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RECOMMENDING A FINANCIALLY AND OPERATIVELY SOUND SCOPE OF SHEET METAL PROCESSING

Helsinki Metropolia University of Applied Sciences

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Time flies. The world changes.
A couple of years ago, I was finishing my Bachelor's thesis for Aste, summarising the development proposal. Today I am finishing my Master's thesis for Aste, summarising another development proposal.

Time flies. But some things remain consistent. Aste is constantly developing and, hopefully, I am able to contribute to its development. No words can express the feeling of seeing how your ideas facilitate positive outcomes. I hope that soon I will find myself summarising the next development proposal.

This was a tough year for many of us. I would like to thank Jussi Salonen for the endless energy that turns impossible things into feasible ones. I would also like to thank Janne Leppämäki, Saku Pelto-Knuutila and Matias Kari for being involved in this study and for showing your unfeigned interest in the process. Thank you for your guidance and support that helped to conduct and improve this study.

I thank my thesis instructor, Dr. Thomas Rohweder, for the laconic and highly meaningful comments and suggestions that guided me during this study.

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My deepest gratitude and many thanks go to my dearest love. You brighten my days and motivate me to never stop improving myself.

The last gratitude goes to you, the one who reads this text. I hope this study will be helpful.

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Forssa
June 01, 2021

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The objective of this study is to recommend a financially and operatively sound scope for sheet metal processing for the case company, Aste Finland Oy. Aste Finland Oy is in the business of assembling commercial display coolers. The company is planning an upstream in-house investment into sheet metal processing to reduce production costs. In order to carry on with the investment, the company needs insight for decision making concerning a financially and operatively sound scope of sheet metal processing.

This study consists of four stages that are performed based on the research design. The first stage comprises the literature review, during which the existing knowledge and best practices are used to develop a conceptual framework for the feasibility demonstration. The second stage includes the collection of necessary ground data for feasibility demonstration. The third stage incorporates the feasibility study of sheet metal processing alternatives and the development of the recommendations on a financially and operatively sound scope of sheet metal processing. The fourth stage contains validation and adjustment of the recommendations.

The outcome of this study is recommendations on a financially and operatively sound scope for sheet metal processing. This study revealed that in-house sheet metal bending is the only financially and operatively feasible alternative at the current state of Aste Finland Oy. Furthermore, recommendations address effectiveness, efficiency, risks, opportunities and strategic importance associated with the implementation of in-house bending. This study also provides the ideas for its further development and recommends corrective actions to address the existing challenges of Aste Finland Oy.

This study provides the decision-makers of Aste Finland Oy with a detailed insight needed to carry on with the upstream in-house investment by recommending the scope of processing, investments and actions.

The outcome of this study has received positive feedback from the decision-makers of Aste Finland Oy. It has been confirmed that further decision-making will incorporate developed recommendations.

Keywords	Processing scope recommendations, feasibility demonstration framework, feasibility demonstration, feasibility study, in-house vs outsourcing

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1 Introduction

"The purpose of management, leadership, parenting, or governing - any form of organisational leadership - is to solve today's problems and get ready to deal with tomorrow's problems. And that means managing change." *— Ichak Kalderon Adizes*

The ultimate goal of business is to make money; many vital factors facilitate that. Some of these factors are optimised internal and external processes, finetuned organisational structure, brand image, customer satisfaction and retention. However, the recognition of vital factors is not enough for the business to be successful; the management of business organisations needs to know which actions should be executed to manage changes, avoid disruptions and enable success. Moreover, even the knowledge of the actions to be taken is not enough as the optimal time for each action should be defined.

This study focuses on analysing and defining possible improvement areas in the case company's production processes and defines financially and operatively sound scope of the development that can facilitate the ultimate goal of the business, money-making.

1.1 Business Context

The case company, Aste Finland Oy (hereinafter referred to as "Aste"), was founded in 2010 by five former employees of Helkama Group in order to design, manufacture and sell high-quality plug-in display coolers. In 2017 the company became a subsidiary of a Belgian company DRU International NV forming Creative Cooling Group. Aste distributes its solutions throughout the Nordic region, in Central and Southern Europe, Russia and Australia. The company has such well-known partners as Carlsberg, Heineken, Unilever, Nestle, Hartwall and PepsiCo.

All facilities of Aste, as well as its headquarters, are located in Forssa, Finland. Aste does not have its own material processing factories. Thus, all subcomponents for the production, such as sheet metal parts, electronic circuit boards, plastic parts, glass doors, are ordered from suppliers. Subcomponents are then assembled together in their Forssa factory.

1.2 Business Challenge, Objective and Outcome

In 2020 Aste seceded from the Creative Cooling Group and started an independent business. The management sees many opportunities for growth and is not restricted in decision making and taking action anymore. Therefore, Aste is increasing its focus on receiving orders from large corporate customers. Such orders are executed in tender format with tight entrance requirements for the participants. In order to win the tender, the participant needs to succeed in a highly competitive environment formed by the leaders of the global commercial display cooler industry.

The management sees the need to extend its presence in the value chain and expand its operations towards material processing. It is considered by Aste that transferring of the outsourced subcomponent production in-house will eliminate costs added by the supplier and the transportation, shorten lead times, lower the risk of disruptions, and lower rate customers with more attractive offers.

Aste is focusing on the sheet-metal components since they share 40% of the total product cost and is planning an upstream in-house investment into sheet metal processing to reduce production costs. However, the company does not possess any information concerning the actions that should be taken to transfer production in-house. The scope of such a transfer is not clear either. The management is not willing to lock money in investments without knowing how it will affect the company.

In order to carry on with the investment, the company needs insight for decision making concerning financially and operatively sound scope of processing.

Therefore, the objective of this study is to recommend a financially and operatively sound scope of sheet metal processing. The outcome of this study is the recommendations on the scope of processing. The outcome allows Aste to develop a clear vision on the scope of processing, investments and actions required to execute the plan and provides the management with recommendations on the plan execution.

1.3 Outline of the Study

This study includes four stages to address the business challenge described in the previous section. During the first stage, the existing knowledge is researched and used for developing the conceptual framework. Then, the framework is used to collect and analyse ground data. This study considers four sheet metal processing alternatives: cutting, bending, painting and all of them together. The in-house processing is compared to outsourcing, which is the current state of Aste. Thus, the feasibility of transferring to in-house processing is defined.

Then, the findings of the feasibility analysis are used to select the scope of a financially and operatively sound sheet metal processing. Therefore, this study answers the question of whether it is feasible to transfer to in-house processing at the current state of Aste. This study defines which alternative: cutting, bending, painting or all together sounds the most feasible to implement. The scope of this study considers the only four in-house processing alternatives outlined in this section. Therefore, other combinations, for example in house cutting and bending, lie out of the scope of this study.

The study consists of 7 sections. The current section, Section 1, introduces the context of the study. Section 2 describes the research approach and how the data is collected and analysed. Section 3 introduces the literature research and the conceptual framework developed during this research. Section 4 describes how the ground data for the feasibility demonstration is gathered and explains how the data was prepared for further analysis. Section 5 delineates the feasibility study and introduces developed recommendations. Section 6 outlines the feedback round with key stakeholders and final recommendations developed based on the feedback. Section 7 presents the executive summary of the research, introduces practical recommendations, reflections and self-evaluation of the study.

2 Project Plan

This section describes the research approach and design, reflects on the data collection and analysis methods used to deliver the outcome of this study, being the recommendations on a financially and operatively sound scope of sheet metal processing. In this way, the second section is connected to the business challenge, objective and outcome of this study introduced in the previous section.

2.1 Research Approach

As soon as the business challenge (research problem) is defined, appropriate method(s) to approach the challenge (problem) should be considered. Saunders, Lewis and Thornhill (2012) and Greener (2008, p. 34) refer to the research by Burrell and Morgan (1979, p. 112) that describes four paradigms for social sciences research:

- Functionalist (problem-solving and rational approach to organisations),
- Interpretive (researching organisations through perceptions of people about them),
- Radical humanist (the research considers organisations as social arrangements and serves to change these organisations),
- Radical structuralist (the research considers organisations as a product of structural power relations, where the conflict is inherent) (Morgan & Burrell, 1979, pp. 21-35).

On the contrary, Saunders et al. (2012, p. 83) describe the different classification of research approaches. The research process "onion" of Saunders et al. (2012, p. 83) is illustrated in Figure 1.

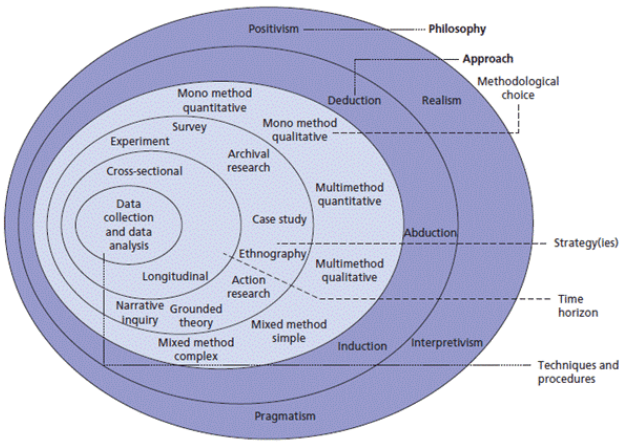


Figure 1. The Research Process "onion" (Saunders, et al., 2012, p. 83)

The "onion" model provides a summary of various research philosophies, approaches, strategies, methodological choices, time horizons and data collection methods. The research philosophies are divided into four groups:

- Positivism: only the factual knowledge gained through observations and measurements is considered trustworthy. The role of the researcher is limited to data collection and interpretation. The deductive approach is used along with quantitative methods (Collins, 2010, p. 38).
- Realism: direct realism that considers all observations as valid. Critical realism assumes that observations might be perceptive. (Saunders, et al., 2012).
- Interpretivism: a human interest is integrated into the study. The research is based on interviews and observations. An inductive approach is used to interpret the elements of the study) (Collins, 2010).
- Pragmatism: the opposite of interpretivism. The research question determines the research philosophy. Both quantitative and qualitative methodologies can be used (Collis & Hussey, 2014).

To better understand the distinction between research philosophies, the research approaches should be described. As Figure 1 indicates, the research approaches are divided into deductive, abductive, and inductive (Saunders, et al., 2012, p. 83).

- The deductive approach is highly accurate and thus requires sufficient time and data to form the hypothesis. The deductive research begins with the investigation of the theory, develops the hypothesis based on the theory and proceeds to test that theory (Greener, 2008, pp. 15-18).

- The abductive approach is less accurate as the hypothesis is derived from patterns or trends; thus, the conclusions are, correspondingly, less accurate. The abductive approach starts with the investigation of the data, then uses the theory to explain the trends or patterns that the data is following to develop the theory (Saunders, et al., 2012).
- The inductive approach uses predictions, thus being the least accurate method of these three. The inductive research begins with the investigation of the focus of research and uses various research methods to generate a theory (Greener, 2008, pp. 15-18).

Finally, to fully understand the distinction between research philosophies, the research methodologies should be explained. The research methodologies can be classified with the help of two attributes: the number and the type. The first attribute is quite straightforward: if multiple quantitative or qualitative methods are used during the research, then it is considered multi-method. In contrast, the use of a single research method results in mono method research. The mixed methodology incorporates the use of both quantitative and qualitative methods for the research (Greener, 2008, p. 35).

The second attribute determines the type of data used in the research and the tools used to process and analyse this data.

- Quantitative research considers structured numerical data collection and the use of statistical analysis. According to Greener (2008, p. 18), quantitative methods are often associated with the testing of theories with the help of numbers and facts.
- Qualitative research, on the contrary, uses interviews, observations, focus groups or action research to study and interpret the data, thus generating the theory (Greener, 2008, p. 35; Yamagata-Lynch, 2010).
- The mixed methodology comprises the use of both qualitative and quantitative methods (Saunders, et al., 2012).

The research philosophy, approach and methodology were selected after thorough consideration of the concepts provided in this Section. In this study, the selected research philosophy is interpretivism, as there is a need to evaluate both tangible and intangible assets and factors that affect the feasibility of sheet metal processing alternatives. The abductive research approach is used to analyse the data necessary for the

feasibility demonstration, find patterns and trends leading to the development of the recommendations on a financially and operatively sound sheet metal processing scope.

The mixed research methodology is used. The reason for mixed methodology comes from the purpose of the research: the qualitative methods allow the assessment of operative feasibility, while the quantitative methods are optimal for the assessment of financial feasibility.

2.2 Research Design

This feasibility study includes four stages. The business challenge serves as the initial motive for this study and thus determines the research approach and the research design. Therefore, the actions necessary for the feasibility demonstration were developed and grouped, as illustrated in Figure 2.

Figure 2. Research Design of this Study

As Figure 2 shows, this study starts with Stage 1, literature research of concepts for feasibility study conduction. The research focuses on understanding the main principles of the feasibility study and draws the key concepts that can be applied to this study with respect to the business case and existing business challenge. Key concepts are defined based on the existing feasibility studies related to business operations, production or outsourcing. Further research reveals methods, tools and practices of qualitative and

quantitative evaluation of key concepts, enabling the development of a conceptual framework for the feasibility demonstration, being the outcome of the literature research phase.

After the conceptual framework is developed, it is used during Stage 2 to address the key concepts by gathering necessary ground data for feasibility demonstration. The data related to individual processing alternatives is collected, analysed and processed, forming sets of data suitable for feasibility demonstration.

After that, during Stage 3, the feasibility study of the individual processing alternatives is performed. During this step, the conceptual framework is applied to the gathered sets of data. The feasibility study reveals the feasibility of each processing alternative, which enables the delivery of the outcome of this phase, which is the recommendations on a financially and operatively sound scope of sheet metal processing with the respect of Aste.

The final, fourth, phase starts from recommending financially and operatively sound scope of sheet metal processing to the top management of Aste, being the stakeholders of this study. The feedback on the feasibility study and the recommendations is gathered and analysed, enabling the development of final recommendations on a financially and operatively sound scope of sheet metal processing. Final recommendations form the outcome of this study.

2.3 Data Collection and Analysis

This study draws from a variety of data sources, delivering the data required for feasibility demonstration. The data is gathered during three rounds of data collection, as illustrated in Figure 3.

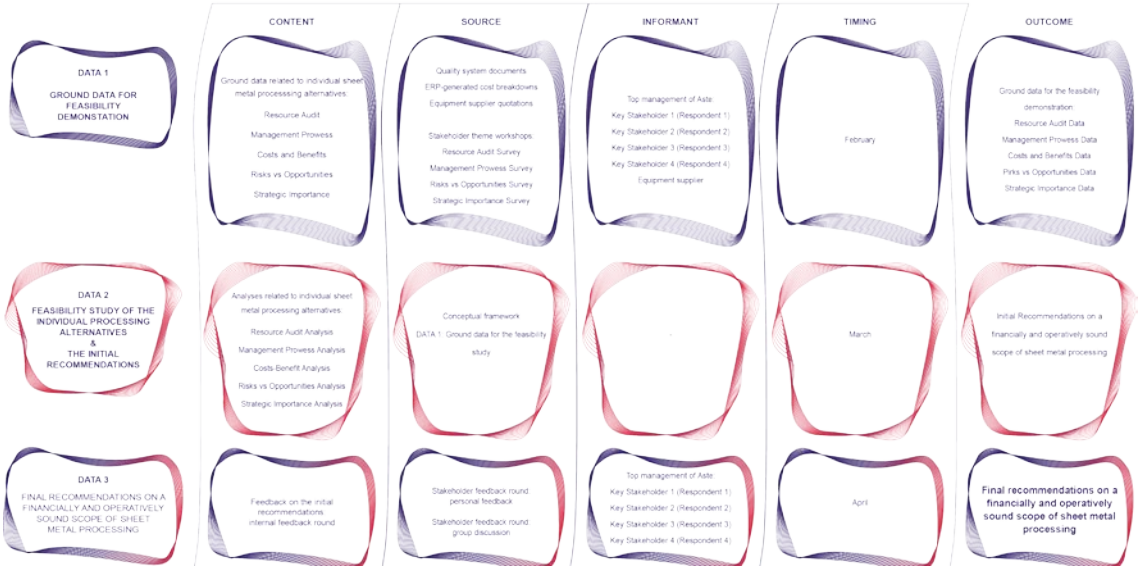


Figure 3. Data Plan of this Study

As seen in Figure 3, the Data 1 collection round was conducted to gather the ground data necessary for feasibility demonstration. The conceptual framework developed during Stage 1 of this research determined the data to be collected as well as the collection tools. Data 1 collection included theme workshops. Theme workshops were conducted to collect the necessary data with the help of key stakeholders. Moreover, internal documents were retrieved from Aste's quality system. An internal ERP system was used to collect financial data. The sheet metal equipment quotations were requested from the equipment supplier. At the end of the Data 1 collection round, the received data was processed for the ground data for the feasibility demonstration. The data was split in accordance with the conceptual framework, as illustrated in Figure 3.

In the second data collection round, the conceptual framework was used to analyse Data 1 and develop the initial recommendations on a financially and operatively sound scope of processing. The final data was collected during the stakeholder feedback round and was used to develop the final recommendations.

It is worth noting that all the calculations, evaluations, survey results, meeting memos were processed or created with the help of the software provided by Aste. The data was and will be kept on Aste's servers. The stakeholders of this study had unrestricted access to all the data used in this study. Moreover, the change log is available for the data. This ensures that the original data can constantly be retrieved in case of any mistakes or forgery. In addition to that, the change log allows evaluating how this study developed along the research process. The overview of such data is provided in Appendix 1.

The surveys used to collect Data 1 can be found in Appendices 2-5. Since the data collection tools were finalised and adjusted during the conceptual framework development stage, all information related to the surveys is provided in Section 3. The following introduces a detailed explanation of the literature review and conceptual framework development stage.

3 Researching Existing Knowledge and Best Practice on Feasibility Study from Relevant Literature

Section 3 discusses existing knowledge on feasibility study design, the critical concepts related to the business feasibility, the tools, methods and practices for feasibility evaluation. This section represents the existing knowledge on feasibility study found from relevant literature, describes how this knowledge was used to develop the framework for the feasibility assessment and demonstration and introduces the final conceptual framework used in this study.

3.1 Basics of Feasibility Study

A feasibility study is an assessment of the practicality of the project or plan being evaluated. According to Arvanitis and Estevez (2018), a feasibility study addresses the viability of an idea, a project or a new business. The purpose of a feasibility study is to highlight challenges related to the implementation and execution of a project. A feasibility study emphasises whether the project should be pursued, taking into consideration all key factors and challenges related to the project. Therefore, a feasibility study provides information on processes, resources, management and metrics (Adamson, et al., 2015), revealing the probability of the success of the project, disincentives and incentives related to the project implementation.

Feasibility studies are largely present in the business, project or idea evaluation. Clearly, key stakeholders of businesses and project try to minimise risks by planning their actions and picking feasible alternatives. For example, the PMBOK® guide by Project Management Institute (2017) by Alexander Osterwalder and Yves Pigneur (2010), the flagship guides in project management and business development, address the feasibility study using the SWOT analysis.

3.2 Feasibility Study Frameworks

SWOT analysis is claimed to originate from Harvard Business School (Hill & Westbrook, 1997), being one of the most popular strategic analysis tools nowadays. SWOT stands for four key concepts: Strengths, Weaknesses, Opportunities, Threats. Therefore, SWOT addresses the business, project, or idea from the perspective of these four key concepts.

Another feasibility study framework is 'TELOS', set out by James A. Hall (2008, p. 579). TELOS stands for Technical, Economic, Legal, Operational and Schedule.

- Technical feasibility study answers the question of whether the project is feasible practically. It determines technical challenges and opportunities that the project may meet based on the goals of the project (Hall, 2008, p. 579).
- An economic feasibility study answers the question of whether the project is cost-effective. It identifies the cost factors and the availability of funds to complete the project (Hall, 2008, p. 579).
- A legal feasibility study answers the question of whether the project meets applicable laws and regulations (Hall, 2008, p. 579). Furthermore, a legal feasibility study addresses the environmental and social aspects of the project (Arvanitis & Estevez, 2018, pp. 109-115).
- An operational feasibility study answers the question of whether work practices, skills and knowledge present in the organisation are adequate to support the project (Hall, 2008, p. 579). Thus, the operational feasibility study determines the effectiveness of the function of the operations of the organisation (Arvanitis & Estevez, 2018, pp. 109-115).
- Schedule feasibility study answers the question of whether the project can be implemented within an acceptable time using internal or external resources (Hall, 2008, p. 579).

