bespaart kan worden op deze functie (Opmerking Bart: maar in de huidige situatie bestaat deze functie helemaal niet, dus besparen kan niet). Parts supply kan gehandhaaft worden zoals de functie op dit moment wordt uitgevoerd. Bij product adjustment ligt het werk bij de externe partij, hier verandert niets.

Conclusie:
- Installation: +
- Repair: *
- Training: +
- Parts supply: *
- Product adjustment: *

Door verschillende doelgroepen moet Elektor meerdere handleidingen en trainingen produceren die via verschillende (nieuwe) kanalen beschikbaar gesteld moeten worden. Hierdoor moet er geïnvesteerd worden in installation en training.
Ook moet er geïnvesteerd worden in repair en parts supply omdat er waarschijnlijk meer werk voor deze functies komt. Bij meer exploitatie zullen klanten ook meer onderdelen bestellen en is de kans op meer reparaties groter.
In product adjustment moet sowieso geïnvesteerd worden omdat deze functie nu niet bestaat.

Conclusie:
- Alle bedrijfsfuncties: +

Alex geeft aan dat er bij installation professioneler te werk moet worden gegaan omdat er bijvoorbeeld meerdere doelgroepen komen. Hierdoor moeten er meerdere handleidingen worden gemaakt en ook in verschillende formats, investeren dus.
Voor de functie repair is er een ander systeem nodig om de coördinatie te handhaven bij grotere exploitatie. Alex geeft aan dat de huidige personele bezetting deze functie aan kan bij meer exploitatie, maar er wel geïnvesteerd moet worden in het systeem.
Omdat er nu niet aan training wordt gedaan moet hier in geïnvesteerd worden om deze functie op te zetten.
Parts supply sluit aan bij repair. Er is een systeem nodig, maar waarschijnlijk geen extra mensen.
In product adjustment moet geïnvesteerd worden. Bij Alex is het onduidelijk in welke mate dit nu gebeurt, maar bij grotere exploitatie moet er een configuratie (bijv. Online) module komen waarmee iemand zijn eigen Wheelie kan samenstellen.

Conclusie:
- Alle bedrijfsfuncties: +

Firm infrastructure

Het scenario bij firm infrastructure gaat er (logischer wijs) vanuit dat dit intern vervuld wordt. Bij meer exploitatie geeft Carlo aan dat er in de functies ook meer geïnvesteerd moet worden omdat er meer aansturing en controle nodig is. Vooral bij de legal functie komen veel meer kosten omdat wanneer Elektor een eindproduct gaat leveren er veel werk verzet moet worden om wet- en regelgeving omtrent een balancerend voortuig e.d. in kaart gebracht en aan voldaan moet worden.

Conclusie:
- Alle bedrijfsfuncties: +

Paul geeft aan dat alle functies hetzelfde kunnen blijven, behalve finance. Bij finance komt meer werk te liggen omdat er bijvoorbeeld meer klanten komen, meer facturen en dus meer werk. De overige functies kunnen hetzelfde blijven omdat deze voornamelijk op één niveau zitten; of je nu 100 Wheelies verkoopt of 1000, deze functies blijven dezelfde druk hebben.

Conclusie:
- General management: *
- Planning: *
- Finance: +
- Accounting: *
- Legal: *
- Government affairs: *
- Quality management: *

De functies general management en accounting kunnen volgens Ferdinand gelijk blijven omdat dit globale functies zijn waarbij het meer exploiteren geen grote impact zal hebben. In planning moet wel geïnvesteerd worden omdat er meerdere strategieën voor verschillende doelgroepen gecreëerd moeten worden. Ook zal de finance functie meer werk krijgen waardoor er in deze functie geinvesteerd moet worden.
In de legal en government affairs functie moet ook geinvesteerd worden omdat er meerdere doelgroepen komen, aansprakelijkheid kan veranderen en implicaties kunnen optreden als de Wheelie een consumentenproduct wordt.
Quality management wordt ook meer werk omdat er meer controle momenten nodig zijn door de vergrootte productie en meerdere doelgroepen.

Conclusie:
- General management: *
- Planning: +
- Finance: +
- Accounting: *
- Legal: +
- Government affairs: +
- Quality management: +

Wisse geeft aan dat er geïnvesteerd moet worden in een productmanager. Er is iemand nodig die volledige sturing aan het project geeft. Dit valt onder general management en planning en hier moet dus geïnvesteerd worden. Bij quality management moet ook geïnvesteerd worden omdat door

grotere afzet controle-/kwaliteitsmomenten toenemen en hier dus meer mensen/middelen voor nodig zijn.
Wisse geeft aan dat de overige functies hetzelfde kunnen blijven. Finance en accounting hebben een rapportage functie. De huidige inrichting hiervan kan een grotere werkdruk aan. Hetzelfde geldt voor accounting en legal, hier kan de huidige samenstelling van deze functies gebruikt worden bij groei.

Conclusie:
- General management: +
- Planning: +
- Finance: *
- Accounting: *
- Legal: *
- Government affairs: *
- Quality management: +

Alex heeft aan dat algemene functies als general management en planning geen extra capaciteit nodig hebben bij meer exploitatie omdat aantallen op deze functies weinig invloed uitoefenen.
Bij finance en accounting is dit anders. Alex verwacht dat hier meer handelingen verricht moeten worden. Deze handelingen hebben meer systemen en capaciteit nodig omdat er veel meer transacties plaatsvinden.
Bij legal en government affairs zal er eenmalig advies ingewonnen moeten worden volgens Alex. Het zijn geen functies waar meer capaciteit op nodig is als de Wheelie meer geëxploiteerd wordt.
Bij quality management moet er geïnvesteerd worden volgens Alex omdat het verbeteren van het product steeds belangrijker wordt. Er moet bijgehouden worden wat mensen willen in verschillende markten en verbeteringen moeten worden doorgevoerd.

Conclusie:
- General management: *
- Planning: *
- Finance: +
- Accounting:+
- Legal: */+
- Government affairs: */+
- Quality management: +

Human Resource Management

Het scenario bij HRM is dat alle functies intern vervuld worden. Carlo geeft aan dat dezelfde redernatie geldt voor HRM als bij firm infrastructure. Meer coördinatie en controle en natuurlijk moet er bij meer exploitatie meer mensen aangenomen worden waardoor de HRM functies extra belast worden.

Conclusie:
- Alle bedrijfsfuncties: +

Paul geeft aan dat er voor exploitatie meer mensen nodig zijn om dit te kunnen doen. Als gevolg hiervan komt er meer werk te liggen bij de HRM activiteit. Meer werk voor recrouting en hiring in het aanneemproces. Meer mensen en meer exploitatie betekent meer training, development en compensation.

Conclusie:
- Alle bedrijfsfuncties: +

Volgens Ferdinand moet er geïnvesteerd worden in recuiting en hiring om meer mensen aan te trekken voor de functies waarbij meer mensen nodig zijn. Training en development kunnen hetzelfde blijven omdat met de huidige mensen/middelen hierin voorzien kan worden. Ook de compensation tak kan hetzelfde blijven omdat er een beloningsstandaard in binnen Elektor.

Conclusie:
- Recruiting: +
- Hiring: +
- Training: *
- Development: *
- Compensation: *

Meer exploiteren betekent meer mensen aannemen. Daarom moet er geïnvesteerd worden in alle functies onder HRM. Meer mensen betekent dat recruiting en hiring zwaarder belast worden, dus investeren. Bij verschillende soorten Wheelies en nieuw personeel moet er ook vaker en meer getraind en ontwikkelt worden waardoor er hier ook geïnvesteerd moet worden. Meer mensen betekent meer compensatie werkzaamheden, hier moet dus ook worden geïnvesteerd.

Conclusie:
- Alle bedrijfsfuncties: +

Ondanks de vergrote exploitatie verwacht Alex niet dat er in de functies recruiting en hiring geïnvesteerd moet worden. De afdelingshoofden werven en nemen aan. Alex verwacht hier niet direct veel meer druk.
Wel verwacht Alex dat er bij training en developmend geinvesteerd moet worden in scholing van het personeel. De Wheelie zal complexer worden en personeel moet op de hoogte blijven van laatste ontwikkelingen.
De compensatie functie zal niet veranderen volgens Alex omdat het compensatie proces een simpel proces is.

Conclusie:
- Recruiting: *
- Hiring: *
- Training: +
- Development: +
- Compensation: *

Technology development

Het scenario bij technology development is dat alle functies intern vervuld worden en dat de functies die direct aan operations zijn gekoppeld extern (zoals servicing procedures bij machines). Bij het meer exploiteren van de Elektor Wheelie geeft Carlo aan dat er bij alle functies geïnvesteerd moet worden. Dit omdat er mensen vrijgemaakt moeten worden of mensen aangenomen moeten worden om de functies te kunnen vervullen.

Conclusie:
- Alle bedrijfsfuncties: +

De functies process equipment design en servicing procedures kunnen hetzelfde blijven omdat deze voornamelijk bij de operations tak ligen en deze is uitbesteed in dit scenario. Maar ook research en product design blijven hetzelfde geeft Paul aan. Kosten voor ontwikkeling en het voorzien aan vraag

blijven hetzelfde. De R&D afdeling kan past altijd dezelfde techniek toe, kleine aanpassingen kunnen ze in volgorde van binnenkomst met de huidige capaciteit veranderen.

Conclusie:
- Alle bedrijfsactiviteiten: *

In research en product design moet geïnvesteerd worden in mensen die de grotere vraag op deze functies kunnen opvangen. Wanneer er meer geëxploiteerd wordt door Elektor zijn er meer mensen nodig die bijvoorbeeld aan specifieke vraag kunnen voldoen vanuit de markt.
Process equipment design en servicing procedures blijven hetzelfde omdat deze functies voornamelijk bij de partij liggen die de operations uitvoert.

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

Wisse denkt dat research en product design binnen de huidige samenstelling kan worden opgepakt bij meer exploitatie. Echter, geeft Wisse ook aan dat de kans op extra werk groter is en dat er dan wellicht extra capaciteit moet worden ingehuurd.
Process equipment design en servicing procedures kunnen hetzelfde blijven omdat deze bij de partij horen die de operations uitvoert.

Conclusie:
- Research: +/*
- Product design: +/*
- Process equipment design: *
- Servicing procedures: *

Alex geeft aan dat er bij meer exploitatie ‘dedicated’ personeel met het Wheelie project bezig moet zijn. Aangezien dit nu nog niet het geval is moet hier zeker in geïnvesteerd worden. De functie product design is nu niet vertegenwoordigd binnen Elektor. Wanneer dit intern wordt vervuld (scenario) dan moet deze functie worden opgezet en dus geïnvesteerd worden in mensen en middelen.
De functies process equipment design en servicing procedures worden door de partij uitgevoerd die ook de operations uitvoert. Deze functies blijven hetzelfde.

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

Procurement

Het scenario bij procurement is dat functies direct gekoppeld aan operations (raw materials, machinery, en housing gedeeltelijk) extern worden vervuld en de rest intern.
Raw materials en machinery blijven hetzelfde volgens Carlo omdat deze functies bij de externe partij liggen en Elektor hier geen extra kosten/werk aan zal hebben. De functie supplies zal ook redelijk hetzelfde blijven, of er kan een kleine plus zijn doordat Elektor extra middelen nodig heeft bij de exploitatie. Elektor beschikt over een eigen laboratorium waarin alle benodigde apparatuur aanwezig

is, daarom hoeft er niet geïnvesteerd te worden in deze functie. Bij office equipment en building moet wel geïnvesteerd worden. Meer exploiteren betekent meer mensen en meer ruimte nodig. Deze mensen verbruiken ook nog een meer office equipment.

Conclusie:
- Raw materials: *
- Supplies: +
- Machinery: *
- Laboratory equipment: *
- Office equipment: +
- Housing: +

Raw materials en machinery blijven hetzelfde omdat deze functies door de operations partij worden ingekocht. Supplies blijft ook hetzelfde omdat producten om de normale bedrijfsfunctie mee uit te oefenen niet veel zullen veranderen. Ook laboratory equipment verandert niet omdat er maar één keer de benodigde apparatuur ingekocht hoeft te worden om deze functie goed te kunnen uitoefenen. Office equipment en housing kunnen wel meer kosten met zich meebrengen. Meer mensen is meer benodigde ruimte en meer benodigde kantoorartikelen.

Conclusie:
- Raw materials: *
- Supplies: *
- Machinery: *
- Laboratory equipment: *
- Office equipment: +
- Housing: +

Raw materials, supplies en machinery kan hetzelfde blijven omdat deze worden uitgevoerd door een externe leverancier (operations). Er hoeft geen extra of meer laboratory equipment worden aangeschaft waardoor deze functie hetzelfde blijft.
Office equipment zal toenemen doordat er meer mensen werkzaam zijn voor de Wheelie binnen Elektor. Wanneer de inbound logistics, operations en outbound logistics extern worden uitgevoerd dan blijft de functie gebouwen hetzelfde omdat Elektor voldoende plek heeft in de huidige vorm om mensen te huisvesten.

Conclusie:
- Raw materials: *
- Supplies: *
- Machinery: *
- Laboratory equipment: *
- Office equipment: +
- Housing: *

Raw materials en machinery liggen bij de operations partij dus deze post blijft hetzelfde. Het lab van Elektor heeft alle benodigde middelen in huis om werk uit te voeren dus hier hoeft niet geïnvesteerd te worden. Wisse geeft aan dat bij de overige functie niet direct geïnvesteerd moet worden, wellicht alleen bij een hele exponentiële groei.

Conclusie:
- Alle bedrijfsfuncties: *

Alex geeft aan dat de functies raw materials, supplies en machinery extern worden ingekocht en dat hier niets verandert. Lab equipment is allemaal al in huis, hier hoeft niets meer ingekocht te worden. In office equipment moet theoretisch geïnvesteerd worden bij dit scenario (exploitatie). Bij andere functies moeten bijvoorbeeld mensen aangenomen worden en voor deze mensen moet office equipment ingekocht worden. Ook moet er in ruimte worden geïnvesteerd omdat het huidige pand te weinig ruimte biedt voor de mogelijke nieuwe bezetting.

Conclusie:
- Raw materials: *
- Supplies: *
- Machinery: *
- Laboratory equipment: *
- Office equipment: +
- Housing: +

Scenario: licensing

Inbound logistics

Het scenario van deze bedrijfsactiviteit is dat het extern wordt vervuld. Aangezien dit in de huidige situatie ook zo is verandert er niets voor de kosten. Managementcapaciteit wordt nu ook al ingezet, hier verandert ook niets.

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets.

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets.

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets.

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets.

Conclusie:
- Alle bedrijfsfuncties: *

Operations

Het scenario van deze bedrijfsactiviteit is dat het extern wordt vervuld. Aangezien dit in de huidige situatie ook zo is verandert er niets voor de kosten. Managementcapaciteit wordt nu ook al ingezet, hier verandert ook niets.

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets.

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets. (Opmerking Bart: misschien wel een besparing bij packaging door wegvallen werk Elektor buiten EU?)

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets.

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets.

Conclusie:
- Alle bedrijfsfuncties: *

Outbound logistics

Het scenario van deze bedrijfsactiviteit is dat het extern wordt vervuld. Aangezien dit in de huidige situatie ook zo is verandert er niets voor de kosten. Managementcapaciteit wordt nu ook al ingezet, hier verandert ook niets.

Conclusie:
- Alle bedrijfsfuncties: *

Omdat Elektor nu de outbound logistics zelf doet en in het licensing scenario de activiteit extern uitgevoerd kan worden kan Elektor besparen op alle functies.

Conclusie:
- Alle bedrijfsfuncties: -

Op zich blijven alle functies hier hetzelfde. Er kan wellicht wat bespaart worden op de kosten voor verzending buiten de EU wat Elektor nu nog zelf doet maar dit zal erg weinig zijn.

Conclusie:
- Alle bedrijfsfuncties: *

De huidige situatie is gelijk aan het scenario en daardoor verandert er niets.

Conclusie:
- Alle bedrijfsfuncties: *

Alex geeft aan dat er niets verandert voor de functies die nu ook zijn uitbesteed. Voor het verzenden van Wheelie's buiten de EU bespaart Elektor wel wat als dit wordt overgedragen aan een externe partij. De besparing is echter niet van hele grote aard.

Conclusie:
- Finished goods warehousing: *
- Material handling: *
- Delivery vehicle operation: */-
- Order processing: */-
- Scheduling: */-

Marketing and sales

Het scenario van marketing and sales is dat het extern wordt uitgevoerd. Aangezien Elektor alle functies van marketing en sales momenteel intern uitvoeren kan hier een besparing op worden gemaakt. Carlo geeft aan dat de besparing niet heel groot zal zijn aangezien er nu niet heel veel werk zit in deze functies. De besparing zal meet theoretisch zijn dat het daadwerkelijk een zware impact heeft op Elektor. Echter, is het wel een besparing aangezien bij alle functies werk weg valt.

Conclusie:
- Alle bedrijfsfuncties: -

Omdat Elektor nu de marketing en sales zelf doet en in het licensing scenario de activiteit extern uitgevoerd kan worden kan Elektor besparen op alle functies.

Conclusie:
- Alle bedrijfsfuncties: -

Op alle functies kan bespaart worden omdat Elektor deze activiteiten niet meer zelf uitvoert. Geen promotie, advertenties, demonstraties etc.

Conclusie:
- Alle bedrijfsfuncties: -

Omdat alle functies overgaan van Elektor naar de licentie partner bespaart Elektor op alle functies.

Conclusie:
- Alle bedrijfsfunctie: -

Alex geeft aan dat er bij dit scenario theoretisch bespaart wordt, maar praktisch zal dit lastig merkbaar zijn omdat het werk nu erg versnipperd is.