The understanding of SWOT and TELOS is required for the next step of the literature research, the case study research.

3.3 Case Study Research

In order to develop the framework suitable for researching and defining feasible sheet metal processing alternative for Aste, various business feasibility studies (hereinafter referred to as "Case Studies") were investigated. Case Studies were addressed with regards to Strengths, Weaknesses, Opportunities, Threats, and Technical, Economic, Legal, Operational, Schedule feasibility perspective. The goal is to determine key concepts applicable to this study that enable the delivery of grounded feasibility recommendations.

3.3.1 Case Study 1. In-house vs Outsourcing: Feasibility

The first researched Case Study addresses the feasibility of setting up a new production line against partly process outsource (Cheepweasarash & Pakapongpan, 2008). The authors use the investment analysis within the feasibility study in order to indicate the costs and benefits between project alternatives. The investment analysis is then presented to the management to determine which project alternative is the best solution for the company (Cheepweasarash & Pakapongpan, 2008).

3.3.2 Case Study 2. In-house vs Outsourcing: Feasibility

The next Case Study by Bränneby and Palmgren (2015) addresses the feasibility of outsourcing versus in-house production and develops a make-or-buy decision model at Atlas Copco Rock Drills AB. In their work, Bränneby and Palmgren (2015, pp. 12-28) question the necessity of own production and outsourcing. According to the authors, outsourcing enables access to specific knowledge, skills or techniques that are desired for a better cost and quality as compared to possible in-house operations (Bränneby & Palmgren, 2015, pp. 17-18). Moreover, Bränneby and Palmgren (2015, p. 18) emphasise flexibility as a key competitive advantage factor enabled by outsourcing.

Furthermore, Bränneby and Palmgren reflect on the efficiency of in-house and outsourcing operations. The authors appeal to existing researches showing the positive effect of outsourcing (2015, pp. 20-22).

Bränneby and Palmgren underline the importance of the time aspect, stating the necessity of taking lead time into consideration. The authors refer to Quinn and Hilmer (1995), claiming that the design-cycle time can be reduced when multiple best in class vendors

working simultaneously on individual components (2015, p. 21). By further referring to Quinn and Hilmer (1995), Bränneby and Palmgren claim that the time effect is influenced by the fact that each individual supplier can achieve a more in-depth knowledge and acquire better technology in own core areas as compared to an individual company trying to improve in several areas simultaneously (2015, p. 21)

Further in the study, Bränneby and Palmgren introduce quality as another key factor for achieving a sustainable advantage (2015, p. 21). By referring to Chou & Chou (2011), the authors specify three steps of quality outsourcing: integration, cooperation, and co-ordination (Bränneby & Palmgren, 2015, p. 21).

Furthermore, Bränneby and Palmgren (2015, pp. 22-25) reflect on the risks of operations and outsourcing. The authors refer to Lockamy and McCormack (2010) to specify risk as to the lack of knowledge of impacting events and how to manage them. Bränneby and Palmgren (2015, pp. 22-23) introduce several risk-classification models. The following models can be applied within this feasibility study :

Risk model, according to Lockamy and McCormack (2010)

- Operational Risk (risk of loss driven by inadequate internal processes and circumstances, or by external events)
- Network Risk (risk of loss associated with the supply chain, its structure and participants)
- External Risk (risk of loss caused by political, weather, market and similar external forces)

Risk model, according to Aron et al. (2005)

- Strategic Risk (risk driven by opportunistic behaviour of one party exploiting the other party)
- Operational Risk (risk caused by limitations and disruptions in the vendor's operations)
- Atrophy Risk (long-term intrinsic risk, such as loss of knowledge or competence due to outsourcing)
- Location Risk (risk caused by the location of vendors, including geopolitical and sovereign risks)

The last key factor introduced in the Case Study is the cost of operations (Bränneby & Palmgren, 2015, pp. 25-27). Bränneby and Palmgren (2015, pp. 25-27) indicate several key issues that affect the production costs and preventing in-house production from being cost-efficient when compared against outsourcing.

Firstly, due to a large number of customers, the external suppliers usually have a higher production volume which enables the economies of scale (Bränneby & Palmgren, 2015, p. 25). **Thus, the in-house production level should be high enough for the production to be fully efficient and economically advantageous.**

Secondly, external suppliers are subjected to intense competition within their market. The competition creates a need for strong incentives and higher operational efficiency. Internal production units, however, lack competition as the driving force for efficiency improvement (Bränneby & Palmgren, 2015, p. 26). **Thus, the efficiency of in-house production should be constantly improved in order to compete with outsourcing alternatives.**

Thirdly, external suppliers focus on their core activities only, whereas companies having in-house production may spread their focus on too many activities and operations (Bränneby & Palmgren, 2015, p. 26). **Thus, in order to manage in-house production, the company should have sufficient resources.**

Finally, parts of the internal production may have different cultures and motives, which may result in negative externalities in the organisation (Bränneby & Palmgren, 2015, p. 26). **Thus, the organisation should have sufficient knowledge, management practices and authority to prevent any risks related to different cultures or motives of various parts of the organisation.**

3.3.3 Case Study 3. In-house vs Outsourcing: Feasibility

The Case Study by Tsai and Lai (2007) applies the activity-based costing model for determining the feasibility of outsourcing versus capacity expansions. The authors define several key factors, such as

- Resources (people, machines, facilities, utilities),
- Activities (machining, finishing, setup, scheduling, product design, plant management),
- Costs (all costs related to the resources and activities),
- Quality (the quality of operations and final products) (Tsai & Lai, 2007, pp. 1-3).

3.3.4 Case Study 4: Mare-or-Buy Decision Models

The research of Nordigården et al. (2014) investigates existing make-or-buy decision models and outlines numerous case studies implicating the outsourcing decision as well as the drivers for such decision.

Based on thorough literature research, Nordigården (2014, pp. 974-983) et al. define four key drivers affecting the make-or-buy decision. Table 1 is retrieved from the research of Nordigården et al. (2014, p. 980) and represents the types of driver, descriptions of outsourcing strategies and related sources.

Table 1. Types of driver, descriptions of subsequent mixed strategies and sources (2014, p. 980)

Type of driver	Subsequent mixed strategy	Source
Capacity flexibility	Balance in-house manufacturing capacity when demand varies and create effective capacity utilization Use multiple supply chains to match predictable vs unpredictable demand (e.g. global vs local sourcing)	Mols (2010b), Jacobides and Billinger (2006), Yang *et al.* (2005), de Kok (2000), Kamien and Li (1990), Harrigan (1986) He and Nickerson (2006), Ferdows *et al.* (2004), Fredriksson *et al.* (2010)
Core competence/ capabilities	Access strong external competencies to develop in-house competencies and/or use strong internal capabilities to strengthen the capabilities of external suppliers	Mols (2010b), Puranam *et al.* (2008), Parmigiani and Mitchell (2009), Parmigiani (2007), Jacobides and Billinger (2006), Rothaermel *et al.* (2006), Veugelers and Cassiman (1999), Bradach and Eccles (1989), Leenders and Nollet (1984)
Lock-in risks	Lower barriers to exit and lock-in risks by keeping buying and manufacturing competencies in-house with a mixed strategy	Mols (2010a, b), Puranam *et al.* (2008), Parmigiani (2007), Heide (2003), Dutta *et al.* (1995), Harrigan (1986)
Cost	Keep production in-house to benchmark the performance of external suppliers and create cost transparency and bargain power	Mols (2010a, b), Puranam *et al.* (2008), Jacobides and Billinger (2006), Heide (2003)

Capacity Flexibility

According to the literature researched by the authors, the need for production flexibility comes from the demand fluctuations, degree of automation and technological development (Nordigården, et al., 2014, p. 980). By referring to Harrigan (1986) and Yang et al. (2005), Nordigården et al. (2014, p. 980) claim that outsourcing helps companies to balance production in case of constantly fluctuating demand or such partially uncontrollable in-house factors as workforce and machines.

Core competence/capabilities

Nordigården et al. (2014, p. 981) refer to existing researches (Veugelers & Cassiman, 1999; Rothaermel, et al., 2006; Jacobides & Billinger, 2006) to state that cooperation with an external supplier can help to develop innovation strategies, increase product diversity by avoiding internal development and enable the knowledge transfer, infusing firms with new ideas.

Lock-in Risks

The authors claim that the complete outsourcing may result in ln lock-in, making outsourcing strategy irreversible (2014, p. 982). The lock-in is caused by the fact that the outsourcing company divests the capabilities it needs to perform the activity at a later stage. Such lock-in risks shifting power to the supplier (2014, p. 982).

Cost

The authors reflect on the lack of cost transparency in the case of complete outsourcing and claim that mixed strategy creases cost transparency (Nordigården, et al., 2014, pp. 981-982).

3.3.5 Case Study 5. Outsourcing Decision

The research by Ketler and Walstrom (1993) addresses the key factors impacting the outsourcing decision, such as personnel, economic, control, data characteristics, organisational characteristics and vendor and contract issues. The authors discuss the variables within each category and outline the advantages and disadvantages of outsourcing (Ketler & Walstrom, 1993). The study refers to Information Systems function outsourcing. However, the key concepts can be easily applied to the current feasibility study.

Personnel

According to Ketler and Walstrom (1993, p. 452), outsourcing can satisfy an organisation's demand for resources, bring knowledge and expertise. On the other hand, outsourcing can cause the loss of in-house expertise (1993, p. 453).

Economic

Ketler and Walstrom (1993, p. 453) refer to economies of scale as an advantage of outsourcing that enables cost savings and increased return on equity. The authors (Ketler & Walstrom, 1993, pp. 452-452) describe, however, several negative consequences of outsourcing, such as

- Higher than expected outsourcing bills due to contract misunderstanding, low vendor estimates or due to hidden costs;
- Increased tax liability and decreased profit margin.

Control

The authors (Ketler & Walstrom, 1993, pp. 453-454) imply that outsourcing the critical elements of some function results in greater dependency on the vendor, quality and confidentiality control loss.

Vendor and Contract Issues

According to Ketler and Walstrom (1993, pp. 456-458), in the case of outsourcing, the company is highly dependent on the vendor. Thus vendor evaluation, planning, contract development and procuring as well as communications are one of the key factors affecting the outcome of outsourcing strategy.

3.3.6 Case Study 6. Conceptual Framework for Outsourcing Decision

The research by Vining and Globerman (1999) suggests a conceptual framework for understanding the outsourcing decision. The authors (Vining & Globerman, 1999, p. 646) outline the efficiency perspective of outsourcing, stating that the organisation should have a clear purpose of outsourcing and a framework that can be applied to the organisation's outsourcing problems. Vining and Globerman (1999, p. 646) claim that there are often potential cost advantages of outsourcing, the authors, however, notice that the cost advantages might be outweighed by increased governance costs.

The framework developed by Vining and Globerman (1999, p. 652) assesses the outsourcing costs and benefits from the organisation's perspective. The authors introduce three types of costs: production costs, bargaining costs and opportunism costs (Vining & Globerman, 1999, pp. 646-648).

Production costs relate to the direct purchase price or the costs of internal production. Such costs are directly generated by the opportunity costs of the resources, such as land, labour or capital used to produce the goods (Vining & Globerman, 1999, p. 647). Vining and Globerman (1999, pp. 647-648) state several reasons for outsourcing cost efficiency: economies of scale, higher efficiency due to competition, diseconomies of the scope of managing various in-house activities, and negative organisational externalities that can be reduced or eliminated through outsourcing.

Bargaining costs relate to the costs of contract details negotiating, the costs of post-contract stage change to the contract, the costs of process control and performance evaluation, the costs of disputes between contracting parties (Vining & Globerman, 1999, p. 646).

Opportunism costs relate to the effect of opportunistic behaviour of the organisation being exploited by the contracting party (Vining & Globerman, 1999, p. 646).

Further in the research, Vining and Globerman (1999, pp. 648-650) introduce three major factors that determine the sum of opportunism and bargaining costs: asset specificity, contestability and product /activity complexity.

Asset Specificity

The authors refer to Klein et al. (1978), stating that an asset is considered specific when it makes a necessary contribution to the production of a good while having significantly lower value in any alternative uses (Vining & Globerman, 1999, p. 650). The specificity of assets, including physical assets, location specificity, human asset specificity, dedicated assets and temporal specificity. The specificity of assets raises the potential for opportunism since the contracting party committing assets is vulnerable to hold-up (Vining & Globerman, 1999, pp. 650-651).'

Product/Activity Complexity

According to Vining and Globerman (1999, p. 648), the complexity of a product or activity defines the degree of difficulty of any operations related to the product or activity. The complexity brings uncertainty to the information asymmetry when one party possesses the knowledge the other party does not possess, which may result in inadequate costs.

Contestability

The authors (Vining & Globerman, 1999, p. 649) introduce the definition of a contestable market, where only a few organisations can provide the desired service immediately, while other organisations quickly become available if the price paid by the outsourcing party exceeded the average cost incurred by contractees. That means, if the market is contestable, the opportunism is reduced at the contract stage. However, if the market is not contestable, the outsourcing party has higher bargaining power, which may result in inadequate costs (Vining & Globerman, 1999, p. 649).

Vining and Globerman (1999, p. 652) provide the framework describing alternative strategies for problem situations related to outsourcing. The framework is illustrated in Table 2. By assessing product/activity complexity, asset specificity, the users of the framework are able to determine potential dominant problems surrounding outsourcing. The framework provides the user with the solution to such problems.

Table 2. The framework for understanding the outsourcing decision (Vining & Globerman, 1999, p. 652)

Case	Product/activity complexity	Asset specificity	Dominant problem(s)	Solution(s)
1	Low	Low	Few	Rely primarily on contestability via contract termination (i,e, increase potential suppliers)
2	Low	High	Hold-up	For physical assets, outsourcing firm owns and leases assets; for temporal specificity, backloaded payments, bonuses and bonding. Use of quick arbitration
3	High	Low	Honest disagreements about quality and other performance attributes	Where possible mutually agreed upon practice guidelines
4	High	High	Opportunism by contractee	Harmonize outsourcing firm and contractee incentives through 'rent-creation'

3.3.7 Case Study 7. Strategic Sourcing Framework

The research performed by Sisilian and Satir (2000) describes a Case Study and the framework for strategic sourcing expressed as the decision flowchart. The authors (Sisilian & Satir, 2000) analyse several existing frameworks and, as a result, outline five major factors related to strategic sourcing: competitive advantage, demand flexibility, process capability, process maturity and strategic risk.

Sisilian and Satir (2000, p. 6) refer to Porter (1979) describing three generic competitive strategies:

- Cost leadership, which can be achieved by reengineering activities, process innovation and improved design/production efficiency
- Product differentiation, which enables the satisfaction of customer needs in different market niches, and
- Focus, which incorporates capturing market share by focusing and improving in a selected market niche.

The sourcing decision is affected by the competitive organisational strategy (Sisilian & Satir, 2000, p. 6).

Sisilian and Satir (2000, p. 6) state that customer requirements often drive the operational strategy of an organisation. Thus, the operation of the organisation is highly dependent on the demand: high forecast accuracy results in low demand flexibility need and vice versa. Thus, the required demand flexibility should be considered when making a make-or-buy decision.

Process capability relates to the ability of an organisation to perform a particular activity, meaning the quality, delivery rates and customer satisfaction (Sisilian & Satir, 2000, p. 6).

Process maturity refers to how widespread a particular process is in the supply market and to the level of ease of performing such a process. The authors outline sheet metal bending as a mature process that is mainly present in the market. The maturity of the process affects the ease of outsourcing or incorporating the process in-house and related costs (Sisilian & Satir, 2000, p. 6).

Sisilian and Satir (2000, p. 7) claim that strategic risk consists of appropriation and diffusion risks. According to the authors (Sisilian & Satir, 2000, p. 7), the appropriation risk means the risk of not receiving the required quantity or quality or the risk of not securing the amount of labour needed to produce goods. The diffusion risk, on the other hand, is the risk of sharing or losing proprietary knowledge or information while outsourcing.

3.4 Bringing Key Concepts Together

The concepts presented in research Case Studies were divided into four major groups: effectiveness, efficiency, risks and opportunities, and strategy. According to Mousas (2006), efficiency and effectiveness are critical terms in assessing business performance. The effectiveness refers to the organisation's ability to generate sustainable growth in earnings within the existing environment and conditions.

3.4.1 Effectiveness

This study refers to effectiveness as the ability of the organisation to manage and perform operations and the ease or difficulty to use this ability. Such concept from researched Case Studies as assets is related to the effectiveness of operations (Klein, et al., 1978). The assets of the organisation mean the resources, such as managerial knowledge, skills and power, human resources, physical resources, capital and intangible resources, resource specificity and product/activity complexity owned by the organisation or available for acquiring.

3.4.2 Efficiency

The efficiency can be described as a necessary hurdle or condition reflected in the organisation's operating margins (Moran & Ghoshal, 1999, p. 393). The efficiency is related to time and costs related to operations. The time refers to the strategy implementation time, equipment deployment time, investment break-even time and production lead times. The costs refer to production costs, equipment costs, operational costs and investment costs connected to the implementation and execution of organisational strategy.

3.4.3 Risks vs Opportunities

The Case Studies describe several types of risks, such as lock-in risk, strategic risks, risk of losing knowledge, risk of supply disruption, operational risks, external risks, which are used further in this research.

The research by Ketler and Walstrom (1993)shows that risks related to outsourcing result in opportunities related to in-house operations and vice versa. For example, outsourcing brings the risk of lock-in and opportunistic behaviour, whereas the in-house production results in the opportunity to eliminate lock-in and opportunistic behaviour risks but brings own risks, such as diseconomies of scope. Thus, the framework that shows the feasibility of individual processing alternatives should consider both risks and opportunities enabled by a particular processing strategy.

3.4.4 Strategic Importance

Some of the concepts present in researched Case Studies related to the strategy, in other words, called the strategic importance of processing strategy. For example, the competitive advantage, contestability, control over the process and quality relate to the importance of a particular strategy to the management, to customers and to suppliers. Thus, the strategic importance of individual processing strategy was considered in the framework for feasibility study and demonstration.

3.5 Tool Selection

As soon as the fundamental concepts of the feasibility framework were established, there was a need to pick sufficient tools that could enable adequate feasibility assessment.

3.5.1 Effectiveness

In order to assess the effectiveness of processing alternative, such tools as resource audit and self-checked management prowess analysis were picked based on existing Case Studies (Nguen, 2016) and literature (Cadle, et al., 2010) (Barringer & Ireland, 2010, p. 114).

3.5.1.1 Resource Audit

The resource audit assesses the key areas of the organisation and its ability to execute and manage processing strategy. Therefore, it answers the question of whether the organisation owns or has access to the resources required (Cadle, et al., 2010). The resource audit covers four areas of an organisation: physical, human, reputation and other resources (Cadle, et al., 2010).

Figure 4 represents groups of physical resources, such as office, production and warehouse facilities and tools, raw material, energy, and heat.

Physical resources	Office facilities
	Production facilities
	Warehouse facilities
	Office equipment & tools
	Production equipment & tools
	Warehouse equipment & tools
	Raw material
	Energy & Heat

Figure 4. Physical Resources

Figure 5 shows groups of human resources. Human resources refer to personnel permanently or temporarily employed by the organisation as well as the labour pool available.

Human resources	Top Management & HR
	Production management & planning
	Production support & equipment setting personnel
	Sourcing management
	Logistics management
	Warehousing management
	Production (line personnel)
	Warehouse (line personnel)
	Finance

Figure 5. Human Resources

In order to assess the feasibility of processing alternatives, human resources were divided into:

- Top Management and HR, Production management and planning, production support and equipment setting personnel, sourcing management, logistics management, warehousing management, production (line personnel), warehouse (line personnel) and finance.