Conclusie:
- Alle bedrijfsfunctie: -

Service

Het scenario gaat er van uit dat alle functies extern worden uitgevoerd. Hierdoor is er een kleine besparing mogelijk op installation, repair, training en parts supply. Elektor levert werk voor deze functies en als de functies wegvallen kan er bespaart worden op mensen en middelen die hieraan gekoppeld zijn. Product adjustment bestaat nu niet binnen Elektor, mocht de licentiepartner dit oppakken dan blijft deze post dus hetzelfde voor Elektor.

Conclusie:
- Installation: -
- Repair: -
- Training: -
- Parts supply: -
- Product adjustment: *

Omdat Elektor nu de service zelf doet en in het licensing scenario de activiteit extern uitgevoerd kan worden kan Elektor besparen op alle functies.
(Opmerking Bart: Paul heeft bij het huidige scenario aangegeven dat product adjustment niet plaatsvindt, is dus eigenlijk hetzelfde)

Conclusie:
- Installation: -
- Repair: -
- Training: -
- Parts supply: -
- Product adjustment: *

Bij installation en training valt werk weg waardoor er bespaart kan worden op deze functies. De overige functies blijven hetzelfde omdat ze nu ook extern zijn uitgevoerd of niet bestaan.

Conclusie:
- Installation: -
- Repair: *
- Training: -
- Parts supply: *
- Product adjustment: *

Wisse geeft aan dat de functies installation, repair, training en parts supply wegvallen bij dit scenario en dus kan hier bespaart worden. Aan product adjustment wordt nu niet gedaan, dus deze functie blijft hetzelfde.

Conclusie:
- Installation: -
- Repair: -
- Training: -
- Parts supply: -
- Product adjustment: *

Bij installation, repair en parts supply kan theoretisch bespaart worden. Er valt werk weg bij het lab en customer service. De functies training en product adjustment bestaan nu al niet dus daar wordt ook niet bespaart.

Conclusie:
- Installation: -
- Repair: -
- Training: *
- Parts supply: -
- Product adjustment: *

Firm infrastructure

Het scenario gaat er van uit dat de firm infrastructure voor de Wheelie bij de externe partij ligt en dat Elektor alleen de licentieovereenkomst coördineert.
Carlo geeft aan dat general management door de coördinatie hetzelfde blijft, door deze functie kan de licentieovereenkomst gecoördineerd worden.
Voor de overige functies geldt een besparing omdat hier werkzaamheden wegvallen. Bij quality management is het geheel afhankelijk hoe dit georganiseerd wordt in de licentieovereenkomst en wat voor label de Wheelie krijgt. Hier geldt dus of een besparing (bij overgaan op licentiepartner of hetzelfde als het bij Elektor blijft liggen).

Conclusie:
- General management: *
- Planning: -
- Finance: -
- Accounting: -
- Legal: -
- Government affairs: -
- Quality management: */-

Paul geeft aan dat er op alle functies bespaart kan worden omdat dit werk wordt overgenomen door de licentiehouder. Allen bij de functie legal nemen de werkzaamheden en de kosten toe om het contract met de licentiehouder te handhaven.

Conclusie:
- General management: -
- Planning: -
- Finance: -
- Accounting: -
- Legal: +
- Government affairs: -
- Quality management: -

Bij planning, finance, accounting, government affairs en quality management kan bespaart worden omdat deze functies overgaan naar de licentiehouder.
General management en legal blijven hetzelfde door het ‘bijhouden’ van de licentiehouder en het contracht hiermee.

Conclusie:
- General management: *
- Planning: -
- Finance: -
- Accounting: -
- Legal: *
- Government affairs: -
- Quality management: -

Wisse geeft aan dat er geïnvesteerd moet worden in general management en quality management. In general management moet geïnvesteerd worden omdat er iemand het licentie contract moet managen. Wisse verwacht dat deze taak meer tijd/werk in beslag neemt dan de huidige algemene management tijd die wordt besteedt aan de Wheelie.

Bij quality management moet geïnvesteerd worden in mensen/middelen om de kwaliteit van producten te handhaven. Hier moet goede grip op gehouden worden.
De rest van de functies kost minder tijd en veel werk valt hier ook weg. Daarom kan hier bespaart worden.

Conclusie:
- General management: +
- Planning: -
- Finance: -
- Accounting: -
- Legal: -
- Government affairs: -
- Quality management: +

Alex geeft aan dat bij firm infractructure de enige taak het beheer van het licentiecontract zit bij dit scenario. Hier kan dus een investering zitten. Bij de overige functies zit een theoretische besparing omdat deze worden overgedragen aan de licentiehouder. Praktisch zal de bsapring minder snel zichtbaar zijn doordat de Wheelie werkzaamheden maar een klein deel vormen van de werkzaamheden bij deze functies binnen Elektor.

Conclusie:
- General management: +
- Planning: -
- Finance: -
- Accounting: -
- Legal: -
- Government affairs: -
- Quality management: -

Human Resource Management

Binnen het scenario worden alle HRM functies m.b.t. de Wheelie extern uitgevoerd. Hierdoor kan er een besparing worden gemaakt op alle functies. Carlo geeft aan dat dit echter een theoretische besparing is omdat de mensen en middelen die nu de HRM functies voltooien gewoon op hun plek blijven. Er valt wel wat tijd vrij voor overige activiteiten waardoor dit wel als besparing aangezien kan worden.

Conclusie:
- Alle bedrijfsfuncties: -

Omdat alle HRM gerelateerd aan de Wheelie worden overgenomen door de licentiehouder vallen hier alle functies weg en kan Elektor dus besparen.

Conclusie:
- Alle bedrijfsfuncties: -

Ferdinand denkt dat de functies recruiting, hiring, training en development hetzelfde blijven omdat hier nu vrij weinig werk voor wordt gedaan. Er worden nu geen nieuwe personen ingehuurd en/of getraint m.b.t. de Elektor Wheelie. Op compensation kan bespaart worden omdat dit wordt overgedragen aan de licentiehouder.

Conclusie:

- Recruiting: *
- Hiring: *
- Training: *
- Development:*
- Compensation: -

Wisse geeft aan dat Elektor weinig verandering zal merken op HRM gebied als deze functie overgaat naar de licentie partner. Op dit moment zit Elektor al op een absoluut minimum qua HR werkzaamheden en zal Elektor hier niets besparen.

Conclusie:
- Alle bedrijfsfuncties: *

Alex geeft aan dat hij geen verandering verwacht bij HRM. Op dit moment doet de HRM afdeling weinig m.b.t. het Wheelie project.

Conclusie:
- Alle bedrijfsfuncties: *

Technology development

Het scenario gaat er van uit dat technology development intern wordt vervuld en voornamelijk het research en development gedeelte er van. Het process equipment design en servicing procedures ligt bij de externe partner. Volgens Carlo moet Elektor investeren in research en product design wanneer via licensing meer aan exploitatie wordt gedaan omdat bij nieuwe doelgroepen er aanpassingen aan de Wheelie gedaan moeten worden.

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

De functies process equipment design en servicing procedures blijven hetzelfde omdat deze al onderdeel waren van de externe partij. Ook research en product design blijven hetzelfde omdat Paul denkt dat het werk van de R&D afdeling hetzelfde kan blijven onder een licentie.

Conclusie:
- Alle bedrijsactiviteiten: *

In research en product design moet geinvesteerd worden bij dit scenario door de druk van de licentiehouder. Elektor zal de Wheelie steeds moeten verbeteren. Process equipment design en servicing procedures blijven hetzelfde omdat dit bij de externe partij ligt.

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

Wisse geeft aan dat er een zwaardere belasting op research en product design zal komen. De licentiepartner zal vraag hebben naar nieuwe soorten Wheelie’s. Elektor kan er een business van

maken van het verbeteren van de Wheelie en een verbeterde versie aanbieden aan de licentiepartner.
Bij de overige functies verandert er niets omdat deze bij de operations partij liggen en dat is Elektor niet.

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

Alex geeft aan dat bij research en product design geïnvesteerd moet worden omdat er vanuit de licentiepartner veel wensen kunnen komen. De licentiehouder zal veel ideeën hebben voor verbetering (en meer afzet) waar Elektor naar moet kijken. Er moet iemand zijn die het dialoog met de licentiehouder onderhoudt. Eventueel zou er op deze manier een nieuwe business kunnen ontstaan voor Elektor: licentiehouder geeft nieuwe ideeën/inzichten, Elektor werkt uit/maakt nieuwe techniek, licentiepartner koopt nieuwe techniek van Elektor.
Process equipment design en servicing procedures liggen bij de operations activiteit en blijven hetzelfde.

Conclusie:
- Research: +
- Product design: +
- Process equipment design: *
- Servicing procedures: *

Procurement

Het scenario van procurement m.b.t. de Wheelie is dat de partner deze activiteit vervuld. Op basis hiervan geeft Carlo aan dat de functies nagenoeg hetzelfde blijven voor Elektor omdat de Wheelie hier maar een zeer klein deel van uitmaakt en er hierdoor niet op bespaart kan worden. Carlo geeft aan dat het denkbaar is dat er wel geïnvesteerd moet worden in laboratory equipment wanneer de R&D activiteiten toenemen.