Figure 6 illustrates groups of reputational resources.

Reputation resources	Ability to initiate partnership with suppliers
	Power in negotiation with suppliers
	Ability to justify changes to the customers

Figure 6. Reputational Resources

Reputation resources relate to the reputation of the organisation; the amount of goodwill or antipathy and power in negotiation resulted from this reputation. The reputation resources were divided into the ability of the organisation to initiate a partnership with suppliers, the power in negotiation with suppliers and the ability to justify changes to the customers.

Figure 7 indicates groups of other resources. Other resources imply the know-how resources and investment resources.

Other resources	Management know-how
	Production management know-how
	Technology know-how (production)
	Technology know-how (design)
	Sourcing & supply know-how
	Warehousing know-how
	Logistics know-how
	Applicable law and regulation know-how
	Financing know-how (ability to initiate and operate investments)
	Investment Resources

Figure 7. Other Resources

The know-how means the knowledge and the information owned by the organisation or available for acquiring. The know-how was divided into management know-how, production management know-how, production technology know-how and design technology

know-how, sourcing and supply know-how, warehousing know-how, logistics know-how, applicable law and regulation know-how, financing know-how. Investment resources refer to owned or available funds and access to the funding organisations.

In order to be valid and descriptive, the resource audit should assess both the extent to which current resources are available and the ease of acquisition of required resources. After all key points were defined, the resource audit tool was finalised. The resource audit tool is illustrated in Appendix 7.

In order to enable the assessment of resources, the resource audit tool was transformed into a survey. The survey was designed according to the validity and reliability criteria (Boparai, et al., 2018). The questions follow the purpose of the study: the resource audit. Each question is equivalent to the other ones since the survey uses the same grading methodology. Moreover, the explanatory workshop was planned in order to ensure that respondents understand the purpose of the survey, its contents and grading methodology. The validity of answers is partly assured by cross-referenced questions and the maximal available respondent amount (four top managers are selected as respondents). However, the validity can be still argued due to self-assessment selected as the principal methodology. Even though the respondents were to be instructed, the answers provided by respondents could have been affected by personal knowledge, experience, or mindset.

First of all, the unconscious bias of the answers was partly covered by the fact that respondents are the stakeholders of this study. Therefore, the limitations of this study, the origin of recommendations and the overall research process were familiar to the stakeholders. Secondly, the scope and the timeframe of this research did not allow the use of a certified body to perform a well-structured audit of Aste, which could eliminate the unconscious bias. Thirdly the connection of the qualitative and quantitative findings was checked during the feasibility analysis to ensure the validity of these findings. Thus, the validity of assessment tools was considered sufficient for the purpose of this study. Discussed requirements and reasons were used for the development of all surveys used in this study.

Figure 8 illustrates the segment of the survey.

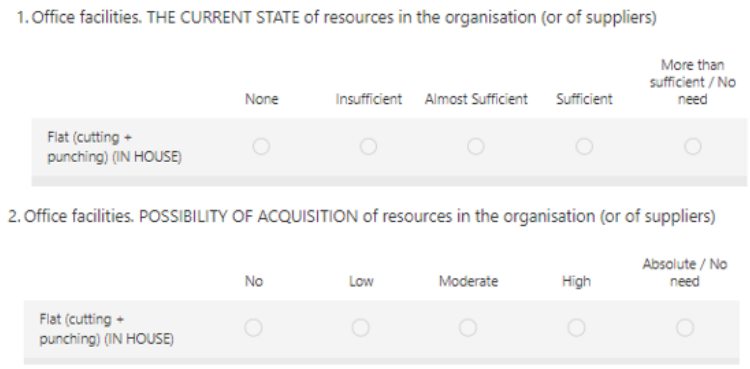


Figure 8. Resource Audit Survey segment

As it can be seen from Figure 8, the survey assesses both the current state of resources existing at Aste as well as the possibility of acquisition of required resources.

In order to assess the feasibility of each processing alternative, answers consider the situation where is no need for additional resources, as well as the situation when there is no need for the acquirement of additional resources. The complete resource audit survey is provided in Appendix 2

3.5.1.2 Management Prowess Analysis

The purpose of the management prowess analysis is used to assess the organisation and the management team, its passion for the business idea, existing skills and knowledge of the market and the business processes (Barringer & Ireland, 2010). The management prowess analysis tool covers such areas of the organisation as

- Top Management
- HR
- Legal Issues
- Sourcing
- Production
- Demand forecast
- Supply forecast
- Process Understanding
- Market Understanding
- Environment & Sustainability
- Warehousing
- Design
- Invoice Management

The tool was transformed into a survey revealed in Appendix 3. The assessment was divided into two parts: self-assessment, which studies the prowess of each individual top manager that uses the tool; and the assessment of the organisation, which analyses the prowess of the whole organisation, thus being the management prowess of Aste. The grading explanation was not provided for this survey due to its self-explanatory nature. Figure 9 illustrates a segment of the survey.

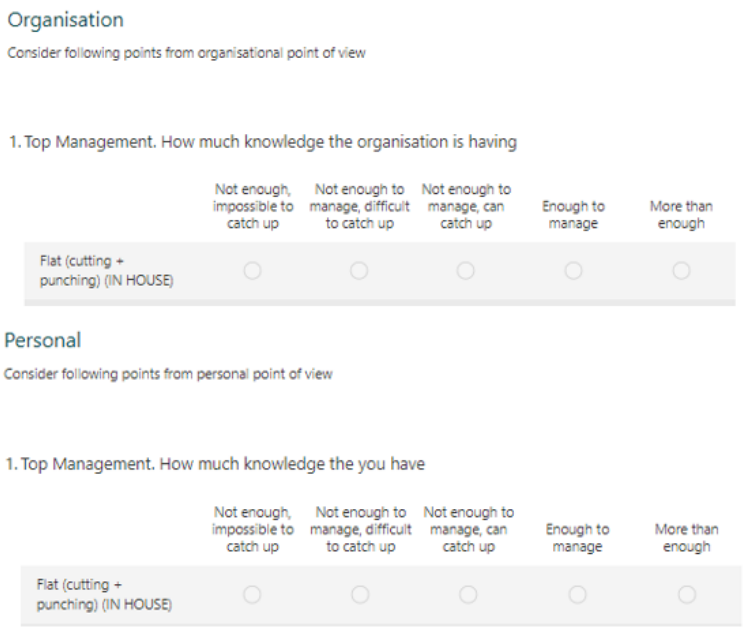


Figure 9. Management Prowess Survey segment

As it can be seen from Figure 9, the survey is divided into two parts: the assessment from the organisation's and personal points of view. Each processing alternative is graded with respect to the knowledge the organisation as a whole or each individual top manager has.

3.5.2 Efficiency

In order to approach the efficiency assessment, cost-benefit analysis was used.

The cost-benefit analysis is a simple but informative tool to assess the overall financial feasibility of an idea, project or business (Layard & Glaister, 2003). The ideas of the tool are straightforward and can be expressed as the following formula:

$$Cost - Benefit\ ratio = \frac{\text{Total Benefits}}{\text{Total Costs}}$$

All incurred costs are compared against benefits of the assessed idea, project or business, expressed in monetary terms. The cost-benefit ratio indicates whether the project brings benefits (the ratio is higher than 1), is unprofitable (the ratio is lower than 1) or whether costs equal benefits (ratio equals 1).

The current state serves as the reference value. Therefore, if the selection of processing alternative results in higher benefits than costs, the selected alternative sounds feasible from the financial point of view. Figure 10 illustrates the costs and benefits associated with the selection of processing alternatives.

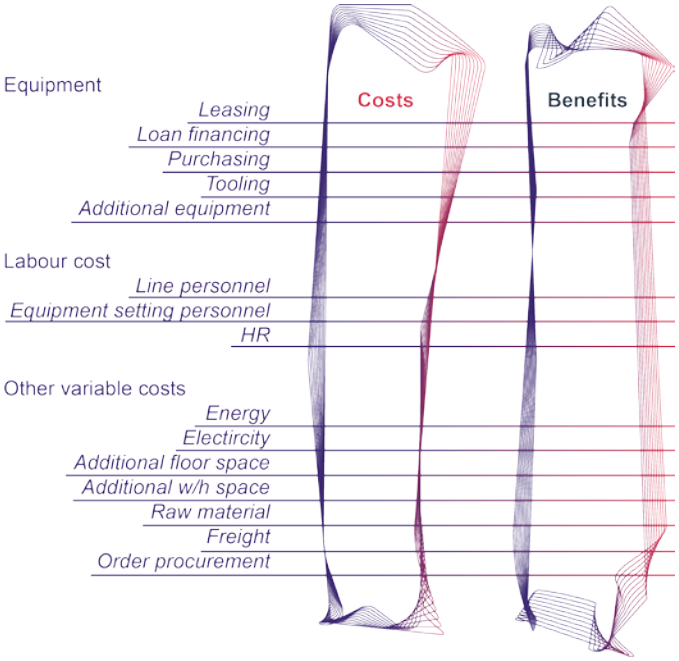


Figure 10. Costs-Benefit Structure

Both costs and benefits are considered for each point of the analysis. For example, selecting an in-house alternative brings additional production line personnel costs. Outsourcing alternative, however, might bring the reduction of incoming raw materials, thus decreasing the expenses associated with warehouse line personnel. It is the purpose of the feasibility study to assess which costs and benefits might be achieved with the selection of individual processing alternatives.

After total costs and benefits are calculated, the cost-benefit ratio is calculated.

3.5.3 Risks vs Opportunities

In order to approach the development of risks and opportunities assessment, the PESTEL model is researched (Cadle, et al., 2010). PESTEL is an acronym standing for Political, Economic, Sociological, Technological, Environmental and Legal factors. The model originates from PEST analysis, which is believed to be introduced under the name ETPS by Francis J. Aguilar (1967). In his work, Aguilar (1967) reflects on economic, technical, political and social factors as key drivers of the business environment. Accordingly, the PESTEL model assesses the influence of macro-environmental factors on the organisation, idea or project.

The risks described in the researched literature (Bränneby & Palmgren, 2015; Lockamy & McCormack, 2010; Aron, et al., 2005; Nordigården, et al., 2014; Tsai & Lai, 2007) are considered with respect to the PESTEL (Cadle, et al., 2010) and TELOS models (Hall, 2008).

In order to serve the goal of this research, which is feasibility demonstration, the PESTEL and TELOS models were adjusted to enable the optimal assessment of processing alternatives. The combination of models enabled the assessment of both external (macro-environmental) and internal factors bringing risks and opportunities. The following areas were considered: political, socio-cultural and environmental, legal, supply and demand, human resources, design and production, economic.

Figure 11 illustrates the developed model for risks vs opportunity evaluation.

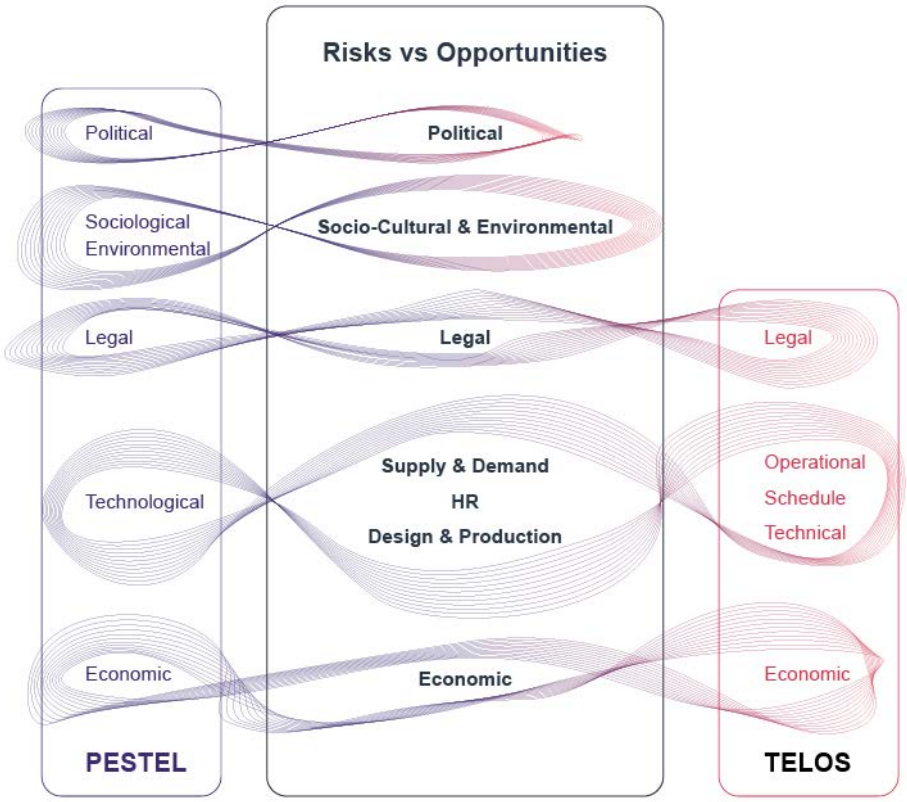


Figure 11. The Model for Risks vs Opportunities Evaluation

As it can be seen from Figure 11, such points as Political, Legal or Economic, are connected to the developed model directly. Sociological and Environmental factors from the PESTEL model were combined and transformed into Socio-Cultural and Environmental risks and opportunities.

Technological factors from PESTEL were combined with Operational, Schedule and Technical parts of the TELOS model, thus forming three new areas for risk and opportunity evaluation, being Supply and Demand; Human Resources; and Design and Production.

However, developed risk and opportunity areas were too broad for sufficient assessment. Thus, each area was divided into several subsections allowing a more detailed analysis of risks and opportunities. Figure 12 represents the subsections derived from the initial model.

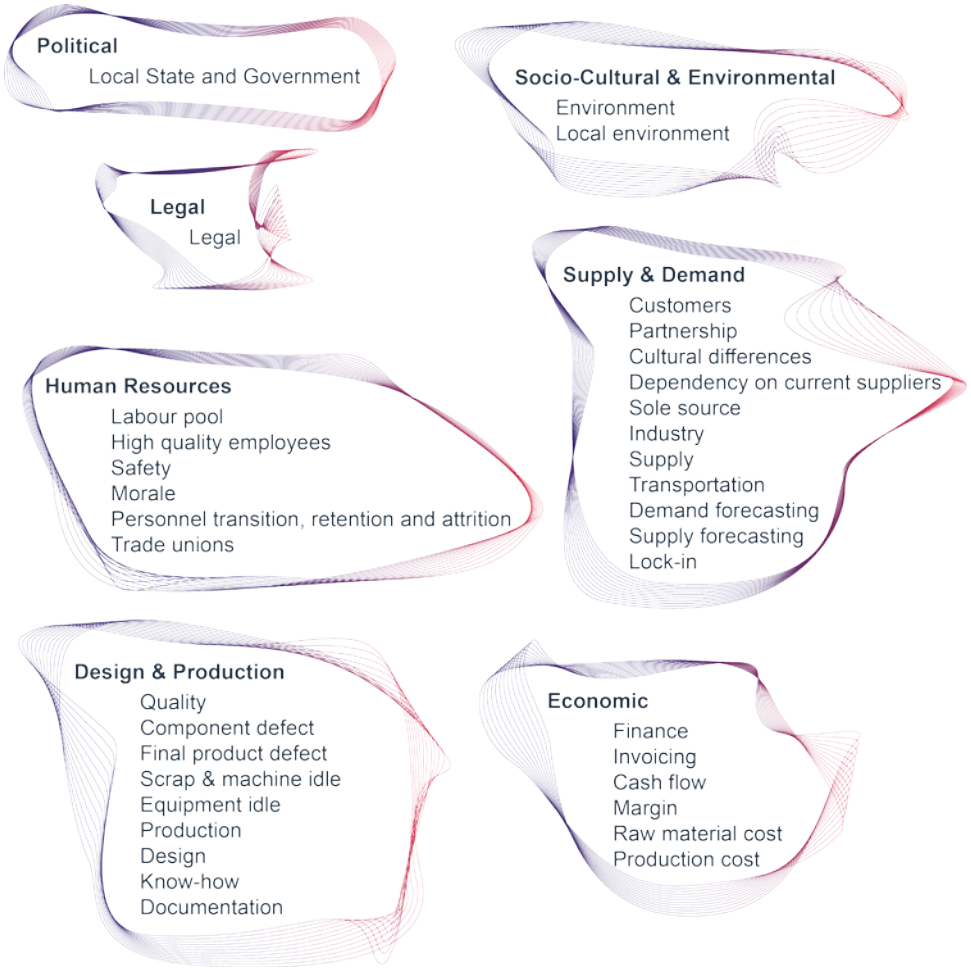


Figure 12. Subsections Derived from the Initial Model

As it can be seen from Figure 12, developed subsections allow the investigation of particular points within the risk and probability area. For example, the economic risks and opportunities consider financing, invoicing, cash flow, margins, raw material and production cost. Assessment of each subsection will provide a detailed and grounded feasibility analysis of risks and opportunities of each processing alternative.

The research of risk assessment techniques from the IEC 31010 standard (2019) revealed the tool suitable for integration to the developed risk and opportunity model. The tool picked from the standard is the consequence/probability matrix. Such a matrix uses the combination of qualitative and semi-qualitative ratings of consequence and probability to produce a level of risk. Figure 13 represents the matrix, where the risks are positioned according to the likelihood of happening and the severity of consequences.

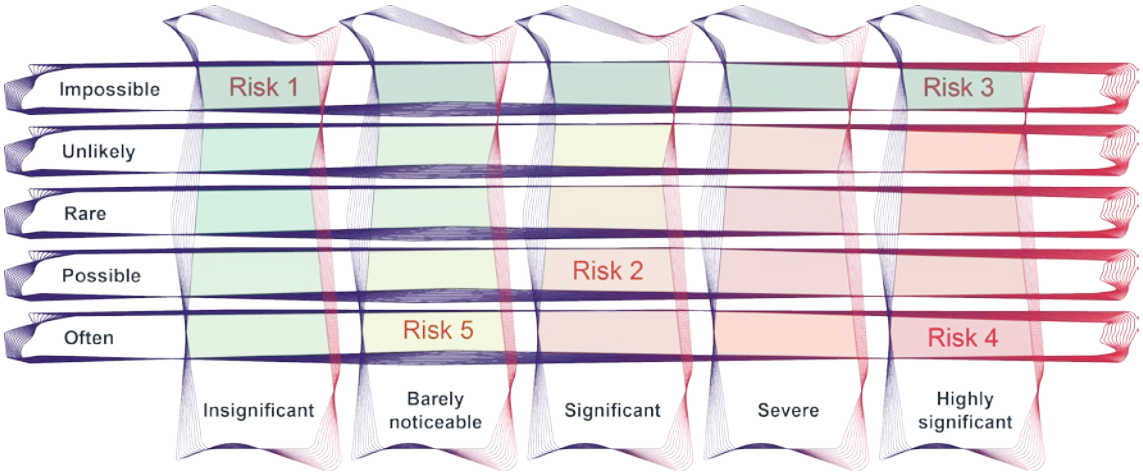


Figure 13. Risk Consequence / Probability Matrix

A similar matrix, illustrated in Figure 14, was created to assess the opportunities.

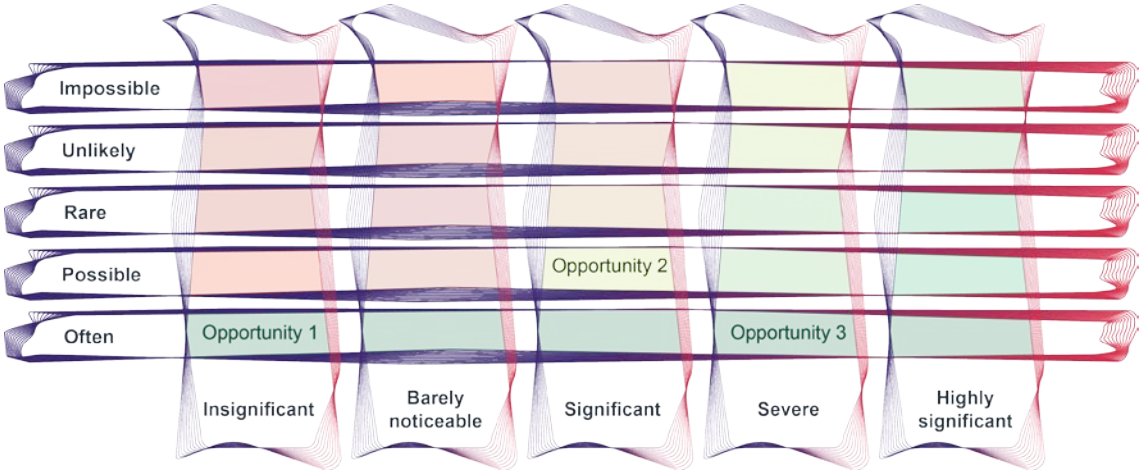


Figure 14. Opportunity Consequence / Probability Matrix

The matrices were then combined to allow the assessment of both risks and opportunities. The combined matrix is represented in Figure 15.

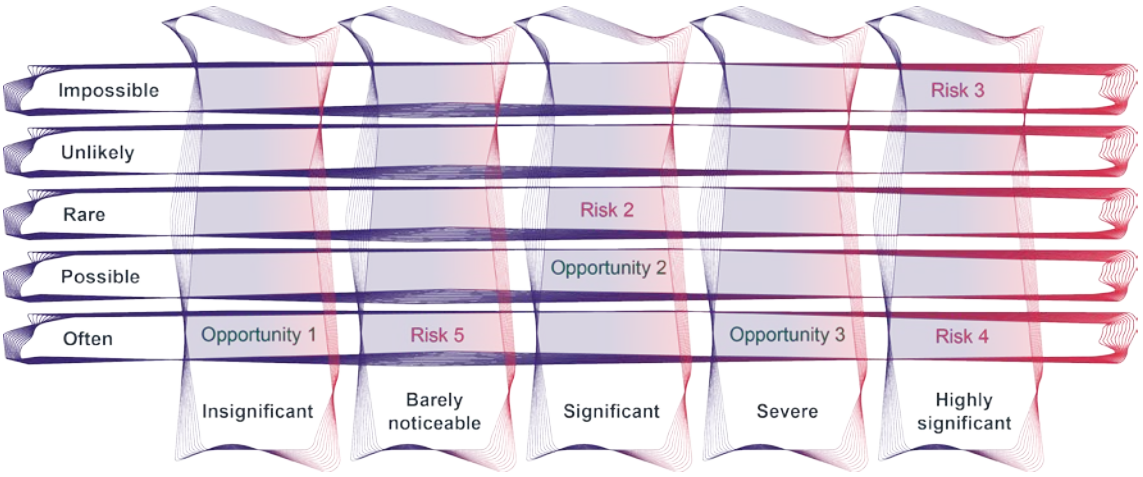
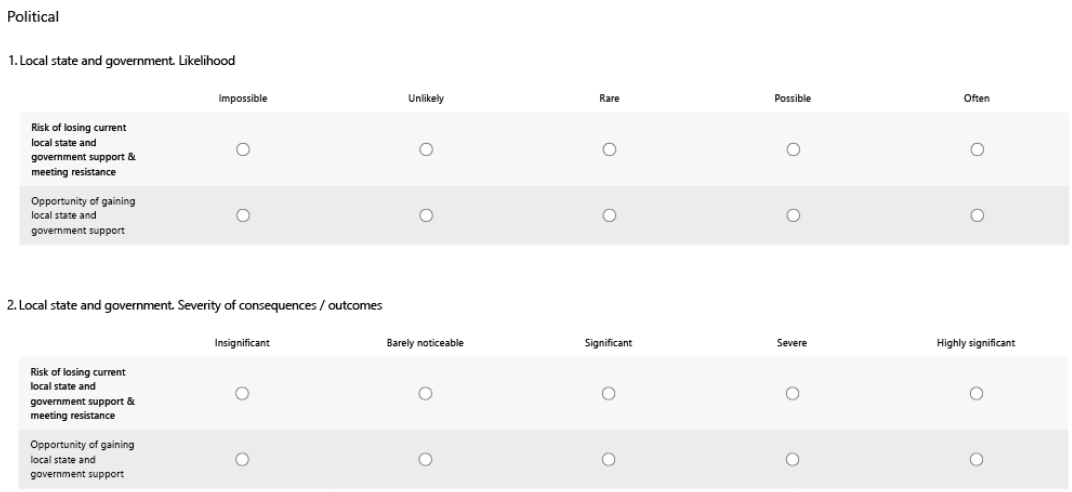


Figure 15. Combined Risk vs Probability Matrix

The next step of risk and opportunity assessment tool development was the assignment of particular events to each subsection. To a certain extent, the risks and opportunities can be considered as two sides of the same coin (Bekefi, et al., 2008). Thus the risks and opportunities inspired by the researched literature (Dibrova, 2015; Phyper & MacLean, 2011; Henisz & Zelner, 2003; Bränneby & Palmgren, 2015; Chou & Chou, 2011; Barringer & Ireland, 2010; Aron, et al., 2005; Bekefi, et al., 2008; Lockamy & McCormack, 2010) were grouped and assigned to the corresponding subsection.

For example, the risk of losing final product quality opposes the opportunity of achieving higher product quality; the risk of increased production costs is set off by the opportunity of decreased production costs. The complete list of risks and opportunities is illustrated in Appendix 8. The list was then applied to the developed model to form a survey (Appendix 4).

Figure 16 illustrates a segment of the survey. Individual surveys were created for each of the processing alternatives.


Political

1. Local state and government. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of losing current local state and government support & meeting resistance	○	○	○	○	○
Opportunity of gaining local state and government support	○	○	○	○	○

2. Local state and government. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of losing current local state and government support & meeting resistance	○	○	○	○	○
Opportunity of gaining local state and government support	○	○	○	○	○

Figure 16. Risks vs Opportunities Survey Segment

The idea is straightforward; the respondents are asked to indicate the likelihood and severity of consequences (or outcomes) of each risk and opportunity. The results were supposed to form the risk vs opportunity part of Data 2.

3.5.4 Strategic Importance

The literature research showed a need to implement a tool that enables the assessment of the strategic importance of individual processing alternatives. On top of previously discussed literature (Bränneby & Palmgren, 2015; Cadle, et al., 2010; Cheepweasarash & Pakapongpan, 2008; Ketler & Walstrom, 1993), several more sources were used to analyse the strategic importance factors that should be considered during the feasibility study. The article by Kelly and Gennard (2007) explains the importance of strategy development for business and studies a set of organisations within the paradigm of strategic decision making. The article by Andrew and Johnson (1982) describes the importance of production and operations management.

The concepts derived from the literature included the importance of current or planned operation to the existence of the organisation, meaning competitiveness, growth, cost-efficiency, customer value, market penetration, the know-how and reputation of the organisation and bargaining power in negotiations (Nguen, 2016; Vining & Globerman, 1999; Porter, 1979; Cadle, et al., 2010; Barringer & Ireland, 2010; Cheepweasarash &

Pakapongpan, 2008; Nordigården, et al., 2014; Arvanitis & Estevez, 2018; Aron, et al., 2005; Bränneby & Palmgren, 2015).

Such concepts were then used to create the basis of the strategic importance assessment tool. The strategic importance was divided into four groups, which are illustrated in Figure 17.

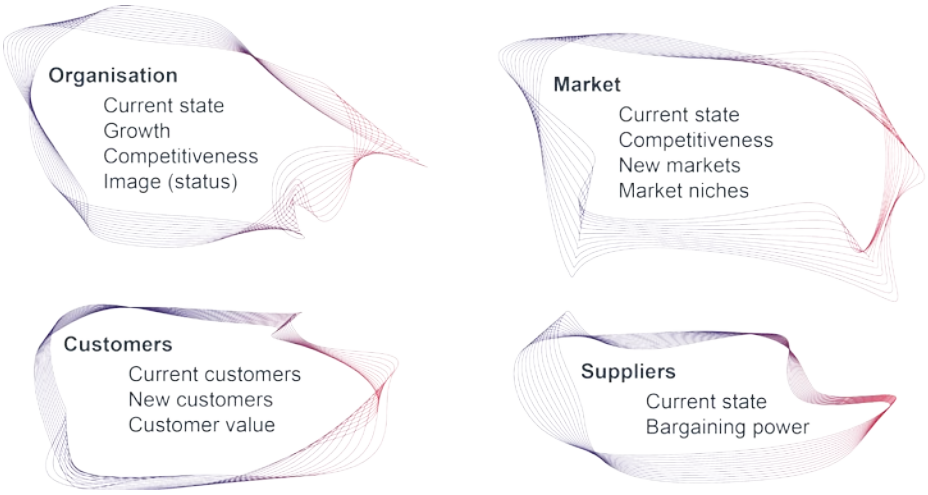


Figure 17. Strategic Importance. Key Concepts

Figure 17 shows that the groups comprise:

- The organisation (existence, growth, competitiveness, reputation (image))
- Customers (customer value)
- Markets (market penetration)
- Suppliers (know-how, reputation, bargaining power)

As it can be seen from Figure 17, some points are interconnected. For example, there is a need to know the strategic importance of the processing alternative to maintaining the current state, whether it is the current state of business, current market position, current customers or suppliers. For the reason of sufficient analysis, there is a need to assess the strategic importance from organisational, management (personal), customer and local society point of view.

The combination of groups and points of view provides the basis for the strategic importance assessment tool, which is illustrated in Appendix 9.

Figure 18 represents the segment of such a basis.

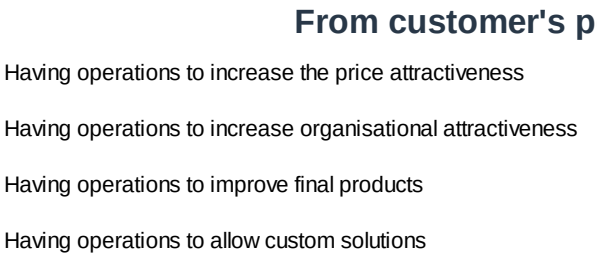


Figure 18. Strategic Importance Basis Segment

It can be seen from Figure 18 that the strategic importance of processing alternative might affect the price attractiveness, the overall organisational attractiveness to the customer. Moreover, the processing alternative can increase customer value as a result of improved final products or the availability of custom solutions. The possible strategic importance with respect to local society, top management and organisation is described in a similar way as illustrated in Appendix 9.

The tool picked for the strategic feasibility study is similar to the tool used for risk vs probability assessment, meaning the consequence/probability matrix. However, there was no need for a multi-dimensional severance-likelihood matrix. Thus, the matrix was simplified, as shown in Figure 19.

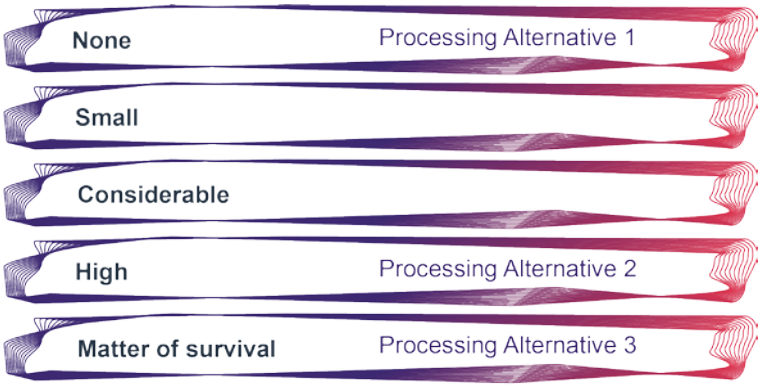


Figure 19. Simplified Matrix for Strategic Importance Assessment

As it can be seen from Figure 19, the importance of each processing alternative is ranked. The ranking consists of five grades, from "none" meaning no strategic importance, to "matter of survival", meaning the utmost importance. A detailed explanation of the ranking is described in Appendix 5.

The last step of the strategic importance assessment tool development was the creation of a survey based on the matrix tool developed.

The survey was formed in a similar way to the risk vs opportunity survey but was simplified due to the elimination of the second probability dimension. The complete survey is presented in Appendix 5. Figure 20 illustrates the segment of the survey.


1. Having operations to increase the price attractiveness

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

Figure 20. Strategic Importance Survey Segment

As it can be seen from Figure 20, the strategic importance of each processing alternative is assessed with respect to a particular strategic factor.

3.6 The Conceptual Framework

The factors and described in previous subsections were combined into the feasibility study framework, which is illustrated in Figure 21.

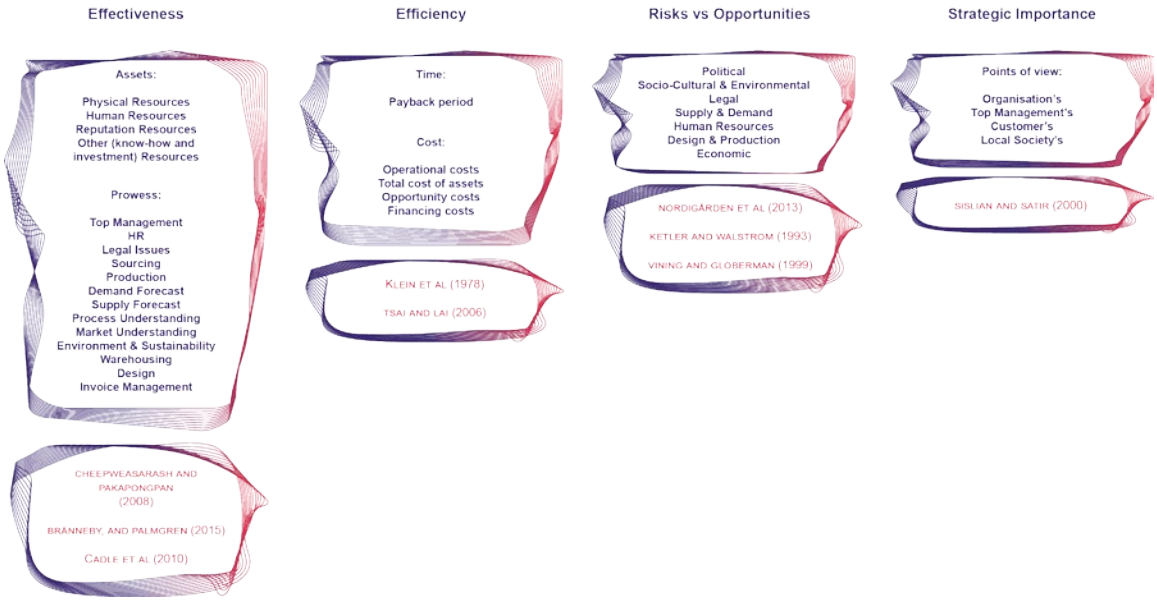


Figure 21. The Conceptual Framework

Figure 21 shows how four feasibility study areas, being effectiveness, efficiency, risks vs opportunities and strategic importance, formed a complete framework. The framework was designed to assess the feasibility of processing alternatives. Four processes, such as cutting, bending, painting and all together, form eight processing alternatives. Processing alternatives considered outsourcing or in-house processing. The scope of this study did not involve the consideration of processing combinations. Thus, the framework was designed to treat each process individually and did not consider the synergy of several processing alternatives being selected at the same time.

The effectiveness of processing alternatives comprises the assets and prowess described in previous subsections. The framework considers physical, human, reputation and other resources. Other resources combine know-how and investment resources. The prowess analysis considers such areas as

- Top Management
- HR
- Legal Issues
- Sourcing
- Production

- Demand forecast
- Supply forecast
- Process Understanding
- Market Understanding
- Environment & Sustainability
- Warehousing
- Design
- Invoice Management

The efficiency of processing alternatives comprises time- and cost-efficiency. The time efficiency considers the payback period of implementation projects. The costs comprise operational, total asset, opportunity and financing costs.

The risks vs opportunities correspond to the model described in previous subsections and comprise political, socio-cultural and environmental, legal, supply and demand, human resources, design and production, and economic risks and opportunities.

The strategic importance comprises the assessment of processing alternatives from organisation's, top management's, customer's and local society's points of view.

The tools developed in this section were applied to the conceptual framework to collect and analyse the ground data necessary for the feasibility demonstration. The combination of the conceptual framework and assessment tools is presented in Appendix 10.

Each processing alternative is to be assessed with the use of tools developed previously in this section. For example, the Risks vs Opportunities Survey is used to collect necessary ground data for the risks vs opportunities feasibility study. The Consequence / Probability Matrix was then applied to the ground data, and the result is analysed. The analysis of the data shows the feasibility of each processing alternative, which in its turn, enables the development and the delivery of recommendations on a strategically sound scope of sheet metal processing. The assessment of effectiveness, efficiency and risks vs opportunities is performed in a similar way (taking into consideration tools and specifics previously described in this section).

In the following Section 4, the process of gathering necessary ground data for the feasibility demonstration is described. The data is selected and processed in accordance with the developed conceptual framework.

4 Gathering Necessary Ground Data for Feasibility Demonstration

4.1 Overview

Section 4 describes the ground data gathered for the feasibility demonstration. The type of data, data sources and data collection tools correspond to the conceptual framework described in Section 3. The outcome of Section 3 was the final conceptual framework for the demonstration of the financial and operative feasibility of individual sheet metal processing alternatives.

For the sake of better readability, the data gathering rounds are grouped by the feasibility study areas, being the effectiveness, efficiency, risks vs opportunities and strategic importance. Each group is then divided into two subgroups, being the in-house and outsourced processing. The reason for such grouping is that the data collection process is repeated in the same way for each processing alternative. However, it should be noted that the data necessary for the feasibility demonstration of in-house processing differs from the data necessary for the feasibility demonstration of outsourced processing. The difference is described further in this section with respect to each feasibility study area.

4.2 Data Necessary for Effectiveness Demonstration

4.2.1 Resource Audit

In order to gather the data necessary for resource audit assessment, the survey described in Section 3 was used. Explanatory Workshop 1 was conducted to make sure that the respondents understand the purpose and specifics of the survey as well as the meaning of questions and answers. The field notes describing the workshop were collected.

As Section 3 describes, the survey considered resources required to maintain current operations, thus being the assessment of the current outsourcing state; and resources required to start in-house production. Additionally, the survey considered the possibility of the acquisition of required resources. The results, being ground data, were gathered and prepared for analysis.

4.2.2 Management Prowess Analysis

The management prowess survey was used to gather the data necessary for the feasibility demonstration. Explanatory Workshop 2 was conducted in a way similar to the one described previously in this section. The results were gathered for the feasibility analysis forming the second part of ground data for effectiveness feasibility demonstration.

4.3 Data Necessary for Efficiency Demonstration

In order to assess the financial feasibility of each processing alternative, several sources were used. A different approach was used to gather data related to in-house and outsourcing processing alternatives.

Since Aste outsources all sheet metal processing, the data concerning outsourcing was retrieved from internal ERP.

The products being sold were analysed, EUR 10 M revenue was used as a reference value for all calculations (Appendix 6). Then, the component structure for each of these products was retrieved. Then, each sheet metal component was analysed. In this way, the cost of each cut, bent or painted component was known. The gathered data was then combined, which enabled further analysis of the use and cost of all cut, bent or painted components. The gathered data is illustrated in Table 3.

Table 3. The cost structure of sheet metal components per the processing type within a 1-year period

Process	Total Cost	
Cutting only	EUR	XX.XXX
Cutting + painting	EUR	XX.XXX
Bending	EUR	XX.XXX
Bending + painting	EUR	XX.XXX
Total cost	**EUR**	XXX.XXX

Then, the information concerning the cost structure of cut, bent and painted components was asked from the suppliers. Due to the fact that the cost of sheet metal components incorporates the labour, energy, electricity and freight cost, there was no need for separate consideration of such costs. Since Aste purchases from a local supplier, no cost difference can be seen for labour, energy or electricity. Thus, the basic cost of labour, energy, electricity and freight was considered equal to the

cost incurred to the outsourcing. Such consideration allowed the cost-benefit calculation through the analysis of cost structure, supplier markups and additional savings.

The markup used by suppliers was retrieved from internal documents possessed by Aste, as Appendix 1 shows. Additional savings, such as freight savings in case of all together in-house processing alternative, were considered and combined with the markup data. In this way, the total possible savings were calculated. Calculated savings are depicted in Table 4.