Conclusie:
- Raw materials: *
- Supplies: *
- Machinery: *
- Laboratory equipment: +
- Office equipment: *
- Housing: *

Op de functies die Elektor nu in eigen huis heeft kan bespaart worden omdat deze worden overgedragen aan de licentiehouder.

Conclusie:
- Raw materials: *
- Supplies: -
- Machinery: *
- Laboratory equipment: -
- Office equipment: -
- Housing: -

Raw materials, supplies en machinery blijven hetzelfde omdat dit nu al extern is. Laboratory equipment blijft hetzelfde omdat al het benodigde al in bezit is van Elektor.
Op office equipment en housing kan bespaart worden omdat deze functies worden overgedragen aan de externe partij.

Conclusie:
- Raw materials: *
- Supplies: *
- Machinery: *
- Laboratory equipment: *
- Office equipment: -
- Housing: -

Raw materials en machinery waren al extern, hier verandert dus niets. Bij de overige functies zal ook niet veel veranderen denkt Wisse. Hij denkt dat de inkoop niet direct zal veranderen omdat de Wheelie maar een erg klein gedeelte is van de totale Elektor werkzaamheden.
Ook hoeft er geen extra lab equipment worden ingekocht.

Conclusie:
- Raw materials: *
- Supplies: *
- Machinery: *
- Laboratory equipment: *
- Office equipment: *
- Housing: *

Bij de functies die Elektor nu zelf uitvoert (lab equipment, office equipment en housing) vallen theoretisch kosten weg. Echter, geeft Alex aan dat dit praktisch lastig is te merken door de kleine hoeveelheid werk van totaal Elektor.

Conclusie:
- Raw materials: *
- Supplies: *
- Machinery: *
- Laboratory equipment: */-
- Office equipment: */-
- Housing: */-

Appendix 7: Elektor Wheelie information

Information (in Dutch) about the Elektor Wheelie published in the Elektor magazine.

In het eerste artikel over het zelfbalancerende enkelassige elektro'voertuig' voor zelfbouw introduceren we het compacte elektronische systeem. Een ATmega32 verwerkt de regel- en sensorgegevens en regelt via de vermogenstrappen van de beide motoren de rijrichting, de snelheid en de balans van het elektrische voertuig – van stilstand tot een snelheid van 18 km/h.

De elektronica van de ElektorWheelie verwerkt de signalen van een stuurpotentiometer, een versnellingssensor en een hoeksensor en stuurt afhankelijk daarvan middels PWM en MOSFET's de draairichting en het draaimoment van de beide motoren. Daardoor blijft het enkelassige voertuig over het gehele snelheidsgebied in balans. Daarbij is het ook mogelijk om praktisch op dezelfde plaats te blijven tijdens het draaien. De aandrijving van

Eigenschappen

- 2 x 500W gelijkstroommotoren
- 2 x 12V AGM-accu's van 9 Ah
- 2 x 14 inch kunststofwielen met luchtbanden
- H-brug-PWM-motorbesturing tot 25 A
- Automatische uitschakeling bij afstappen
- Fail-safe-nooduitschakeling
- display van de laadtoestand van de accu
- Max. snelheid 18 km/h
- Reikwijdte ongeveer 8 km
- Gewicht ongeveer 35 kg

Sensoren:

- Gyroscoop Invensense IDG300 (IDG500)
- Versnellingssensor Analog Devices ADXL 320
- Stroomsensor Allegro ACS 755-SCB 100

Microcontrollers:

- AtMega16 (motorbesturing)
- ATtiny25 (stroombewaking)

Compiler:

- BASCOM-AVR (Basic-compiler)

Balanceren, sturen, remmen

Voor het succesvol balanceren van het voertuig is het noodzakelijk dat de sensoren betrouwbare informatie over de hellingshoek van het basisplatform en de snelheid van de hoekverandering leveren – en natuurlijk ook dat de regeling, motorsturing en de motoren zelf goed gedimensioneerd zijn.

Het balanceren zelf is relatief eenvoudig. Buigt de bestuurder naar voren, dan kantelt het platform en de motoren worden zo versneld, dat het zwaartepunt van het totale systeem weer in balans komt. Dat wil zeggen, de voeten van de berijder worden onder het zwaartepunt van het totale systeem (bestuurder plus voertuig) naar voren versneld zodat de berijder iets naar achter kantelt en de hellingshoek weer kleiner wordt.

Het gehele systeem heeft daardoor de neiging om op te slingeren, wat wordt tegengegaan met een overeenkomstige stabiele behuizing en een proefondervindelijk aangepaste filterfunctie. De pool van het filter ligt dus net iets lager dan de resonantiefrequentie van het systeem.

Sturen gebeurt door verschillend sterk versnellen respectievelijk afremmen van de motoren. Er moet daarbij wel rekening mee worden gehouden dat de stuurbeweging bij grotere snelheden voor alle zekerheid beperkt moet worden. De ElektorWheelie zal bij snelle richtingsveranderingen niet omkiepen – de bestuurder is hier eerder de beperkende factor.

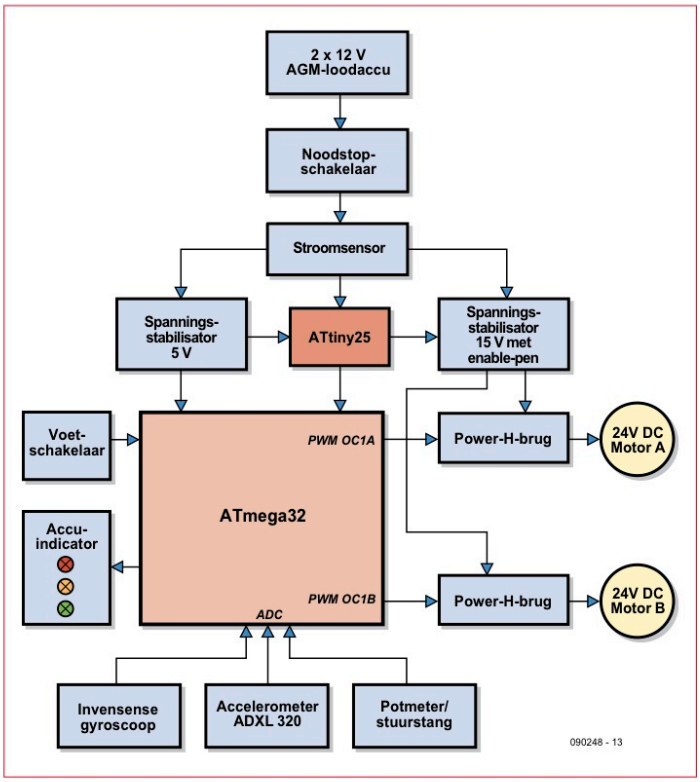
Uiteindelijk komt ook de krachtigste motor niet verder dan zijn eigen maximum. In het geval van de ElektorWheelie zou het echter fatale gevolgen voor de bestuurder kunnen hebben als de motoren geen vermogen meer over hebben om een verstoring van de balans uit te middelen. Daarom worden de motoren slechts met een maximaal vermogen van ongeveer 70% belast. Er moet altijd een vermogensreserve zijn die er voor zorgt dat de bestuurder ook bij het bereiken van de maximale snelheid nog door een extra versnelling zover naar achter gekanteld kan worden, dat een automatische vermindering van de snelheid wordt bereikt. Naar achter leunen remt de Wheelie af, naar voren leunen geeft een vergroting van de snelheid.

de ElektorWheelie bestaat uit twee gelijkstroommotoren van 500 W. De voeding wordt geleverd door twee AGM-lood-accu's van 12 V. De elektronica bestaat uit een besturingsprint met een er bovenop geplaatste sensorprint.

De regeling functioneert volgens het principe van de dynamische stabilisatie. Net zoals bij het menselijke evenwichtsorgaan stuurt het voertuig met behulp van sensoren de balans van het basisplatform. Dreigt deze naar voren of naar achteren over te hellen, dan versnelt het voertuig proportioneel beide motoren tegen de kiepbeweging in. Door de motoren met een verschillende kracht aan te sturen, kan het voertuig gestuurd worden.