Table 4. The savings enabled by the implementation of in-house processes

		Process			
		Cutting only	Cutting + painting	Bending	Bending + painting
In-House	Cutting	X%	X%	X%	X%
	Bending	X%	X%	X%	X%
	Painting	X%	X%	X%	X%
	All together	X%	X%	X%	X%

As soon as the savings percentage was known, total savings were calculated, which is represented in Table 5.

Table 5. Total savings per in-house processing alternative within a 1-year period

		Process				Total Savings
		Cutting only	Cutting + painting	Bending	Bending + painting	
In-House	Cutting	EUR XX.XXX	EUR XX.XXX	EUR	EUR XX.XXX	EUR XX.XXX
	Bending	EUR -	EUR -	EUR	EUR XX.XXX	EUR XX.XXX
	Painting	EUR -	EUR -	EUR	EUR XX.XXX	EUR XX.XXX
	All together	EUR XX.XXX	EUR XX.XXX	EUR	EUR XX.XXX	EUR XX.XXX

No other benefits were found for in-house alternatives.

The last step of the efficiency data collection was the retrieval of the data from the equipment supplier. The supplier was provided with access to a detailed description of the current state of Aste, technical drawings of sheet metal parts and information concerning currently used production technology. Furthermore, since the equipment supplier had access to the cost structure and component structure of products being sold, the capacity of the proposed equipment was connected to the turnover of the company. The data concerning the proposed equipment was received, as indicated in Appendix 1.

It is worth noting that the energy consumption and required labour capacity were not considered as described previously in this section. The supplier has developed production layouts that enabled the calculation of the total floor area required. The gathered data is illustrated in Table 6.

As it can be seen from Table 6 and Appendix 6, Aste possesses the required floor area to deploy cutting or bending equipment. However, there is a need for additional floor area in case of painting equipment deployment.

Table 6. Total costs of sheet metal processing implementation within a 1-year period

		Costs					
		Equipment cost	Tooling Cost	Capacity	Area	Available area	Rent
In-House	Cutting	EUR XXK	EUR XK	EUR 20 M	100 m2	200 m^2	EUR 14.5 per m2
	Bending	EUR XXK	EUR XK	EUR 15 M	75 m2		
	Painting	EUR XXK	EUR XXK	EUR 30 M	570 m2		
	All together	EUR XXXK	EUR XXK	EUR 15-30 M	745 m2		

The cost-benefit ratio was then calculated using the formula discussed in Section 3. Table 7 illustrates the data used for cost-benefit calculation. The ratio is then transformed to the payback period.

Table 7. The cost-benefit calculation for in-house sheet metal processing alternatives

		Costs				Cost-benefit ratio	Benefits (savings), total
		Equipment cost	Tooling Cost	Area rent	Costs, total		
In-House	Cutting	EUR XXK	EUR XXK	EUR -	EUR XXK	0.26	EUR XXK
	Bending	EUR XXK	EUR XXK	EUR -	EUR XXK	0.9	EUR XXK
	Painting	EUR XXK	EUR XXK	EUR XK	EUR XXK	0.03	EUR XXK
	All together	EUR XXK	EUR XXK	EUR XK	EUR X M	0.13	EUR XXXK

In this way, the data required for efficiency feasibility analysis was collected and processed.

4.4 Data Necessary for Risks Vs Opportunities Demonstration

In order to collect the data necessary for assessing the third area of the feasibility study, being risks vs opportunities, the survey described in Section 3 was used. An Explanatory Workshop 3 was conducted. The respondents showed an understanding of the purpose of the survey and the meaning of questions and grading, the summary of the workshop was described in field notes. The results of the survey were collected and prepared for feasibility analysis, thus forming the ground data.

4.5 Data Necessary for Strategic Importance Demonstration

The collection of the data necessary for strategic importance feasibility demonstration was performed in a way similar to the ones discussed in subsections 4.2; and 4.5. During an Explanatory Workshop 4, respondents were instructed, and the understanding of the survey was confirmed and reflected in the field notes. The results were then collected and prepared for the next step, the feasibility study, being the analysis of collected data. Therefore, the ground data was formed.

In the following Section 5, the ground data is incorporated into the conceptual framework, thus enabling the feasibility analysis of individual processing alternatives. The analysis describes critical points related to Aste as a whole as well as critical points related to each individual sheet metal processing alternative.

5 Conducting A Feasibility Study of The Individual Processing Alternatives and Generating Recommendations

In Section 5, the conceptual framework is used to assess the feasibility of each sheet metal processing alternative. The ground data described in Section 4 is used for such assessment. Each in-house alternative is compared to the corresponding outsourcing alternative. Further in Section 5, a summary of the analysis is provided. Then, the process of creation of the initial recommendations is described. Section 5 ends with a summary of initial recommendations.

To start with, it is worth noting that prior to the analysis of individual processing alternatives, the general analysis was performed. Therefore, the collected ground data was assessed to determine critical points are not related to individual processing alternatives, however should be considered.

5.1 The General Analysis

5.1.1 Effectiveness

5.1.1.1 Resource Audit

Firstly, the resource audit revealed insufficient production facilities, meaning the lack of floor space. Due to the “low” to “moderate” possibility of acquisition of new production facilities, the floor space might not even prevent the development of Aste but can result in the rollback.

Secondly, the audit showed insufficient warehouse facilities required to maintain the current state. The lack of warehouse facilities might be caused by two factors: low inventory turnover or the warehouse space being less than required for current operations. Since the study revealed a moderate possibility of warehouse facilities acquisition, the lack of facilities will show a negative effect on Aste's operations and performance if no actions are taken.

Thirdly, the study revealed a lack of skilled production management & planning, sourcing management, warehousing management and warehouse line personnel. Poor produc-

tion management and planning will result in delayed orders and money locked in inventory. Insufficient sourcing and warehousing will aggravate this effect. If the problem persists, either new orders are cancelled or harsh actions, such as mandatory second shift work, are taken to cope with it. It is worth noting that the market still recovers from the Covid-19 outbreak, which can be proved by the current revenue of Aste and the information coming from the partners. Due to the market situation, there is a high possibility that the management will not consider order cancellation as an option. Therefore, customer satisfaction will decrease due to the delayed orders, personnel satisfaction will decrease due to the harsh treatment, and the money will be still locked in inventory. All mentioned events will show a severe negative effect on the performance of Aste.

Fourthly, the investment resources of Aste are limited. Thus, the selection of processing alternative should be performed after a thorough investigation.

To sum up, however, it should be stated that all other resources of Aste are considered sufficient to maintain the current state or even to enable further development.

5.1.1.2 Management Prowess Analysis

The management prowess analysis showed mostly sufficient knowledge to manage current operations. However, a lack of knowledge of supply and demand forecast was found. Moreover, both the top management and the organisation have some knowledge and understanding of in-house processing alternatives. Although the knowledge is not enough to effectively manage the in-house production, the study showed that it could be quickly acquired.

5.1.2 Efficiency

The cost-benefit analysis revealed that sheet metal components comprise a significant share of the total product cost. Since the total product cost represents the most significant item of expenditure, the sheet metal components cost plays a significant role in Aste's profitability. Therefore, the decision to choose sheet metal processing for the feasibility study was shown to be highly justified.

5.1.3 Risks vs Opportunities

The analysis showed a high risk of poor demand forecasting, which can show a significant adverse effect on Aste's performance. This finding complemented the result of the effectiveness analysis that showed insufficient demand forecasting resources and knowledge.

High dependency on the supplier and severe risk of increased raw material costs, revealed during the analysis, is connected to the high risk of increased costs. This finding complemented the efficiency analysis, which showed that sheet metal components comprise a significant share of total expenditure.

Moreover, the analysis revealed a significant risk of production disruption and, obviously, its severe effect on Aste's performance. The risk is directly connected to demand forecast, sourcing, warehousing and production planning issues already covered in this paper.

On the other hand, the analysis indicated that the risk of legal issues, risk of decreased employee safety, and the risk of personnel attrition are low or are believed to have no effect on Aste's performance.

Moreover, the analysis showed that Aste has a high opportunity for sufficient supply chain development that will significantly improve Aste's performance.

5.1.4 Strategic Importance

The strategic importance analysis revealed the fact that Aste can freely choose between in-house and outsourcing alternatives: there is a need for development, and nothing prevents Aste from transforming. Moreover, in-house alternatives showed higher strategic importance.

5.2 Sheet Metal Cutting Alternatives: Analysis

5.2.1 Effectiveness

The audit of resources operations showed that Aste has enough resources to manage the outsourcing of sheet metal cutting efficiently. However, it is not enough to manage in-house production. The lack of resources comprises insufficient production and warehouse facilities; production management, planning, support personnel, equipment setting personnel. The study showed a moderate possibility of acquisition of personnel. However, the study reveals a low possibility of facility acquisition. The low possibility is explained by the need for land or building purchase; or the need for building modification in case of facility rental.

Moreover, the audit revealed several critical points worth consideration.

First of all, the resource assessment showed the need for warehouse facilities to deal with incoming components along with the moderate possibility of new warehouse facilities acquisition. The implementation of in-house cutting brings higher material density (due to the flat shape) but is connected to the purchase of new warehouse equipment.

Secondly, the study revealed a sufficient need for skilled production management and planning personnel, as the current state of operations is below the desired level. However, such personnel can be acquired. The same statement is valid for in-house cutting. Moreover, in-house operations require skilled equipment setting personnel. The analysis showed that such a person could be acquired.

The management prowess analysis showed that the level of knowledge is enough to manage current operations and mostly enough to manage in-house cutting. However, there is a lack of market understanding, production and top-management knowledge. Moreover, both Aste and individual top-management members do not have enough knowledge concerning the environment and sustainability issues related to in-house cutting. On the other hand, the study showed no knowledge or understanding that is impossible to acquire.

5.2.2 Efficiency

As previously illustrated in Table 7, the cost-benefit ratio of in-house cutting is the second-highest among all sheet metal processing alternatives and equals 0.26. The analysis showed total savings of EUR XX thousand and total costs of EUR XXX thousand during the first 12 months of alternative implementation. In comparison, the outsourcing alternative brings no additional costs nor savings since it was used as a reference. The payback period was calculated considering the pessimistic scenario: the revenue, costs, and prices always stay the same. In this case, the investment payback period is 47 months.

5.2.3 Risks vs Opportunities

The study revealed that overall, cutting in-house brings more opportunities and fewer risks than outsourcing.

- First of all, in-house cutting possibly brings know-how to Aste. However, the need for such know-how might be argued since it can be considered a need.
- Secondly, in-house cutting might possibly decrease costs. This finding is supported with efficiency analysis outcomes.
- Thirdly, in-house cutting allows optimisation of the inventory, which, in its turn, will free money locked in inventory.

Fourthly, the development of in-house production will enable the partnership with several key market players, such as large retail chains and breweries. Such partnership was not previously available due to the fact that many key market players require producers to have their own sheet metal production. The logic behind such requirements is relatively straightforward: the leaders of the display cooler market continuously extend their presence in the value creation chain, which allows process optimisation that decreases expenditures. Thus, the fact of having in-house production serves as proof of size, efficiency and stability of display cooler producer along with lower prices for its customers.

However, in-house cutting brings the risk of locking money in investments along with the risk of machine idle. As the previous analysis showed, if the management of Aste will not solve the sourcing, warehousing, forecasting and planning issues, the risk will become a fact.

5.2.4 Strategic Importance

The strategic importance of in-house cutting is significantly higher than such of outsourcing. In case Aste overcomes the challenge of starting partnerships with large retail chains and breweries, which was previously discussed, Aste will be able to acquire new customers, penetrate new markets and market niches, improve the image of the customer and deliver higher customer value.

Moreover, possible savings analysed during the efficiency feasibility study will result in higher price flexibility, thus increasing the price attractiveness.

All mentioned events, in their turn, allow the growth of the company.

Additionally, the development of in-house production and the growth of the company will facilitate the development of local society along with bringing additional jobs for locals.

The average strategic importance of in-house cutting with respect to mentioned aspects was assessed as “considerable”.

5.2.5 Summary

The comparison of in-house and outsourced sheet metal cutting alternatives shows that in-house processing brings more significant opportunities than outsourcing. A slight lack of resources and knowledge can be eliminated relatively quick. However, the issues that persist in Aste will decrease or even eliminate all positive effect of the transition to in-house production. Therefore, these issues should be solved as soon as possible.

In-house cutting operations will bring savings as well as image gains to Aste. The savings and image gains will result in higher competitiveness and will enable the penetration of new markets and the increase of current market share. However, the scale of sheet metal processing is not yet enough to bring mentioned effects. Even if current prices and costs are kept at the same level, the investment will not pay off during the next 3,84 years.

5.3 Sheet Metal Bending Alternatives: Analysis

5.3.1 Effectiveness

The resource audit showed that, in general, Aste possesses sufficient resources to maintain bending outsourcing efficiently, except sourcing, warehousing, forecasting, and planning resources discussed previously in this section. Most resources, except office facilities, equipment and tools, are insufficient to start in-house processing. The analysis revealed that the possibility of the acquisition of necessary resources is “moderate” to “high”. Moreover, the study showed that there is a low need for production facilities as the bending equipment required to produce currently used sheet metal components requires little space.

5.3.2 Efficiency

The cost-benefit ratio of in-house bending equals 0.9 being the highest among all sheet metal processing alternatives. The analysis showed the total costs of EUR XX thousand and total benefits of EUR XX thousand within the first twelve months after the implementation of in-house processing. Calculated benefits are higher than the ones of in-house cutting and bending. The highest cost-benefit ratio, however, is explained by the least incurred costs, being EUR XX thousand. First of all, the equipment can be deployed at the current production facilities due to low floor area requirements. However, such deployment will only aggravate the current lack of production facilities at Aste. The payback period calculated considering a pessimistic scenario equals 14 months. Therefore, the in-house bending is considered financially feasible.

5.3.3 Risks vs Opportunities

The analysis of risks against opportunities showed that most risks are outweighed by the opposite opportunity. However, the analysis revealed several possible severe risks associated with in-house bending. First of all, the risk of locking money in the investment. However, such risk is neglected by considerably little budget required. Secondly, the study showed a high risk of production disruptions. This risk was considered a major one, taking into account forecasting and planning issues persisting at Aste. Thirdly, the analysis indicated a possible significant risk of increased scrap and machine idle.

This issue can be solved by the hiring of skilled personnel, improved design for manufacturing, optimised sourcing and selling the excess of capacity. Both resource audit and risks vs opportunities analysis showed that the first two points could be easily solved. However, sourcing was shown to be a significant issue at Aste, as discussed previously in this paper. Therefore, the full potential of the investment could not be realised before existing issues are solved.

On the other hand, the study revealed such opportunities as the gaining of new know-how, freeing money locked in inventory and decreasing costs (proved during cost-benefit analysis). Moreover, the study showed a high-potential opportunity for local support programs. The opportunity should be investigated and used to boost the growth of Aste.

Overall, in-house bending may possibly bring sufficient opportunities that are not available at the current outsourcing state of Aste while having the same or even lower risks.

5.3.4 Strategic Importance

The analysis of strategic importance analysis showed “none” to “small” strategic importance of sheet metal bending outsourcing for all considered factors. The in-house bending alternative showed considerable to high strategic importance.

The respondents believed that there is little correlation between the implementation of in-house bending and maintaining the current state. As it was discussed in section x, the belief is connected to the fact that Aste is not locked in any of the processing alternatives.

The analysis revealed that the most significant strategic importance of in-house bending is linked to such aspects as the growth of the company, penetration of new markets and market niches, increased competitiveness, improved image. The effect of these aspects is discussed previously in this section. Even though the strategic effect relates to similar topics as compared with the strategic importance of in-house cutting, the average assessment is higher (“considerable” to “high” against “considerable”)

5.3.5 Summary

The analysis showed that the in-house bending alternative sounds more feasible than the outsourcing alternative. The company does not possess enough resources and knowledge to implement in-house bending successfully. Thus, there is still an asset gap. However, the gap is the least as compared with other in-house processing alternatives and requires little actions to be eliminated.

In-house bending becomes financially feasible within 1,1 years after the implementation, being the shortest payback period among other in-house alternatives. Moreover, the cost-benefit analysis showed the highest cost-benefit ratio as the implementation of in-house bending requires the least investments.

Even though the implementation of in-house bending may possibly bring more risks than the implementation of in-house cutting, the risks are outweighed by enabled opportunities. Moreover, most of the risks comprise existing challenges of Aste and are not caused by the in-house bending directly.

The strategic importance of in-house bending is significantly higher than the one of outsourcing. Moreover, in-house bending showed overall higher strategic importance than in-house cutting.

5.4 Sheet Metal Painting Alternatives: Analysis

5.4.1 Effectiveness

The resource audit of painting outsourcing revealed issues similar to the ones discussed in subsections 5.2 and 5.3. Therefore, the discussion of existing issues is left out. The audit of in-house painting, however, showed the most significant asset gap, which should be eliminated in order to implement and manage in-house painting successfully. The analysis revealed insufficient knowledge of production, sourcing, logistics, warehousing, HR, and top management, along with the moderate possibility of their acquisition. Moreover, the research revealed a low possibility of acquisition of production support, equipment setting and line personnel, being the lowest among other processing alternatives.

The management prowess analysis revealed the least organisational and individual knowledge of processes related to in-house painting, among other processing alternatives.

The overall effectiveness feasibility of in-house painting is significantly lower than the one of outsourcing. In order to implement and successfully manage in-house painting, significant effort should be made.

5.4.2 Efficiency

The cost-benefit analysis of in-house painting showed a cost-benefit ratio equal to 0.05. This is the lowest value among other processing alternatives. This is caused by EUR XXX thousand investment required. The payback period was not calculated due to the rent costs. The cost-benefit analysis considers the rent of the first year only. This happened for the reason that Aste is not willing to rent floor space for a long period of time and considers that the factory is extended by the year 2025, no matter if any in-house processing alternative is implemented. The rent cost was, therefore, recalculated to consider 36 months of payments, the total costs were adjusted. The cost-benefit ratio was recalculated.

Table 8 represents the adjusted cost-benefit ratios.

Table 8. The adjusted cost-benefit calculation used for the indication of payback period

		Costs				Cost-benefit ratio	Benefits (savings), total
		Equipment cost	Tooling Cost	Area rent	Costs, total		
In-House	Cutting	EUR XX K	EUR XX K	EUR -	EUR XX K	0.26	EUR XX K
	Bending	EUR XX K	EUR XX K	EUR -	EUR XX K	0.9	EUR XX K
	Painting	EUR XX K	EUR XX K	EUR XK	EUR XX K	0.03	EUR XX K
	All together	EUR XX K	EUR XX K	EUR XK	EUR XM	0.13	EUR XXX K

It is worth noting that the adjusted cost-benefit ratio lays out of the scope of this research since the cost-benefit analysis considers 12 months. The ratio is used only for the indication of the payback period. Accordingly, the payback period of in-house painting is 33,3 years, being the longest among the alternatives.

Of course, in the case of company growth and an increased number of components, the payback period will also decrease. However, the analysis considers the cost-benefit ratio

for the first 12 months only. The benefits of in-house painting are the lowest among the other alternatives, being EUR XX thousand. In other words, considering the current state of Aste, in-house painting does not sound financially feasible for at least next few years.

5.4.3 Risks vs opportunities

The analysis showed that both risks and opportunities related to in-house painting are higher than the ones of outsourcing.

First of all, in addition to common risks discussed in subsection 5.1, the study showed possible significant risks associated with in-house painting. Such risks comprise the insufficient labour pool and high-quality employees having no interest in joining Aste. Secondly, the risk of locking money in investments is significantly higher as compared with the similar risks associated with in-house cutting and in-house bending. The efficiency feasibility analysis described in section x explained the reason for such difference.

Overall, the respondents assigned higher significance to the risks associated with in-house painting as compared with in-house cutting and in-house bending.

The research showed that in-house bending, however, is associated with significant opportunities. Such opportunities comprise the attraction of new customers, decreased production costs, high-quality employees motivated to join Aste, decreased costs, decreased component defect rate and decreased final product defect rate.

The reasons for the attraction of new customers and decreased production costs are similar to the ones for in-house cutting and in-house bending described in subsection 5.2.

The reasons for high-quality employees motivated to join Aste is directly associated with the implementation of in-house painting. Thus, in addition to new job positions attracting high-quality employees, the implementation of in-house painting improves the image of Aste, providing high-quality employees with the impression of a solid and perspective company.

The reasons for decreased costs were discussed in sub-subsection 5.2.3, which describes the efficiency analysis.

A possible significant opportunity of decreased defect rate is, however, unique for in-house painting. The defect rates are highly dependent on scrapped painted parts. The parts are scrapped when the coating is damaged. Own painting equipment allows re-painting of damaged parts, thus decreasing the defect rate. On the other hand, the re-painting will result in additional costs. However, as compared with the current state, when the parts are entirely scrapped and new ones are ordered, the repainting cost is less than the component purchasing cost.

To sum up, the opportunities for in-house painting are high but cannot be enabled at the current state of Aste. In contrast, the risks are not restricted and may affect Aste as soon as the processing alternative is implemented.

5.4.4 Strategic importance

The strategic importance of painting outsourcing was assessed by the respondents as “none” to “small” for all the factors. The strategic importance of in-house painting, however, was assessed as “considerable” for most of the factors.

The study revealed that the least strategic effect of the in-house painting is associated with maintaining the current state, meaning the flexibility of Aste to pick any of the processing alternatives.

The study showed that in-house painting is essential when it comes to growth, competitiveness, customer attraction, new market and market niche penetration. The reasons for such importance are similar to the ones of other in-house processing alternatives and were previously described previously in this section.

5.4.5 Summary

The analysis of painting alternatives showed no feasibility of in-house painting at the current state of Aste. Even though the implementation of in-house painting is associated with significant opportunities and strategic importance, the potential of in-house painting cannot be enabled at the moment. Significantly higher production volumes, resources and knowledge is required.

5.5 Sheet Metal Alternatives All Together: Analysis

5.5.1 Effectiveness

The resource and management prowess analyses showed the lack of resources and know-how required to implement in-house cutting, bending and painting at the same time. The resources and know-how are, however, sufficient to maintain the current state to the extent described in subsection 5.1. The analyses revealed that the lack of resources and know-how required to implement and manage each in-house alternative successfully is aggravated due to the fact that the alternatives are implemented simultaneously.

5.5.2 Efficiency

The cost-benefit analysis of the implementation of all in-house processing alternatives simultaneously showed the cost-benefit ratio equal to 0.13. The adjustments that concern the total cost of the rent were made as described previously in this section. The cost-benefit ratio, however, remained equal to 0.13 after the adjustments. This ratio was expressed as 7,7 years payback period. The cost-benefit ratio is higher than the one of in-house painting, yet it is lower than the ratio of in-house bending and in-house cutting.

5.5.3 Risks vs Opportunities

The analysis showed that simultaneous implementation of in-house processing alternatives results in the highest opportunities. However, such implementation is also associated with the highest risks. The most significant risk concerns the money locked in investments.

5.5.4 Strategic Importance

The analysis revealed the low strategic importance of sticking to the outsourcing of sheet metal processing. The analysis showed, however, that the successful simultaneous implementation of in-house cutting, bending and painting is associated with the highest strategic importance among all processing alternatives.

5.5.5 Summary

The feasibility study of simultaneous implementation of all in-house processing alternatives showed significant opportunities and strategic importance. The positive effect is, however, outweighed by the associated risks, low effectiveness and efficiency feasibility. Moreover, the positive effects cannot be enabled at the current state of Aste. Therefore, all together in-house processing alternative does not sound feasible and should be considered after the significant growth of Aste.

5.6 Feasibility Study Summary

The study revealed that the in-house bending is the most operatively and financially sound sheet metal processing alternative considering the current state of Aste. The resources and knowledge required for the implementation can be acquired, the investment pays off within a 1,1-year period. The implementation has significant strategic importance, brings sufficient opportunities and is associated with risks that can be managed.

The study showed that the next sheet metal processing alternative to be considered is in-house cutting. However, it does not sound feasible at the moment.

Therefore, the prerequisites for the recommendations were developed based on the feasibility study of Aste as a whole and the feasibility study of the in-house sheet metal bending alternative.

Figure 22 shows the critical points found during the analysis.

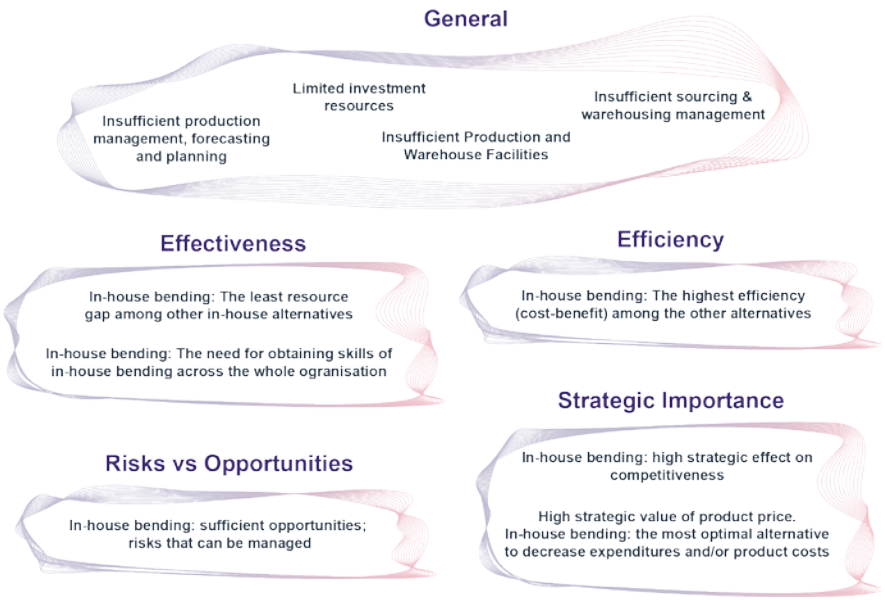


Figure 22.Prerequisites for the Initial Recommendations

As illustrated in Figure 22, such critical points as limited investment resources, insufficient production and warehouse resources, insufficient production, sourcing and warehouse management, production forecasting and planning were considered the general prerequisites worth considering in recommendations. Moreover, the findings of the feasibility study of in-house bending served as a ground for the initial recommendations.

In Figure 22, the findings are placed according to the areas of this feasibility study. Thus, the effectiveness feasibility analysis showed the least resource gap among other in-house alternatives and the need for obtaining skills related to sheet metal bending processes across the whole organisation. The efficiency feasibility analysis revealed the highest efficiency of in-house bending among the other alternatives. The risks vs opportunities feasibility analysis showed sufficient opportunities and manageable risks. The strategic importance feasibility analysis confirmed the high strategic effect of in-house bending on the competitiveness of Aste; and the positive effect of in-house bending on the product costs and prices.

5.7 Creation of the Initial Recommendations

The results of the feasibility analysis described in subsection 5.6 were transformed to recommendations, thus forming initial recommendations on a financially and operatively sound scope of sheet metal processing.

The recommendations were combined into two groups: general recommendations developed from the general analysis of Aste's operations and sheet metal processing scope recommendations derived from the detailed analysis of each processing alternative. Figure 23 illustrates initial general recommendations.

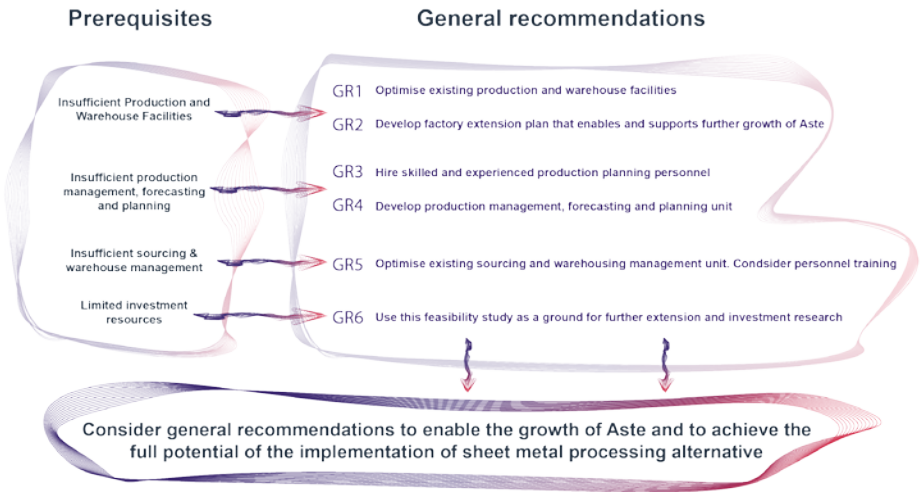


Figure 23. The Initial General Recommendations

As shown in Figure 23, general recommendations developed by the analysis of the critical points of Aste's operations discussed in subsection 5.1. It is highly advised to consider these recommendations to enable the growth of Aste. Moreover, specifics of Aste's current state can decrease the effect of the implementation of sheet metal processing alternative that sounds feasible.

The first two recommendations in Figure 23 are developed to solve existing issues related to insufficient production and warehouse facilities. The production and warehouse should be optimised, then prepared for scaling. Otherwise, Aste could not achieve any development.

The third and fourth recommendations consider existing challenges of poor production management, forecasting and planning. The development of a new functional unit that comprises production management, forecasting and planning is highly recommended.

The fifth recommendation considers insufficient sourcing and warehousing management. The existing function is not efficient and should be optimised with the help of personnel training.

The last recommendation is related to existing investment limitations. Therefore, the management of Aste should ensure that available investments will show a positive effect within a short period of time.

As it can be seen, general recommendations consider the processes related to the creation of a final product. At the moment, Aste reached the limitations of a small business, further growth is not possible without expansion, and the expansion is ineffective if current processes are not optimised.

In Figure 24, the initial recommendations on a financially and operatively sound scope of sheet metal processing are summarised.

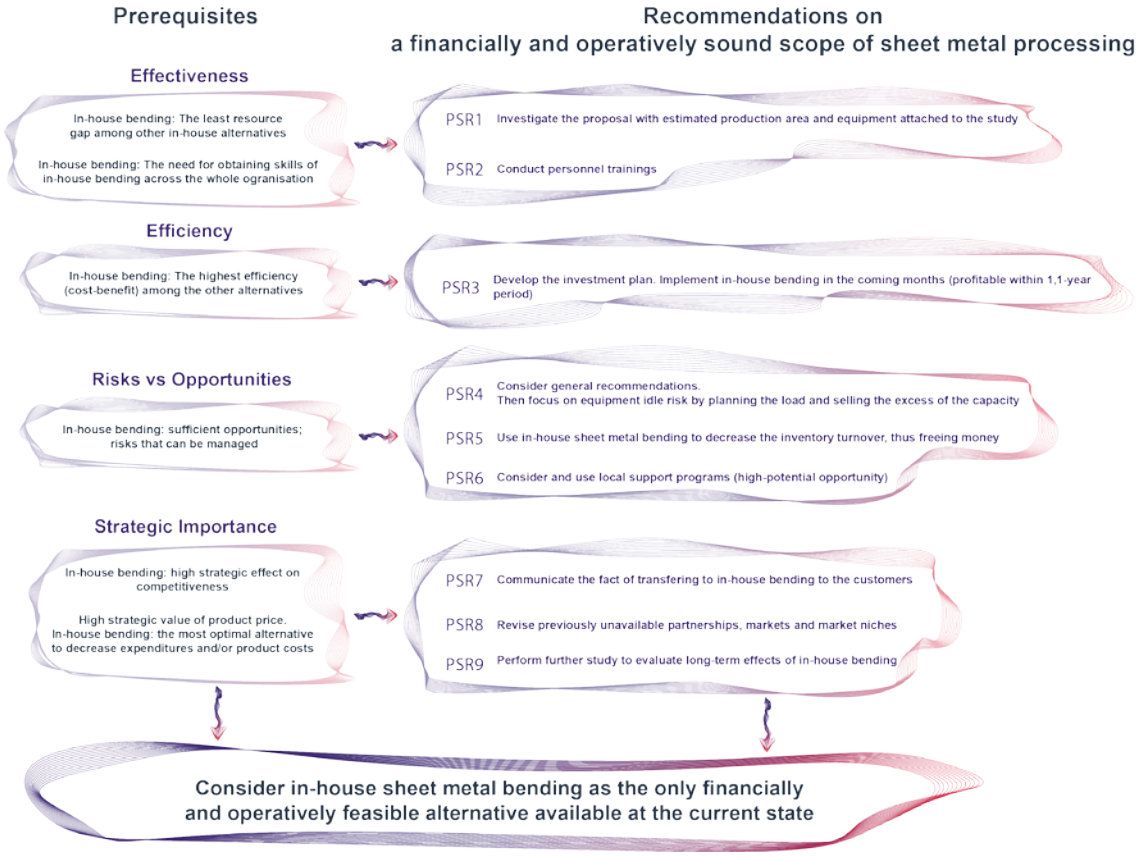


Figure 24. The Initial Recommendations on a Financially and Operatively Sound Scope of Sheet Metal Processing

Figure 24 also shows the connection between the recommendations and the conceptual framework used for the feasibility study.

The recommendations reveal the prerequisites that resulted in in-house sheet metal bending being the only financially and operatively feasible processing alternative available at the current state.

The reasons are grouped according to the key analysis areas: effectiveness, efficiency, risks vs opportunities and strategic importance.

The first recommendation is related to the findings of the resource audit that showed the least resource gap. The gap should be eliminated in order to implement and manage in-house bending effectively. The equipment and area requirements provided in Appendix 6 should be investigated. Thus, the stakeholders of this study will gain an understanding of the existing resource gap.

The second recommendation is connected to the management prowess analysis that revealed the lack of knowledge and skills required to implement and manage in-house bending effectively. The study recommends the conduction of personnel training to solve this challenge.

The third recommendation is related to the cost-benefit analysis that showed the highest cost-benefit ratio of in-house bending among the other processing alternatives. Since this research serves as a pre-study for the development project to be conducted by Aste, it is recommended to develop a sufficient investment plan. Taking into account that the required investments are low and have a pretty short payback period, it is recommended to implement in-house bending as soon as possible.

The fourth, fifth and sixth recommendations are related to the risks vs opportunities analysis that showed sufficient opportunities opposing the risks that are manageable. Since the full potential of in-house bending could not be achieved at the current state, previously described general recommendations should be considered to solve existing challenges. In-house bending is connected to the equipment idle risk. Thus the fourth recommendation advises to focus on that risk and manage it by sufficient planning and possible in-sourcing. The fifth recommendation suggests that the inventory turnover can be decreased with the implementation of in-house bending, thus freeing money locked in inventory. The sixth recommendation advises to approach and use local support programs enabled by the implementation of in-house bending.

The last three recommendations are based on the strategic importance analysis. As it was previously described in this section, the fact of having in-house sheet metal processing dramatically changes the image of the company, enabling previously unavailable

partnerships and allowing the entrance to new markets and market niches. Another finding of strategic importance is that in-house bending is the most optimal alternative to decrease expenditures and total product costs. Decreased expenditures allow higher product price flexibility. As the research showed, the product price has high strategic value increasing the overall attractiveness of partnerships with Aste. Therefore, the seventh recommendation advises communicating the fact of transferring to in-house bending to the customers. Moreover, previously unavailable partnerships, markets and market niches should be revised, as the eighth recommendation suggests. Since this feasibility investigation serves as a pre-study for an internal project, further evaluation of long-term strategic effects related to the implementation of in-house bending is required for sufficient strategic planning. The ninth recommendation advises conducting such evaluation.

Finally, Figure 24 illustrates the recommendation that serves as the primary outcome of the study. The in-house sheet metal bending should be considered as the only financially and operatively feasible alternative available at the current state of Aste.

In Section 5, each sheet metal processing alternative is analysed. The analysis covers critical points related to Aste as a whole and related to each individual sheet metal processing alternatives. Section 5 describes how the findings from the feasibility assessment are used to create the initial recommendations for a financially and operatively sound scope of sheet metal processing. Section 5 ends with a summary of the initial recommendations. The following Section 6 describes the process of the validation of the initial recommendations. It reflects on the feedback received during the validation process and shows how this feedback was used to develop the final recommendations on a financially and operatively sound scope of sheet metal processing. Section 6 demonstrates the final recommendations and ends with a summary of the validation process.

6 Recommending a Financially and Operatively Sound Scope of Processing. Validating the Recommendations

Section 5 describes the process of validation of the initial recommendations developed in Section 5. This section provides an overview of the feedback round, then describes the feedback received from the stakeholders and shows how the recommendations were corrected according to the received feedback. Finally, it provides the summary of the final recommendations, being the outcome of this study.

6.1 Overview of The Feedback Round

The validation of the initial recommendations that were described in Section 5 was performed during the feedback round. During the feedback round held at Aste, initial recommendations were presented to the stakeholders of this study, being the top management of Aste. Moreover, the findings of this feasibility study were explained, and the description of the feasibility analysis process was presented to the stakeholders. The purpose of the feedback round was to evaluate the recommendations, meaning both general recommendations and sheet metal processing scope recommendations. Therefore, the stakeholders were assessing the meaningfulness and validity of recommendations with respect to feasibility analysis.

The first part of the feedback round considered the presentation of the recommendations and the explanation of prerequisites for such recommendations. After the understanding of the methodology, analysis-prerequisite-recommendation connection and the recommendations was confirmed, the stakeholders were asked to provide their feedback in a written format, generating the first portion of Data 3 for this study. The development of written feedback formed the second part of the feedback. Then, the stakeholders were asked to discuss their feedback in a group format. The feedback received during group discussions formed the second portion of Data 3 for this study. The initial recommendations were then adjusted based on Data 3.

6.2 Summary of the Final Recommendations

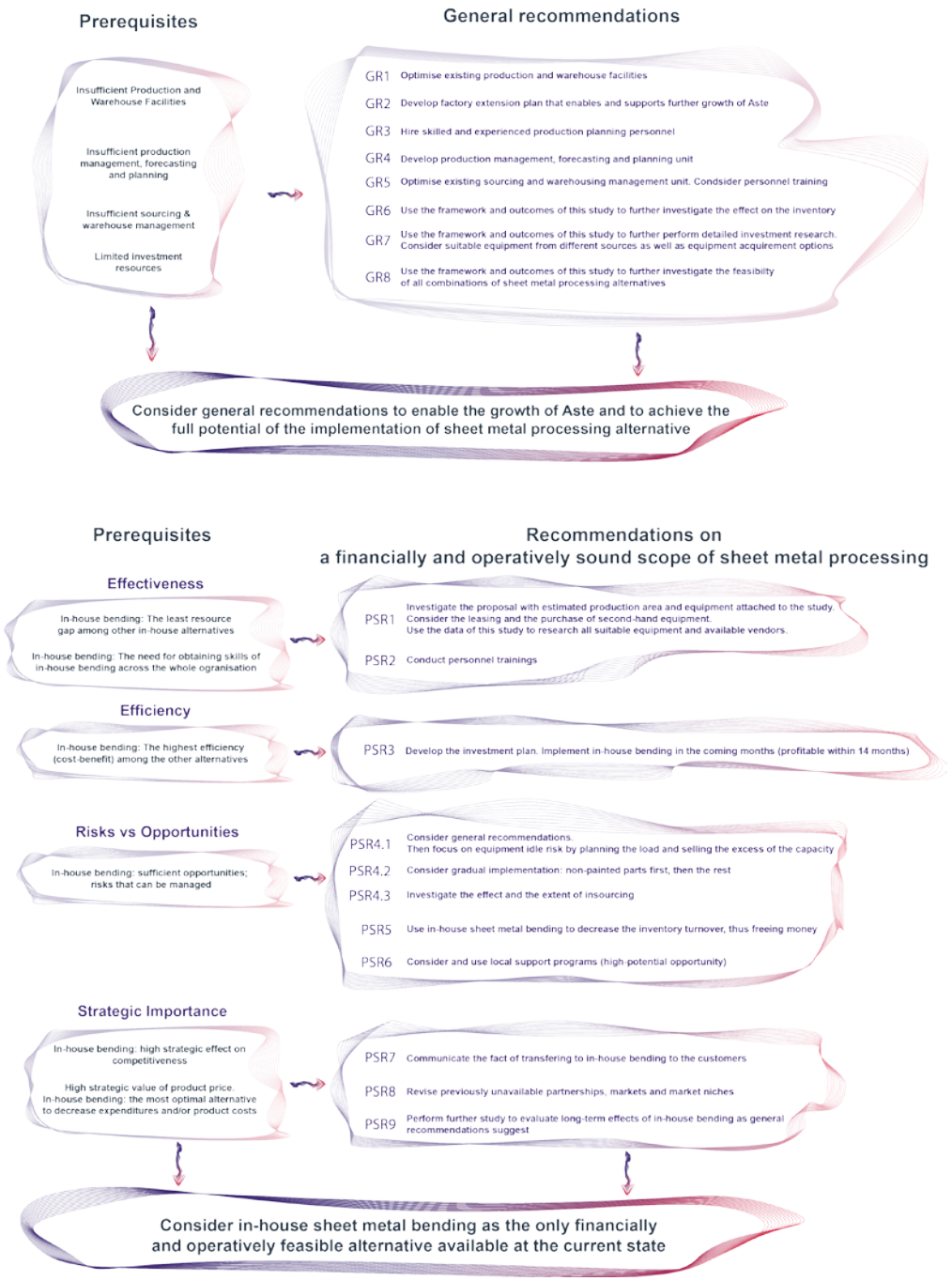


Figure 25. The Final Recommendations

The final recommendations are illustrated in Figure 25. The recommendations are divided into general recommendations and recommendations on a financially and operatively sound scope of sheet metal processing, corresponding to the way initial recommendations were created and presented.