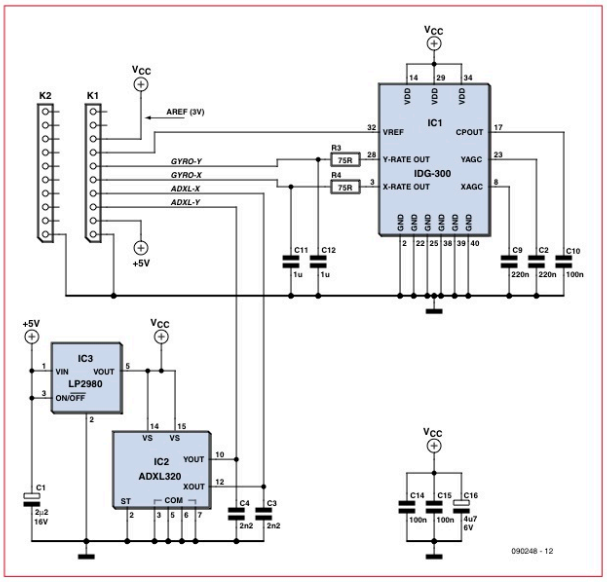
Principeschakeling

Het hart van de in het blokschema in **figuur 1** getoonde standregeling en motorbesturing is een ATmega32 van Atmel. Deze bestuurt via twee PWM-uitgangen en twee MOSFET-H-bruggen de beide 24-V-DC-motoren. Met behulp van een Hall-effect-stroomsensor bewaakt een tweede microcontroller, een ATtiny van Atmel, de motorstroom. Bij het overschrijden van de maximale stroom, bijna 80 A bij kortsluiting, schakelt de ATtiny via de enable-pen van de 15-V-spanningsregelaar de voedingsspanning van de drivers van de H-bruggen uit. In het geval van een kortsluiting waarbij de motorelektronica volledig uitvalt, wordt de accustroom via een zuiver elektromechanische noodstopvoorziening onderbroken om 'op hol slaan' van het voertuig onder alle omstandigheden uit te sluiten. Blijft de stroom binnen de normale grenzen, dan meldt de Tiny25 een overschrijding van de normale stroom van bijna 25 A aan de Mega32 en initieert daarmee een dynamische aanpassing van het PWM-signaal.



Figuur 1. Het blokschema van de motorbesturing.

De Mega32 krijgt de stuursignalen van de gyroscoop, de versnellingssensor van de sensorprint en van een zeer betrouwbare stuurpotentiometer die met de stuurhendel van de ElektorWheelie is verbonden binnen via zijn ADC. Deze wordt ongeveer 100 maal per seconde uitgelezen.
Als veiligheidsvoorziening is een voetcontact (voetdrukknop) met de ATmega32 verbonden. Wordt deze knop niet ingedrukt omdat de berijder is afgestapt (of er zelfs vanaf is gesprongen), dan schakelt de microcontroller na twee seconden de motorstroom uit. Daarmee wordt verhinderd dat het voertuig onbemand verder gaat.
De accuspanning wordt eveneens via de ADC van de ATmega32 gemeten, die afhankelijk daarvan de resterende bedrijfstijd met drie LED's aangeeft.



Figuur 2. De schakeling van de sensorprint met de gyroscoop en versnellingssensor.

Sensors en dynamische stabilisering

De standsensoren zijn op een afzonderlijk printje ondergebracht dat op de hoofdprint van de regeling wordt gestoken. In **figuur 2** is de schakeling van de sensorprint te zien. Naast een 2-assige gyroscoop IDG300 [1] van Invensense zit er ook een 2-assige versnellingssensor ADXL-320 [2] van Analog Devices op de print. De spanningstabilisator IC3 voorziet de sensoren van de benodigde spanning van 3 volt, die tegelijk dienst doet als referentiespanning voor de ADC van de Mega32 op de hoofdprint.

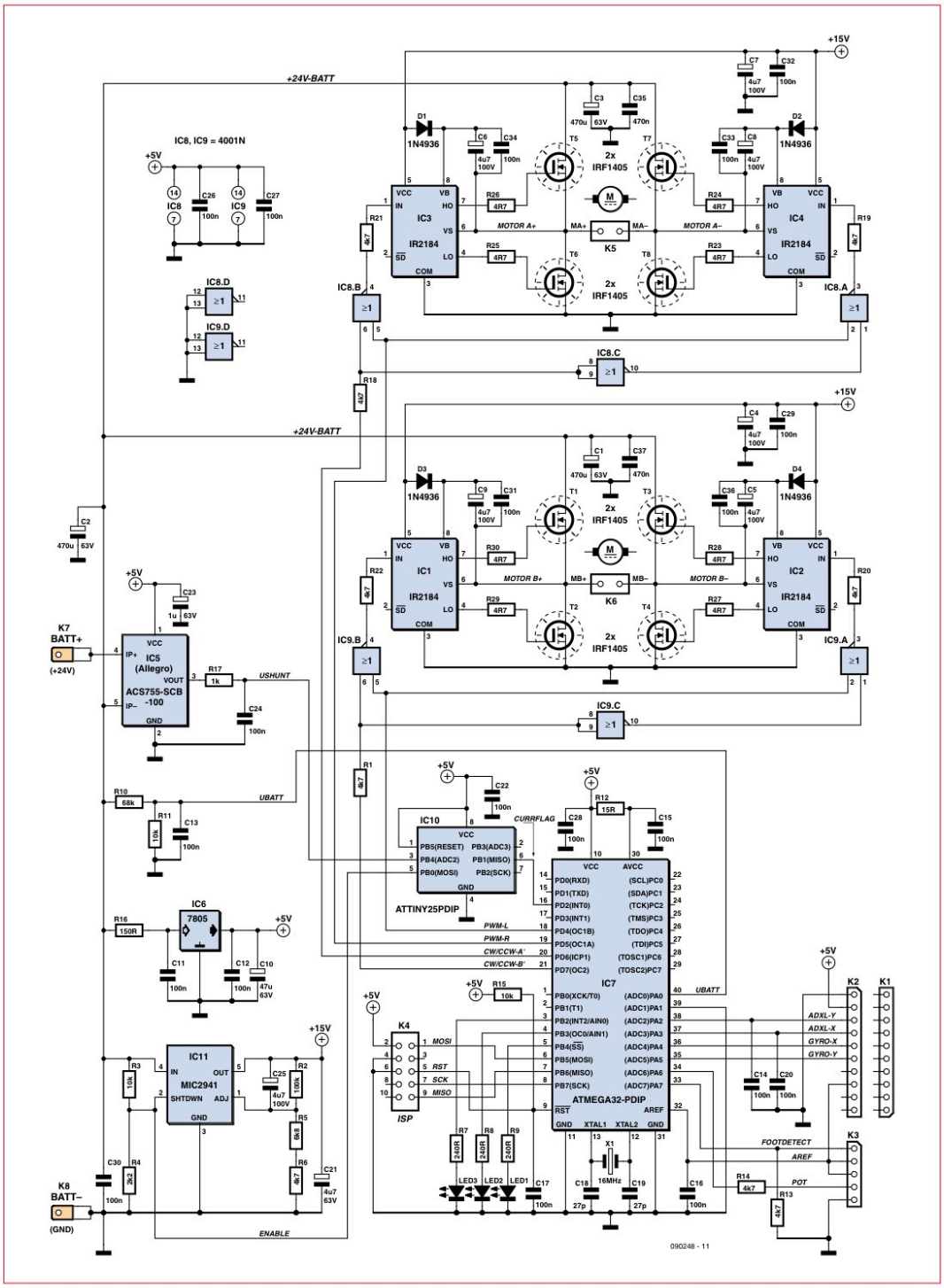
De gyroscoop geeft een spanning af die evenredig is met de draaiing (hoeksnelheid). Kantelt het platform snel, dan is er een grote spanningsverandering binnen een gegeven tijdsperiode. In ruststand geeft de gyroscoop een spanning die ongeveer de helft bedraagt van de voedingsspanning.
De versnellingssensor meet in de horizontale stand de valversnelling. Wordt de sensor gekanteld, dan verandert de hoek waaronder de zwaartekracht werkt. De versnellingssensor functioneert zodoende als hoeksensor en geeft een waarde die evenredig is met de hellingshoek van het platform.
Om een zo goed mogelijke stabilisering te verkrijgen, is het noodzakelijk om continu de exacte hoek van het platform te kunnen bepalen. De waarde van de versnellingssensor wordt daarom over een langere tijd geïntegreerd om een vloeiend signaalverloop te verkrijgen. Hier wordt de spanning van de gyroscoop bij opgeteld. De vermenigvuldigingsfactoren werden hierbij empirisch aangepast en geoptimaliseerd. De benodigde versnellingswaarde komt dan als som uit het hoekverschil (huidige/gewenste) en de hoeksnelheid waarmee het platform kantelt – met verschillende gewichtsfactoren van deze beide waarden. Principieel geldt: hoe groter de hoekafwijking en hoe groter de hoeksnelheid, des te groter is de benodigde motorversnelling voor de stabilisatie.