As shown in Figure 25, such recommendation as GR6, PSR3 and PSR9 were adjusted, such recommendations as GR7, GR8, PSR4.2 and PSR4.3 were added. The initial recommendations can be found in Section 5, while the description of changes made to the initial recommendations is provided further in this section.

6.3 Summary of the Feedback

The feedback round showed highly positive stakeholder feedback. Since the stakeholders were respondents of all surveys used for this feasibility study, there was no need for a detailed explanation of how effectiveness, risks vs opportunity and strategic importance recommendations were developed. However, some of the findings of the feasibility study were considered unexpected but confirmed as valid and well-grounded:

> This is interesting! We all had a feeling that the paint shop is the best option. This turns things upside down (Respondent 1).

> If the use of bending can give access to tenders so easily, let's do it. But we need to plan it carefully (Respondent 2).

Most of the feedback received from the stakeholders considered a further development of this feasibility study:

> But how exactly does it affect the inventory? How about the savings? How will we store the material? (Respondent 2)

> We need to think about forklifts and pallets. But if we can buy flat sheet metal, everything will become so much easier. (Respondent 3)

> At which point are we able to buy the paint shop? We need to investigate this. Are we able to buy it within three years? (Respondent 1)

> All combinations of processes should be investigated. It seems we can save more there. (Respondent 4)

> You recommend investigating selling capacities. We need to see where to sell it and how much capacity is available in, let's say, two years. (Respondent 4)

> Can we lease the machines? Let's also ask from different suppliers. (Respondent 2)

> It might be easier to bend only non-painted parts. At least in the beginning. We can introduce bending of parts to be painted later. (Respondent 3)

Such feedback is explained by the fact that this study serves as a pre-study for a broader and more detailed research project planned to be conducted at Aste. Since the scope of this pre-study was confirmed by the stakeholders, the feedback is considered to be out of the scope of this study. Therefore, the recommendations were adjusted to consider further development of this study.

6.4 Creation of the Final Recommendations

The feedback round showed the need for re-evaluation of proposal efficiency.

> It would be great to see what happens after this 1,1-year period. We may consider three years and, for example, thirty per cent revenue growth. (Respondent 2)

Therefore, the efficiency analysis was performed. The analysis considers the 3-year period and 30% growth of the revenue, as proposed during the feedback round.

Firstly, the sheet metal costs were calculated by extrapolation of Data 2 in correspondence with 30% revenue growth. The growth, of course, corresponds to the sales growth related to the number of products being sold, which in its turn, incurs the increase of variable expenditures. The sheet metal cost is one of such variable expenditures. Table 9 illustrates the total sheet metal cost for the 3-year period.

Table 9. The cost structure of sheet metal components per the processing type within a 3-year period

Process	Total Cost Y1		Y2		Y3	
Cutting only	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX
Cutting + painting	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX
Bending	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX
Bending + painting	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX
Total cost	**EUR**	XXX.XXX	**EUR**	XXX.XXX	**EUR**	XXX.XXX

Then, the total benefits, illustrated in Table 10. were calculated using the same principles as the ones discussed in Section 4.

Table 10. Total savings per in-house processing alternative within a 3-year time period

		Total Benefits (Savings)						Total	
		Y1		Y2		Y3			
In-House	Cutting	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX
	Bending	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX
	Painting	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX
	All together	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX	EUR	XXX.XXX

Then, the cost-benefit ratio was calculated using total costs and benefits associated with individual in-house processing alternatives.

Table 11 shows the cost-benefit ratios of processing alternatives as well as the data used to derive these ratios.

Table 11. The cost-benefit calculation for in-house sheet metal processing alternatives

		Investment			Rent			Costs ,total	Cost/benefit ratio	Benefits (savings),total	Savings		
		Y1	Y2	Y3	Y1	Y2	Y3				Y1	Y2	Y3
In-House	Cutting	EUR XX K	EUR 0K	EUR 0K	EUR 0K	EUR 0K	EUR 0 K	EUR XX K	1.05	EUR XX K	EUR XXK	EURXXK	EURXXK
	Bending	EURXX K	EUR 0K	EUR X K	EUR 0K	EUR 0K	EUR X K	EUR XX K	1.79	EUR XX K	EUR XXK	EURXXK	EURXXK
	Painting	EUR XX K	EUR 0K	EUR 0K	EURX K	EURX K	EUR X K	EUR XX K	0.14	EUR XX K	EUR XXK	EURXXK	EURXXK
	All together	EUR XX K	EUR 0K	EUR X K	EUR X K	EUR X K	EUR X K	EURXXX K	0.52	EUR XX K	EUR XXK	EUR XXK	EUR XXK

As it can be seen from Table 11, the ratios changed as compared to Table 7 provided in Section 4. First of all, new investment rounds and area requirements were considered due to the equipment capacity limitations discussed in Section 4.

Secondly, the savings correspond to increased product sales in the same way as described in Section 5. The ratios, however, follow the same logic: in-house bending is the most feasible alternative, in-house cutting is the second most feasible alternative, in-house painting is the least feasible alternative.

Furthermore, a detailed payback period analysis was performed. Figure 26 illustrates the payback period calculations for in-house bending.

In-house Bending. Payback period is 14 months

	Y1-1	Y1-2	Y1-3	Y1-4	Y1-5	Y1-6	Y1-7	Y1-8	Y1-9	Y1-10	Y1-11	Y1-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR 10 M
Investment, tot	EUR XX K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR XX K
Rent	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR XX K
Project profit	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K

	Y2-1	Y2-2	Y2-3	Y2-4	Y2-5	Y2-6	Y2-7	Y2-8	Y2-9	Y2-10	Y2-11	Y2-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR 13 M
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K
Rent	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR XX K
Project profit	EUR -X K	EUR X K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K

	Y3-1	Y3-2	Y3-3	Y3-4	Y3-5	Y3-6	Y3-7	Y3-8	Y3-9	Y3-10	Y3-11	Y3-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR 17 M
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K
Rent	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR XX K
Project profit	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K

Figure 26. Detailed Payback Period Analysis for In-House Bending

As it can be seen from Figure 26, in-house bending pays off in 14 months after the implementation taking into consideration that the first year's revenue of EUR 10 M gradually increases during the second and the third year and reaches EUR 16.9 M.

The same calculations were performed for other in-house processing alternatives and are presented in Appendix 11. In-house cutting has the payback period of 33 months, the payback period of in-house painting and all together in-house is, however, significantly larger than 36 months.

As a result of the adjusted efficiency study, the processing scope recommendation three was adjusted, stating recalculated payback period of 14 months.

Other recommendations were considered valid, feasible and potential to implement from the business perspective.

6.5 Changes Made to the Initial Recommendations

The initial recommendations were adjusted according to the feedback received from the stakeholders during the feedback session.

The adjustment of general recommendations comprised one change, which is shown in Figure 27

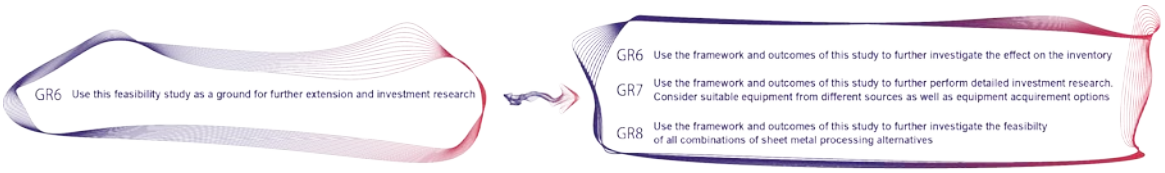


Figure 27. Changes to the Initial General Recommendations

The sixth recommendation was divided into three parts, as Figure 27 illustrates. The first part, general recommendation 6, advises using the framework and outcomes of this study to investigate the effect of each processing alternative on the inventory. The second part, general recommendation 7, suggests using the framework and outcomes of

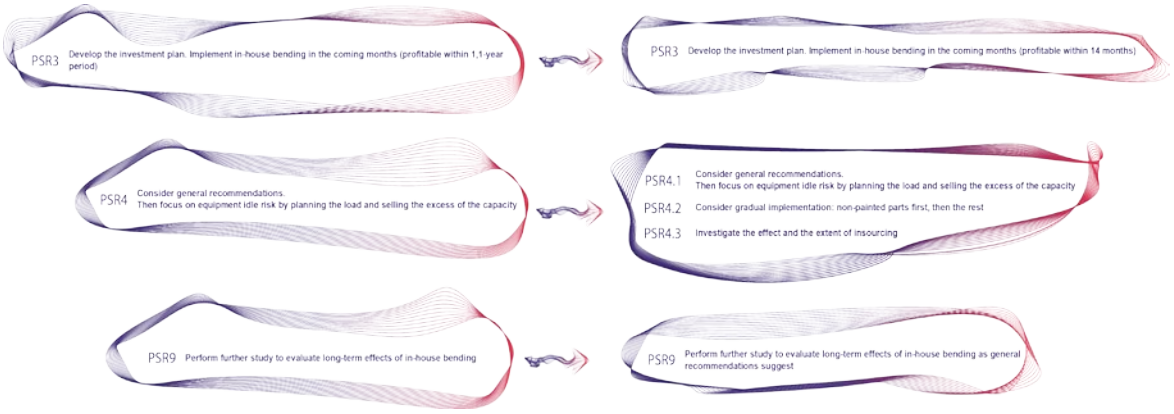


Figure 28. Changes to The Initial Recommendations on a Financially and Operatively Sound Scope of Sheet Metal Processing

this study to perform detailed investment research. Multiple equipment options, as well as various types of its acquirement, should be considered. Finally, the third part, general recommendation 8, advises investigating all possible combinations of sheet metal processing alternatives using the framework and outcomes of this study.

The adjustment of recommendations of a financially and operatively sound scope of sheet metal processing comprised three changes, as indicated in Figure 28.

Firstly, the third recommendation was adjusted to state the payback period of in-house bending explained previously in this section. Thus, the recommendation now states a 14-months payback period, as can be seen from Figure 28.

Secondly, the fourth recommendation was updated to suggest consideration of gradual implementation and investigation of insourcing. For the sake of simplicity, the recommendation was split into three parts. The numbering was adjusted to keep one of the other recommendations. Thus, recommendation 4.1, 4.2 and 4.3 were introduced.

The final recommendation 4.1 corresponds to the fourth initial recommendation. Recommendation 4.2 suggests considering gradual implementation of in-house bending, meaning that at first, only non-painted parts are processed to keep the ease of material handling. Then at some point, all sheet metal parts should be processed by Aste. Further study is required to investigate and plan such activities. Finally, recommendation 4.3 advises investigating the effect and the extent of insourcing. As it was revealed in the study, the total capacity of the equipment is not used before the scale of processing reaches the one corresponding to the turnover of EUR 15 M. Therefore, in order to calculate the efficiency of the equipment, the insourcing option should be considered. It is worth noting that the efficient use of equipment is not available before challenges stated in Section 5 are resolved, as general recommendations suggest.

Finally, the ninth recommendation was adjusted in order to link processing scope recommendations to updated general recommendations.

To sum up, the validation of the initial recommendations resulted in higher validity of the recommendations. Most of the recommendations were considered feasible and grounded. The other recommendations were adjusted according to the received feedback. No challenges were met during the validation process, as the stakeholders collaborated on the research process during the previous stage, which allowed sufficient understanding of the analysis and recommendation creation processes.

The following Section 7 concludes this study. It summarises the work, reflects on the research conduction and the outcome of the research and presents the self-evaluation of the study.

7 Conclusions

This final section of the study provides an executive summary, reflects on the recommendations for the further development discussed in Section 6, describes the self-evaluation of this study and its results and ends with the closing words.

7.1 Executive Summary

The objective of this study was to recommend a financially and operatively sound scope of sheet metal processing to Aste Finland Oy, the manufacturer of display coolers. The company is planning an upstream in-house investment into sheet metal processing to reduce production costs. However, the scope is not clear. The company needs insight for decision making. This research served as a pre-study for the internal project of Aste. The outcome of this study is the recommendations that allow the top management of Aste to make well-grounded investments. Additionally, this study provides general recommendations on how to overcome several existing challenges of Aste.

This study follows the interpretive philosophy of the research using the abductive approach. This study assessed the operative feasibility of the processing alternatives with the help of qualitative tools. The financial feasibility, on the contrary, was assessed with the help of quantitative tools. This study was executed in four stages. The first stage was a literature review that resulted in the development of the conceptual framework for the feasibility demonstration. The second stage was the collection of ground data necessary for the feasibility demonstration. The third stage was the feasibility analysis of the ground data that resulted in the initial recommendations on a financially and operatively sound scope of sheet metal processing. Moreover, the analysis allowed the development of general recommendations that consider the existing challenges of Aste. The last stage was the validation of the initial recommendations. During this stage, the feedback received from the key stakeholders was used for the generation of the outcome of this study, the final recommendations on a financially and operatively sound scope of sheet metal processing.

The conceptual framework comprised four key feasibility areas of sheet metal processing: effectiveness, efficiency, risks vs opportunities and strategic importance. The ground data necessary for the feasibility demonstration was retrieved from various

sources, such as self-assessment surveys, quality system documents, equipment quotations. The self-assessment involved the key stakeholders of this study. The ground data was analysed, interpreted, thus forming the findings of the feasibility study. The findings formed four groups in line with the key areas of the conceptual framework and were used as prerequisites for the initial recommendations.

The initial recommendations were created with the help of the conceptual framework of this study. The recommendations were split into two groups, being general recommendations and processing scope recommendations. General recommendations considered the challenges existing at Aste revealed during the feasibility analysis. A total of six initial general recommendations were developed. The first five recommendations consider the optimisation of ineffective processes and the acquirement of insufficient resources. The recommendations suggest optimising currently insufficient sourcing, warehouse and production management, production forecasting and production planning. The recommendations furthermore advise optimising currently insufficient production and warehouse facilities and suggest developing a factory extension plan. The study highly recommends considering general recommendations to enable the growth of Aste and to implement processing alternative provided in the processing scope recommendations successfully.

The initial processing scope recommendations reveal that in-house bending is the only financially and operatively sound alternative at the current state of Aste. A total of nine initial processing scope recommendations were created, covering the four areas of the feasibility study. The study revealed the high strategic effect of in-house bending on the competitiveness of Aste, which enables previously unavailable partnerships, markets and market niches. Therefore, the recommendations advise communicating the fact of transferring to in-house production to the customers and revising partnerships, markets, and market niches. Moreover, the study indicated the need for further research of in-house bending, such as the development of investment plan, evaluation of the long-term effects, evaluation of required equipment and floor area, and the use of local support programs and in-sourcing option investigation.

The initial recommendations were validated by the stakeholders of this study during the feedback round. Firstly, the feedback round participants were provided with the initial recommendations and the overview of the feasibility analysis. The stakeholders were asked to assess the meaningfulness and validity of recommendations in a written format. Then, the recommendations were discussed in the group.

Thus, the group feedback was received. In general, the feedback was highly positive. The findings that resulted in recommending an in-house bending alternative were considered valid and grounded. Most of the feedback received considered a further development of the research, thus being out of the scope of this study. The prerequisites and recommendations were considered valid and meaningful. However, the scope of efficiency analysis was adjusted to consider a broader time period. The recommendations were adjusted, four new recommendations were added by splitting existing recommendations and specifying each of them.

The final recommendations provide insight for decision making concerning the financially and operatively sound scope of sheet metal processing, thus solving the business challenge that induced this study. The recommendations provide an overview of key factors which should be considered if the processing alternative is implemented; these recommendations furthermore suggest how the full potential of the investment may be achieved. Moreover, the final general recommendations point to existing challenges that may prevent Aste from development; and suggest corrective actions. The implementation of the recommendations will allow process optimisation, the elimination of several critical risks, cost savings, increased customer satisfaction, increased competitiveness and improved image of Aste, thus enabling further growth and increased profitability.

7.2 Next Steps and Recommendations Toward Implementation

The outcomes of this study contain the recommendations toward implementation and the reflection on the further development of the research. First of all, it is worth noting that the general recommendations should be considered prior to the implementation of in-house bending. The existing challenges may prevent the investments from showing any positive effect. For example, the implementation of in-house bending may possibly disrupt production planning and forecasting, which is already insufficient, as the study revealed.

It is recommended to broaden the scope of the study by investigating all possible sheet metal processing combinations. It is advised to research partial insourcing and outsourcing alternatives. Moreover, more detailed analysis, considering qualitative and quantitative effects of the implementation of in-house processing, should be conducted.

The long-term recommendations consider three main points.

- First of all, the in-house cutting alternative should be reassessed in one year after this research is published if the outcomes of this study will be considered, thus allowing the growth of Aste. The in-house cutting alternative would soon become feasible.
- Secondly, the use of the methodology developed during this study for the assessment of other processing alternatives, for example, insulation foaming or plastic moulding.
- Thirdly, it is recommended to conduct periodic assessment studies. Such studies would help to notice existing challenges and opportunities, thus helping the decision making.

7.3 Self-evaluation of the Study

Various criteria for research evaluation exist. First of all, the objective should be met.

However, for the study to be sufficient and meet the goals, meeting the objective is not enough. The research should be relevant, valid, reliable, comprehensive, logical and consistent (Shenton, 2004; Taylor, 2013; Mizzaro, 1997).

This study was performed to solve the existing business challenge of Aste, and the top managers are the key stakeholders of this study. Therefore, the study is failed if the key stakeholders consider the study irrelevant, invalid, unreliable, noncomprehensive, illogical or inconsistent.

The initial business challenge for this study was the need of the top management of Aste for insight for decision making concerning the financially and operatively sound scope of sheet metal processing. The study was designed to provide the needed insight to the top management of Aste by recommending such a scope. The study was then performed according to the developed design. The recommendations were created, validated and adjusted. Therefore, the objective of this study was met. The study was overall approved by the stakeholders.

The relevance can be described as a relation between two entities or the relevance of the information received to the information need (Mizzaro, 1997, p. 811). The relevance of this study is evaluated by the connection of the information provided by the research to the information need.

The relevance of this study is ensured by several facts. The research design was developed to solve an existing business challenge. The scope of the research was defined by the stakeholders, then confirmed and fixed. The research involved the key stakeholders: the qualitative data was provided by the stakeholders, the quantitative data and related calculations were validated by the key stakeholders, the recommendations were adjusted with the help of the key stakeholders. The study showed that the stakeholders were highly motivated to participate in this study. Moreover, the analysis and recommendations (the information provided) were validated and approved by the key stakeholders. The stakeholders plan to use the outcomes of the research for the decision making, which ensures the relevance of this study.