Motorbesturing

De schakeling van de hoofdprint in **figuur 3** toont de complete besturing van de ElektorWheelie, inclusief de vermogenselektronica. De twee standsensoren zijn zoals hierboven beschreven op een aparte print ondergebracht.
De functiegroepen die in het blokschema zijn aangegeven, laten zich relatief gemakkelijk identificeren. In het midden staat de met 16 MHz geklokte ATmega32, die over een 10-polige programmeerinterface (ISP-connector K4) beschikt en de drie LED's (LED1...3) voor de accuconditie rechtstreeks aanstuurt.
De sensorprint is via K2 met de besturing verbonden en geeft de X- en Y-signalen van de beide standsensoren aan de ADC-ingangen ADC2...5 van de ATmega32 door, die op pen 32 (AREF) ook 3 V van de spanningsregelaar van de sensorprint krijgt. Deze 3 V ligt via K3 ook aan de stuur-potmeter. De loper daarvan levert een spanning aan de ADC6-ingang van de ATmega32 die afhangt van de positie van de stuurhendel. De ingang ADC0 van de ADC meet de accuspanning via de spanningsdeler R10/R11 terwijl ADC7 via K3 met de voetschakelaar is verbonden. Verder ontvangt de ATmega via pen 16 (INT0) nog een overstroomsignaal (CURRFLAG) van de stroombewaking van de ATtiny (IC10) die wederom het signaal van stroomsensor IC5 verwerkt. IC5 is een geïntegreerde Hall-effect-stroomsensor van Allegro MicroSystems, die in een gebied van 100 A lineair werkt. CURRFLAG wordt bij een stroom van bijna 25 A geset en begrenst de motorstroom via de PWM-besturing waarmee we zijn aangekomen bij de uitgangssignalen van ATmega.

Het resultaat van de verwerking van de ingangssignalen zijn de signalen op de vier uitgangspennen 18 tot 21, namelijk PWM-L/R en CW/CCW-A´/B´. CW/CCW-A´ en CW/CCW-B´ zijn via logicaschakelingen (IC8 en IC9) verbonden met de PWM-uitgangssignalen PWM-L en PWM-R en besturen ieder de draairichting van de geregelde motors, terwijl de PWM-signalen via H-bruggen (complete bruggen) de stroom door de motor sturen. Voor elke motor zijn er aldus twee stuursignalen en een H-brug-schakeling. Elke H-brug bestaat uit twee halfbrug-driver-IC's van het type IR2184 en vier MOSFET's van het

Figuur 3. De schakeling van de hoofdprint bevat de complete besturing inclusief de vermogenselektronica.


+15V
+24V-BATT
IC8, IC9 = 4001N
+5V
IC8
IC9
C26
C27
100n
IC8.D
IC9.D
D1
1N4936
D2
1N4936
C3
470u 63V
C35
470n
C7
4u7 100V
C32
100n
C6
C34
C33
C8
2x IRF1405
T5
T7
T6
T8
IC3
IC4
IR2184
R26
R24
R25
R23
4R7
R21
R19
4k7
MOTOR A+
MOTOR A–
MA+
MA–
K5
IC8.B
IC8.A
IC8.C
R18
D3
1N4936
D4
1N4936
C1
C37
C4
C29
C9
C31
C36
C5
T1
T3
T2
T4
IC1
IC2
R30
R28
R29
R27
R22
R20
MOTOR B+
MOTOR B–
MB+
MB–
K6
IC9.B
IC9.A
IC9.C
C2
470u 63V
K7
BATT+
(+24V)
IC5
(Allegro)
ACS755-SCB
-100
VCC
VOUT
GND
IP+
IP–
C23
1u 63V
R17
1k
USHUNT
C24
100n
R10
68k
R11
10k
C13
100n
UBATT
R1
IC10
ATTINY25PDIP
PB5(RESET)
PB4(ADC2)
PB0(MOSI)
PB3(ADC3)
PB1(MISO)
PB2(SCK)
C22
CURRFLAG
C28
R12
15R
C15
IC6
7805
R16
150R
C11
C12
C10
47u 63V
PWM-L
PWM-R
CW/CCW-A'
CW/CCW-B'
IC7
ATMEGA32-PDIP
PB0(XCK/T0)
PB1(T1)
PB2(INT2/AIN0)
PB3(OC0/AIN1)
PB4(SS)
PB5(MOSI)
PB6(MISO)
PB7(SCK)
PD0(RXD)
PD1(TXD)
PD2(INT0)
PD3(INT1)
PD4(OC1B)
PD5(OC1A)
PD6(ICP1)
PD7(OC2)
(SCL)PC0
(SDA)PC1
(TCK)PC2
(TMS)PC3
(TDO)PC4
(TDI)PC5
(TOSC1)PC6
(TOSC2)PC7
ADC0)PA0
ADC1)PA1
ADC2)PA2
ADC3)PA3
ADC4)PA4
ADC5)PA5
ADC6)PA6
ADC7)PA7
AVCC
AREF
RST
XTAL1
XTAL2
GND
X1
16MHz
C18
27p
C19
27p
C16
100n
C17
100n
R15
10k
K4
ISP
MOSI
RST
SCK
MISO
R7
R8
R9
240R
LED3
LED2
LED1
K2
K1
K3
ADXL-Y
ADXL-X
GYRO-X
GYRO-Y
FOOTDETECT
AREF
POT
R14
4k7
R13
4k7
C14
C20
IC11
MIC2941
SHTDWN
ADJ
R3
10k
R2
100k
C25
4u7 100V
R5
6k8
R6
4k7
C21
4u7 63V
C30
100n
R4
2k2
K8
BATT–
(GND)
ENABLE
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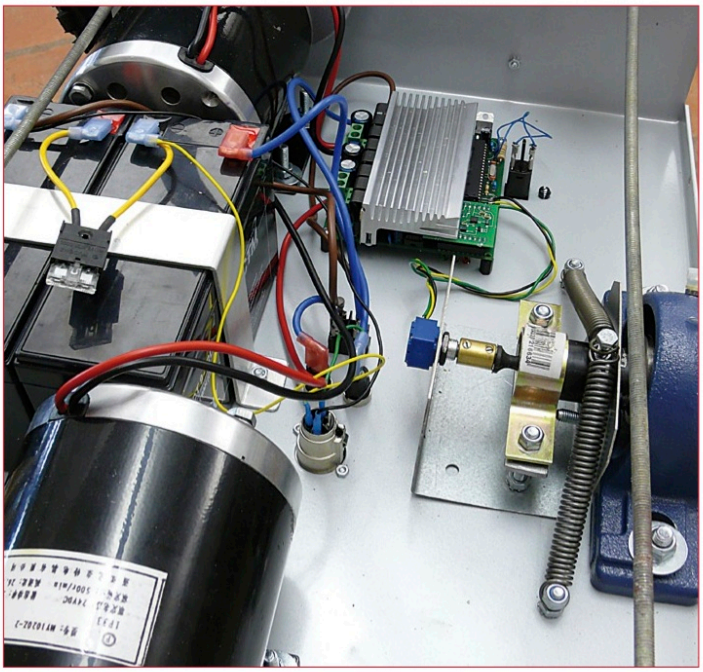
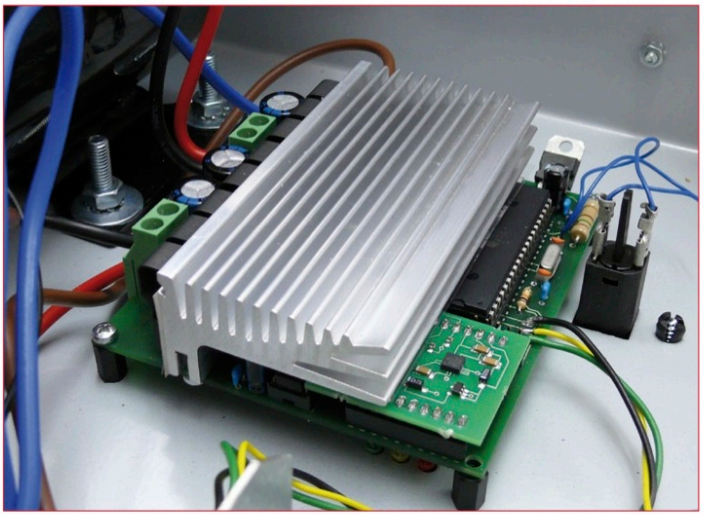
PRAKTIJK ELEKTORWHEELIE



Figuur 4. Aan de onderzijde van het metalen chassis zijn de accu's en het elektronicablok gemonteerd.

type IRF1405. Voor de linkermotor zijn dat IC1 en IC2 en T1...T4, voor de rechter motor IC3 en IC4 en T5...T8.
De MOSFET-brugschakelingen zijn via de stroomsensor IC5 met de spanning van 24 V van de beide in serie geschakelde AGM-loodaccu's van 12 V verbonden.



Figuur 5. De compacte elektronica bestaat uit de hoofdprint met koellichaam en de sensorprint daarop gemonteerd.

De halfbrugdriver-IC's worden via een eigen spanningsregelaar van het type MIC2941 (IC11) voorzien van 15 V. Dit IC beschikt over een shutdown-ingang (pen 2) die met het enable-signaal van de stroombewaking (pen 5 van de ATtiny, IC10) is verbonden. Dit signaal schakelt bij te veel stroom de spanningsregelaar en daarmee de brugdriver-IC's uit, zodat de MOSFET's sperren en de motorstroom onderbreken. Alle andere IC's krijgen hun voedingsspanning van +5 V van de standaard voedingsstabilisator IC6.

Compact opgebouwd

Het elektronicablok (**figuur 5**) dat aan de onderzijde van het platform (metalen chassis **figuur 4**) is gemonteerd, bestaat uit de hoofdprint met daarop de sensorprint gemonteerd.

De acht MOSFET's zitten op een rijtje aan de achterzijde van de hoofdprint en worden door een speciaal koellichaam gemeenschappelijk gekoeld. Het koellichaam is op de print vastgeschroefd en met de MOSFET's verbonden met klemveren. Een zelfklevende warmtegeleidende folie tussen de transistors en het koellichaam zorgt voor elektrische isolatie.

De hoofdprint is in tegenstelling tot de SMD-sensorprint geheel met conventionele onderdelen met aansluitdraden opgebouwd. De print-layouts in pdf-formaat staan zoals vanouds op de website van het project [3] en kunnen gratis gedownload worden. Op de website zijn ook de onderdelenlijsten van de printen te vinden.

Software

De firmware van de beide controllers is met BASCOM-AVR ontwikkeld. **Figuur 8** geeft een overzicht van de belangrijkste functies van de motorsturing. Deze worden hieronder kort beschreven.

Functie Init:
Initialiseren en configureren van Timer0, Timer1/PWM, initialiseren van de variabelen, afregelen van de gyroscoop, versnellingssensor en stuurhendelpotentiometer.

Functie Get_Angle:
De functie leest de waarden van de ADC-kanalen (gyro, ADXL320, potmeter, accuspanning, voetdrukknop). Voor de gyro, ADXL320 en accuspanning

worden de waarden over een tijdsperiode van 50 lussen geïntegreerd.
De hoeksnelheid (Angle_Rate) en absolute hoek (Tilt_angle) worden berekend.
De positie van de potentiometer wordt uitgelezen.

Functie Filter:
Berekent de benodigde verschilversnelling van de motoren (Balance_Diff), berekent de totale motorsnelheid (Drive_Speed).

Functie process:
Berekent op basis van snelheid en positie van de potentiometer/stuurhendel de snelheidsaanpassing van de motoren om een overeenkomstige stuurbeweging te verkrijgen. Controleert of er door de ATtiny een overschrijding van de maximale stroom gemeld werd en vermindert de motorsnelheid (Drive_speed) overeenkomstig. Signaleert met het knipperen van de LED's een waarschuwingsmelding (overschrijding maximale stroom of voetknopalarm). Roept de functie Get_speed_batt aan.

Functie Get_Speed_Batt:
Zorgt voor een extra hoekcorrectie (Angle_Correction) bij het overschrijden van de maximale snelheid en toont de accuspanning met de 3 LED's.

Functie PWM_OUT:
Stuurt de PWM-uitgangen voor motor A en motor B afhankelijk van de versnelling en stelt de uitgangen correct in voor de draairichting van de motoren.
De functie begrenst ook het maximale vermogen (PWM_MAX).

Functie interrupt:
Deze wordt vanuit Timer0 100 maal per seconde aangeroepen en roept de functies Get_Angle, Filter, Process en PWM_out op.

Mechanica

Het tweede en laatste deel van de projectbeschrijving is bestemd voor de minder elektronische kant van de ElektorWheelie. Naast de beschrijving van de mechanische constructie geven we ook een overzicht over de bouw en de bedrading en natuurlijk ook een paar tips voor de ingebruikneming en ideeën voor de praktijk.

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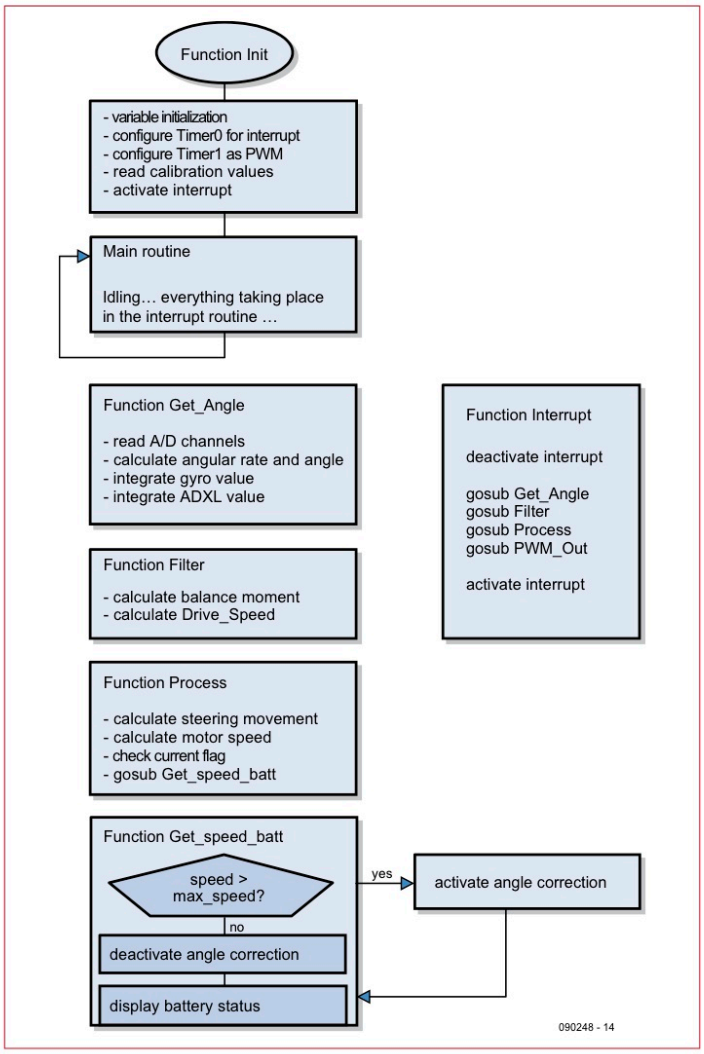
Meer informatie over de ElektorWheelie kit:
www.elektor.nl/wheelie



Figuur 6. Functies van de besturingssoftware.

LET OP!

- **De ElektorWheelie is een 'open project'. De koper kan naar eigen inzicht aanpassingen aan de hard- en software van de ElektorWheelie kit maken.**
- **Het gebruik van de ElektorWheelie op de openbare weg is afhankelijk van de in Nederland en België (of andere landen) geldende wetten. Voor de ElektorWheelie is door Elektor geen aanvraag voor toelating op de openbare weg gedaan en kopers wordt dan ook geadviseerd zich op de hoogte te stellen van de regelgeving in zijn/haar land voordat hij/zij met de ElektorWheelie de openbare weg op gaat. Elektor International Media BV aanvaardt hiervoor geen enkele aansprakelijkheid**
- **Aangezien het hier om een 'open project' gaat, kan Elektor International Media niet verantwoordelijk worden gesteld voor schade, boetes of verwondingen die door de ElektorWheelie of zijn gebruik zijn veroorzaakt.**

PRAKTIJK **ELEKTORWHEELIE**

ElektorWheelie

Opbouwen en rijden

In het eerste artikel over het zelfbalancerende enkelassige elektro'voertuig' in het zomernummer deden we de elektronica uit de doeken. Natuurlijk komt er ook een stukje mechanische opbouw bij kijken, voordat de ElektorWheelie in gebruik kan worden genomen.

De ElektorWheelie wordt geleverd als compleet bouwpakket. Het pakket bevat alle benodigde elektronica, de accu's, de stalen behuizing, de wielen, de motoren, de 'stuurstang' en een eenvoudige lader. De printplaat is reeds volledig bestukt en gemonteerd in de kast, net als de motoren. Wat u zelf nog moet doen, beschrijven we in dit artikel met behulp van een aantal foto's.

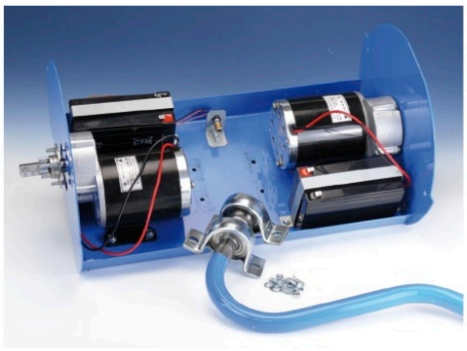
Zelf sleutelen

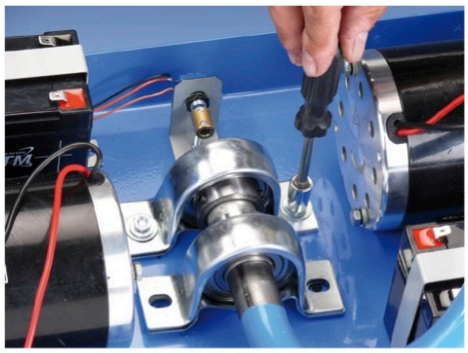
1. Het voornaamste dat u zelf moet doen, is het monteren van de 'stuurstang' en het bevestigen van de banden.

2. We beginnen met de stuurstang. Hiervoor hebt u de beugels/lagerhouders, een viertal bouten, bijbehorende moeren en ringetjes nodig.

3. De bevestigingsbeugels/lagerhouders worden met de bouten in het midden van de bodemplaat (tussen de motoren) bevestigd. Daarvoor zijn reeds boorgaten in de behuizing aanwezig. Draai de moeren goed aan, zodat ze niet lostrillen onder het rijden.

4. Nu moet de koppeling tussen de stuurstang en de potmeter bevestigd worden. Zet de potmeter van tevoren ongeveer in de middenstand. Deze moet zowel linksom als rechtsom de nodige speling hebben, omdat hiermee de





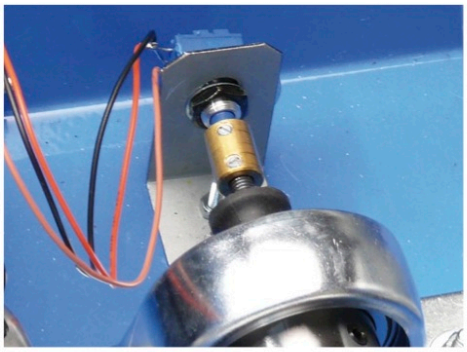
stand van de stuurstang wordt bepaald.
5. Vervolgens is het de beurt aan de bedrading. In het bedradingsschema vindt u de correcte verbindingen terug. Let op: sommige kabels zijn misschien wat kort voor de volgende handeling en moeten hierna pas verbonden worden.
6. Nu kan de afdekkap gekanteld over de stuurstang worden geschoven en met vier schroeven aan de zijkanten worden bevestigd. Hierna bevestigt u de wielen en de twee overige delen van de stuurstang. Let er op dat u de grote wielmoeren goed aandraait!

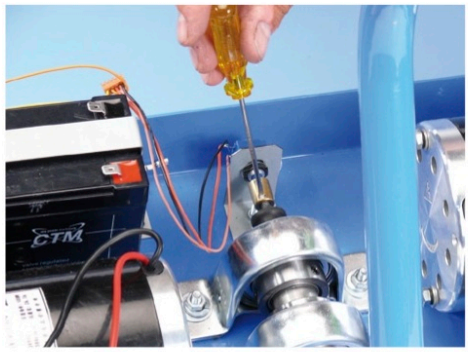
De bouwkit wordt zoals gezegd inclusief een eenvoudige lader geleverd. Het volledig laden van de accu's duurt zo'n 16 uur. Elders in deze uitgave presenteren we een betere lader die gebaseerd is op een eerder Elektorontwerp. Deze schakeling zorgt ervoor dat beide accu's apart geladen kunnen worden en er geen onbalans ontstaat.

Vóór de eerste rit is het verstandig de werking van de ElektorWheelie te testen. Plaats de Wheelie hiervoor op een kratje of een doos met de wielen vrij. Schakel de Wheelie in en kijk of hij correct reageert op naar voren of naar achter kantelen. Probeer ook de werking van de stuurstang uit.

De eerste rit

Om met de ElektorWheelie weg te rijden, begint u met het plaatsen van de dubbele pen van de Safety Switch. Nu kan de elektronica ingeschakeld worden met behulp van de hoofdschakelaar (*Main Switch*). Houd hierbij de Wheelie rechtop, in de stand waarin u gaat rijden (dragerplaat zo horizontaal mogelijk). De elektronica kalibreert zichzelf op deze stand en zal proberen deze stand aan te houden wanneer u met de Wheelie rijdt.
Vervolgens plaatst u uw rechtervoet op de in de dragerplaat ingebouwde voetschakelaar (*Foot Switch*). Deze schakelaar zorgt ervoor dat de elektronica weet dat u op de Wheelie bent gaan staan. U kunt nu de Wheelie even testen door hem iets naar voren of naar achter te neigen en te kijken of de Wheelie meebeweegt. Deze knop is een deel van de beveiliging van de Wheelie, waarover verderop meer.
Nu kunt u uw andere voet ook op de Wheelie zetten. Het is belangrijk dat u goed rechtop staat en niet door de knieën zakt! Het helpt hierbij om recht vooruit te kijken, niet naar beneden. Versnellen doet u door uw gewicht meer op uw tenen te zetten. Niet tegen de stuurstang duwen, dat gaat niet goed. Om te vertragen verplaatst u uw gewicht naar de hakken. De elektronica in de Wheelie zorgt ervoor dat u in balans blijft en dat u gewoon op de balancerende tweewieler kunt blijven staan.
Sturen doet u met behulp van de stuurstang. Een lichte uitwijking naar links doet de linkermotor langzamer draaien, zodat de Wheelie naar links draait. Een lichte uitwijking naar rechts doet de Wheelie naar rechts afbuigen.
Wanneer de berijder niet meer correct op de dragerplaat staat, wordt de stroom naar de motoren met enige vertraging (hysteresis) onderbroken, zodat de Wheelie stopt en niet op eigen houtje gaat bepalen waar hij heen rijdt.
Als extra beveiliging is de ElektorWheelie voorzien van een noodstop (Safety Switch). Deze werkt op de volgende manier: Een pen zit via een koord verbonden aan een bandje dat u om uw arm draagt. Mocht u onverhoopt ten val komen, dan zal de pen met het koord worden verwij-





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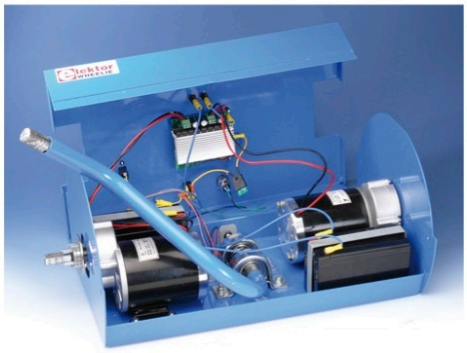

derd, waarmee de motoren en de elektronica *direct* afgeschakeld worden.

Tips

Maak de eerste rit onder begeleiding! Er kan van alles fout gaan. Helm, knie- en elleboogbescherming zijn in het begin zeer zeker aan te raden.
De software die de ElektorWheelie gebruikt is open. Dat wil zeggen dat u hierin zelf naar hartenlust kunt aanpassen en veranderen. De meegeleverde software heeft echter uitgebreide testen doorstaan, is ver doorontwikkeld en daardoor prima bruikbaar zonder verdere aanpassingen.

Let op:

In dit artikel wordt gebruikt gemaakt van een bouwkit van een prototype. Een uitvoerige bouwhandleiding wordt bij elke uitgeleverde ElektorWheelie-kit meegeleverd. De handleiding is ook gratis te downloaden van www.elektor.nl/wheelie. Foto's, video's en impressies zijn te vinden op het Wheelie-blog: http://ewheelie.blogspot.com.

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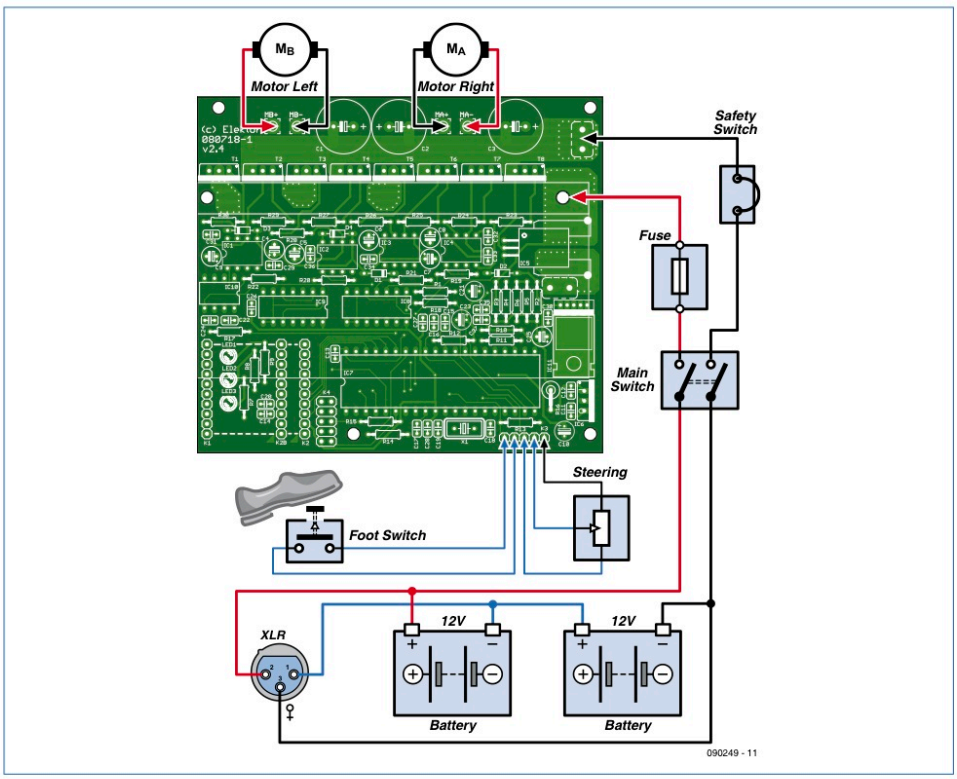

In het bedradingsschema is te zien hoe alle onderdelen met elkaar verbonden dienen te worden. Let hierbij vooral op de polariteit van de accu's en de aansluitingen van de motoren (links en rechts niet verwisselen).