On the other hand, the feedback round showed a need for the adjustment of efficiency calculations. Thus, showing that the study did not oversee the exact need for the information.

The validity of the research means that the research process and its outcomes are sound, justified, logical, consistent and evidence-based (Taylor, 2013). The validity of this research may be argued. However, the use of primarily qualitative methods and the abductive approach was justified by the specifics of the research. This research serves as a pre-study providing the key stakeholders with insight. The outcomes of this study were not required to be deducted from highly valid and non-biased sources, meaningfully deductive approach. This does not mean that the validity of the research was not considered. The goal of the study is to quickly yet thoroughly and consistently assess the current state of Aste and develop grounded evidence-based recommendations. Therefore, the optimal approach was proposed to the stakeholders at the early stages of this study. The approach was confirmed.

This study, however, uses several data sources and mixed methods to cross-check the findings, investigate trends, patterns and thus develop recommendations. Section 5 described how the analysis of different areas of the feasibility led to similar results.

The feedback round showed that the stakeholders desire to broaden the scope of the research, using this feasibility study as a basis. Therefore, this study, the research approach and the findings consider valid for the purpose of this study and within the extent of this study.

The initial scope is defined by the key stakeholders of this study since the study is performed at their request. As seen from the feedback round description, the stakeholders were highly interested in the broader scope of this study. However, the time to execute the study was limited, and the author of this research maintained the scope of this study.

The reliability of this study considers whether the same results could be obtained if the study is executed once again. (Shenton, 2004, pp. 71-72). The self-assessment is dependent on the bias and, therefore, may provide varying results depending on the number and specifics of respondents. However, this study can be considered reliable, taking into account its purpose.

The cost-benefit analysis, in its turn, is highly reliable. First of all, this is a quantitative analysis. Secondly, the model developed for the calculation of costs and benefits with respect to the turnover enables using it for the future feasibility studies planned at Aste. The model, of course, requires data that should be populated there. Therefore, the data collection should be executed in accordance with the specifics of future feasibility studies.

The data generated during the research was collected and stored, the processes, calculations and findings were explained and documented, forming field notes and ground data. Thus this study can be repeated step by step. The study can be used as a basis for the future projects of Aste but would require significant adjustments.

To sum up, this study meets the criteria and purposes it was designed to meet. However, it has room for improvement.

7.4 Closing Words

The ultimate goal of business is to make money, and the management should lead the business towards this goal. Someone, however, should find the way that leads towards the goal. The study initiated by the top management of Aste produced the recommendations showing the direction and the optimal steps to achieve the goal. This study was a success as it provided the researcher and the stakeholders of this study with valuable ideas and a convenient feasibility demonstration tool that will be used in future projects of Aste.

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Overview of Internal Documents and Field Notes Used in this Study

	Informant	Affiliation	Number of pages/other content	Type	Subject	Documented as
1	Key Stakeholder 1	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 1. Resource Audit Survey	Field Notes
	Key Stakeholder 2	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 1. Resource Audit Survey	Field Notes
	Key Stakeholder 3	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 1. Resource Audit Survey	Field Notes
	Key Stakeholder 4	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 1. Resource Audit Survey	Field Notes
2	Key Stakeholder 1	Aste Finland Oy	1 Sheet	Excel file	Resource Audit Survey Results	Ground Data
	Key Stakeholder 2	Aste Finland Oy	1 Sheet	Excel file	Resource Audit Survey Results	Ground Data
	Key Stakeholder 3	Aste Finland Oy	1 Sheet	Excel file	Resource Audit Survey Results	Ground Data
	Key Stakeholder 4	Aste Finland Oy	1 Sheet	Excel file	Resource Audit Survey Results	Ground Data
3	Key Stakeholder 1	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 2. Management Prowess Survey	Field Notes
	Key Stakeholder 2	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 2. Management Prowess Survey	Field Notes
	Key Stakeholder 3	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 2. Management Prowess Survey	Field Notes
	Key Stakeholder 4	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 2. Management Prowess Survey	Field Notes
4	Key Stakeholder 1	Aste Finland Oy	1 Sheet	Excel file	Management Prowess Survey Results	Ground Data
	Key Stakeholder 2	Aste Finland Oy	1 Sheet	Excel file	Management Prowess Survey Results	Ground Data
	Key Stakeholder 3	Aste Finland Oy	1 Sheet	Excel file	Management Prowess Survey Results	Ground Data
	Key Stakeholder 4	Aste Finland Oy	1 Sheet	Excel file	Management Prowess Survey Results	Ground Data
5	Dynamics NAV, ERP	Aste Finland Oy	1 Sheet		Sales Report: 2018-2021.xlsx	Ground Data
	Dynamics NAV, ERP	Aste Finland Oy	1 Sheet		The Component Structure: All products.xlsx	Ground Data
	Dynamics NAV, ERP	Aste Finland Oy	1 Sheet		Sheet Metal Components 2018-2021.xlsx	Ground Data
6	Representative 1	Sheet Metal Supplier	1 Sheet		Cost Distribution per component.xlsx	Ground Data
	Representative 3	Equipment Distributor	34 Pages		Equipment Quotations Combined.pdf	Ground Data, Generalised Equipment Quotations
7	Key Stakeholder 1	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 3. Risks vs Opportunities Survey	Field Notes
	Key Stakeholder 2	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 3. Risks vs Opportunities Survey	Field Notes
	Key Stakeholder 3	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 3. Risks vs Opportunities Survey	Field Notes
	Key Stakeholder 4	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 3. Risks vs Opportunities Survey	Field Notes
8	Key Stakeholder 1	Aste Finland Oy	1 Sheet	Excel file	Consequence vs Probability Survey Results	Ground Data
	Key Stakeholder 2	Aste Finland Oy	1 Sheet	Excel file	Consequence vs Probability Survey Results	Ground Data
	Key Stakeholder 3	Aste Finland Oy	1 Sheet	Excel file	Consequence vs Probability Survey Results	Ground Data
	Key Stakeholder 4	Aste Finland Oy	1 Sheet	Excel file	Consequence vs Probability Survey Results	Ground Data
9	Key Stakeholder 1	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 4. Strategic Importance Survey	Field Notes
	Key Stakeholder 2	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 4. Strategic Importance Survey	Field Notes
	Key Stakeholder 3	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 4. Strategic Importance Survey	Field Notes
	Key Stakeholder 4	Aste Finland Oy	1 Page	One Note file	Explanatory Workshop 4. Strategic Importance Survey	Field Notes
10	Key Stakeholder 1	Aste Finland Oy	1 Sheet	Excel file	Strategic Importance Survey Results	Ground Data
	Key Stakeholder 2	Aste Finland Oy	1 Sheet	Excel file	Strategic Importance Survey Results	Ground Data
	Key Stakeholder 3	Aste Finland Oy	1 Sheet	Excel file	Strategic Importance Survey Results	Ground Data
	Key Stakeholder 4	Aste Finland Oy	1 Sheet	Excel file	Strategic Importance Survey Results	Ground Data
11	Key Stakeholder 1	Aste Finland Oy	1 Page	One Note file	Feedback Round. Feasibility recommendation feedback round	Field Notes
	Key Stakeholder 2	Aste Finland Oy	1 Page	One Note file	Feedback Round. Feasibility recommendation feedback round	Field Notes
	Key Stakeholder 3	Aste Finland Oy	1 Page	One Note file	Feedback Round. Feasibility recommendation feedback round	Field Notes
	Key Stakeholder 4	Aste Finland Oy	1 Page	One Note file	Feedback Round. Feasibility recommendation feedback round	Field Notes

Resource Audit Survey

The current state of resources

None	There are no resources available to proceed with the selected processing alternative. An acquisition is definitely required
Insufficient	Available resources are not sufficient to proceed with the selected processing alternative. An acquisition is required
Almost sufficient	Available resources are almost sufficient to proceed with the selected processing alternative. A slight acquisition is required
Sufficient	Available resources are sufficient to proceed with the selected processing alternative. No acquisition is required
More than sufficient / No need	There is an excess of resources required to proceed with the selected processing alternative. No acquisition is required

Possibility of acquisition

No	Resources required to proceed with selected processing alternative could not be acquired
Low	Resources required to proceed with selected processing alternative could be hardly acquired
Moderate	Resources required to proceed with selected processing alternative could be acquired
High	Resources required to proceed with selected processing alternative could be acquired with some effort
Absolute / No need	Resources required to proceed with selected processing alternative could be easily acquired with almost no effort /There is no need to acquire required resources.

Physical Resources

1. Office facilities. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

2. Office facilities. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

3. Production facilities. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

4. Production facilities. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

5. Warehouse facilities. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

6. Warehouse facilities. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

7. Office equipment & tools. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

8. Office equipment & tools. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

9. Production equipment & tools. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

10. Production equipment & tools. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

11. Warehouse equipment & tools. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

12. Warehouse equipment & tools. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

13. Raw material. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

14. Raw material. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

15. Energy & Heat. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

16. Energy & Heat. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

Human Resources

1. Top management & HR. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

2. Top management & HR. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

3. Production management & planning. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

4. Production management & planning. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

5. Production support & equipment setting personnel. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

6. Production support & equipment setting personnel. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

7. Sourcing management. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

8. Sourcing management. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

9. Logistics management. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

10. Logistics management. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

11. Warehousing management. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

12. Warehousing management. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

13. Production (line personnel). THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

14. Production (line personnel). POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

15. Warehouse (line personnel). THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

16. Warehouse (line personnel). POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

17. Finance. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

18. Finance. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

Reputation Resources

1. Ability to initiate a partnership with suppliers. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

2. Ability to initiate a partnership with suppliers. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

3. Power in negotiation with suppliers. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

4. Power in negotiation with suppliers. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

5. Ability to justify changes to the customers. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

6. Ability to justify changes to the customers. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

Other Resources

1. Management know-how. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

2. Management know-how. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

3. Production management know-how. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

4. Production management know-how. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

5. Technology know-how (production). THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

6. Technology know-how (production). POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

7. Technology know-how (design). THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

8. Technology know-how (design). POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

9. Sourcing & supply know-how. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

10. Sourcing & supply know-how. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

11. Warehousing know-how. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

12. Warehousing know-how. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

13. Logistics know-how. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

14. Logistics know-how. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

15. Applicable law and regulation know-how. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

16. Applicable law and regulation know-how. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

17. Financing know how (ability to initiate and operate investments). THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

18. Financing know how (ability to initiate and operate investments). POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

19. Investment resources. THE CURRENT STATE of resources in the organisation (or of suppliers)

	None	Insufficient	Almost Sufficient	Sufficient	More than sufficient / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

20. Investment resources. POSSIBILITY OF ACQUISITION of resources in the organisation (or of suppliers)

	No	Low	Moderate	High	Absolute / No need
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

Management Prowess Survey

Organisation

Consider following points from organisational point of view

1. Top Management. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

2. HR. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

3. Legal Issues. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

4. Sourcing. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

5. Production. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

6. Demand forecast. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

7. Supply forecast. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

8. Process Understanding. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

9. Market understanding. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

10. Environment & Sustainability. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

11. Warehousing. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

12. Design. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

13. Invoice management. How much knowledge the organisation is having

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

Personal

Consider following points from personal point of view

1. Top Management. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

2. HR. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

3. Legal Issues. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

4. Sourcing. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

5. Production. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

6. Demand forecast. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

7. Supply forecast. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

8. Process Understanding. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

9. Market understanding. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

10. Environment & Sustainability. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

11. Warehousing. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

12. Design. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

13. Invoice management. How much knowledge the you have

	Not enough, impossible to catch up	Not enough to manage, difficult to catch up	Not enough to manage, can catch up	Enough to manage	More than enough
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

Risks vs Opportunities Survey

Likelihood of happening

Impossible	The selection of processing alternative will not trigger the event
Unlikely	The selection of processing alternative will most probably not trigger the event
Rare	The selection of processing alternative might trigger the event
Possible	The selection of processing alternative will probably trigger the event
Often	The selection of processing alternative will most probably trigger the event

Severity of consequences / outcomes

Insignificant	The event will show no effect
Barely noticeable	The event will show slight effect that is believed to have insignificant change of the current state
Significant	The event will show some effect that is believed to slightly change the current state
Severe	The event will show significant effect that is believed to definitely change the current state
Highly significant	The event will show significant effect that is believed to dramatically change the current state

Political

1. Local state and government. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of losing current local state and government support & meeting resistance	○	○	○	○	○
Opportunity of gaining local state and government support	○	○	○	○	○

2. Local state and government. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of losing current local state and government support & meeting resistance	○	○	○	○	○
Opportunity of gaining local state and government support	○	○	○	○	○

Socio-Cultural & Environmental

3. Environment. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of environmental damage cause by the activity	○	○	○	○	○
Opportunity of proper material handling and improving the environment	○	○	○	○	○

4. Environment. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of environmental damage cause by the activity	○	○	○	○	○
Opportunity of proper material handling and improving the environment	○	○	○	○	○

5. Local environment. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of disrupting local environment & meeting resistance from local society	○	○	○	○	○
Opportunity of developing local environment & meeting support from local society	○	○	○	○	○

6. Local environment. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of disrupting local environment & meeting resistance from local society	○	○	○	○	○
Opportunity of developing local environment & meeting support from local society	○	○	○	○	○

Legal

7. Legal. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of legal issues	○	○	○	○	○
Opportunity of having less legal issues	○	○	○	○	○

8. Legal. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of legal issues	○	○	○	○	○
Opportunity of having less legal issues	○	○	○	○	○

Supply & Demand

9. Customers. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of losing customers	○	○	○	○	○
Opportunity of attracting new customers	○	○	○	○	○

10. Customers. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of losing customers	○	○	○	○	○
Opportunity of attracting new customers	○	○	○	○	○

11. Partnership. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of inability to initiate new partnership & risk of losing current partnerships	○	○	○	○	○
Opportunity of initiating new partnerships & retaining current partnerships	○	○	○	○	○

12. Partnership. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of inability to initiate new partnership & risk of losing current partnerships	○	○	○	○	○
Opportunity of initiating new partnerships & retaining current partnerships	○	○	○	○	○

13. Cultural differences. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of issues due to cultural differences	○	○	○	○	○
Opportunity of improvements due to cultural differences OR Opportunity of having no cultural differences	○	○	○	○	○

14. Cultural differences. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of issues due to cultural differences	○	○	○	○	○
Opportunity of improvements due to cultural differences OR Opportunity of having no cultural differences	○	○	○	○	○

15. Dependency on current suppliers. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of increased dependency on new suppliers	○	○	○	○	○
Opportunity of decreased dependency on current suppliers	○	○	○	○	○

16. Dependency on current suppliers. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of increased dependency on new suppliers	○	○	○	○	○
Opportunity of decreased dependency on current suppliers	○	○	○	○	○

17. Sole source. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of having sole source of supply	○	○	○	○	○
Opportunity of having multiple sources of supply	○	○	○	○	○

18. Sole source. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of having sole source of supply	○	○	○	○	○
Opportunity of having multiple sources of supply	○	○	○	○	○

19. Industry. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of the disruption of related industry	○	○	○	○	○
Opportunity of growth of related industry	○	○	○	○	○

20. Industry. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of the disruption of related industry	○	○	○	○	○
Opportunity of growth of related industry	○	○	○	○	○

21. Supply. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of insufficient supply	○	○	○	○	○
Opportunity of developing sufficient supply chain	○	○	○	○	○

22. Supply. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of insufficient supply	○	○	○	○	○
Opportunity of developing sufficient supply chain	○	○	○	○	○

23. Transportation. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of transport disruption	○	○	○	○	○
Opportunity of transportation development	○	○	○	○	○

24. Transportation. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of transport disruption	○	○	○	○	○
Opportunity of transportation development	○	○	○	○	○

25. Demand forecasting. Likelihood

	Impossible	Unlikely	Rare	Possible	Often	Вариант 6
Risk of poor demand forecasting	○	○	○	○	○	○
Opportunity of better demand forecasting	○	○	○	○	○	○

26. Demand forecasting. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of poor demand forecasting	○	○	○	○	○
Opportunity of better demand forecasting	○	○	○	○	○

27. Supply forecasting. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of poor supply forecasting	○	○	○	○	○
Opportunity of better supply forecastingal issues	○	○	○	○	○

28. Supply forecasting. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of poor supply forecasting	○	○	○	○	○
Opportunity of better supply forecasting	○	○	○	○	○

29. Lock-in, Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of lock-in, when the equipment limits other activities (design, planning, management, development)	○	○	○	○	○
Opportunity of development, when the equipment initiates new activities (design, planning, management, development)	○	○	○	○	○

30. Lock-in, Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of lock-in, when the equipment limits other activities (design, planning, management, development)	○	○	○	○	○
Opportunity of development, when the equipment initiates new activities (design, planning, management, development)	○	○	○	○	○

HR

1. Labour pool. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of having insufficient labour pool	○	○	○	○	○
Opportunity of having sufficient labour pool	○	○	○	○	○

2. Labour pool. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of having insufficient labour pool	○	○	○	○	○
Opportunity of having sufficient labour pool	○	○	○	○	○

3. High quality employees. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of high quality employees having no interest in joining company	○	○	○	○	○
Opportunity of high quality employees motivated in joining company	○	○	○	○	○

4. High quality employees. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of high quality employees having no interest in joining company	○	○	○	○	○
Opportunity of high quality employees motivated in joining company	○	○	○	○	○

5. Safety. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of decreased employee safety	○	○	○	○	○
Opportunity of increased employee safety	○	○	○	○	○

6. Safety. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of decreased employee safety	○	○	○	○	○
Opportunity of increased employee safety	○	○	○	○	○

7. Morale. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of decreased employee morale	○	○	○	○	○
Opportunity of increased employee morale	○	○	○	○	○

8. Morale. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of decreased employee morale	○	○	○	○	○
Opportunity of increased employee morale	○	○	○	○	○

9. Transition, retention and attrition of personnel. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of personnel attrition to other companies and transition to suppliers	○	○	○	○	○
Opportunity of personnel attrition from other companies and transition from suppliers	○	○	○	○	○

10. Transition, retention and attrition of personnel. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of personnel attrition to other companies and transition to suppliers	○	○	○	○	○
Opportunity of personnel attrition from other companies and transition from suppliers	○	○	○	○	○

11. Trade unions. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of worsen relations with trade unions	○	○	○	○	○
Opportunity of better relations with trade unions	○	○	○	○	○

12. Trade unions. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of worsen relations with trade unions	○	○	○	○	○
Opportunity of better relations with trade unions	○	○	○	○	○

Design & Production

13. Quality. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of losing final product quality (ease of manufacture, colour, shape, overall quality)	○	○	○	○	○
Opportunity of better product quality	○	○	○	○	○

14. Quality. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of losing final product quality (ease of manufacture, colour, shape, overall quality)	○	○	○	○	○
Opportunity of better product quality	○	○	○	○	○

15. Component defect. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of increasing component defect rate	○	○	○	○	○
Opportunity of decreasing component defect rate	○	○	○	○	○

16. Component defect. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of increasing component defect rate	○	○	○	○	○
Opportunity of decreasing component defect rate	○	○	○	○	○

17. Final product defect. Likelihood

	Impossible	Unlikely	Rare	Possible	Often	Вариант 6
Risk of increasing final product defect rate	○	○	○	○	○	○
Opportunity of decreasing final product defect rate	○	○	○	○	○	○

18. Final product defect. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of increasing final product defect rate	○	○	○	○	○
Opportunity of decreasing final product defect rate	○	○	○	○	○

19. Scrap & machine idle. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of increasing scrap & machine idle	○	○	○	○	○
Opportunity of increasing scrap & machine idle (e.g. joining several orders together)	○	○	○	○	○

20. Scrap & machine idle. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of increasing scrap & machine idle	○	○	○	○	○
Opportunity of increasing scrap & machine idle (e.g. joining several orders together)	○	○	○	○	○

21. Equipment idle. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of equipment idle	○	○	○	○	○
Opportunity of having no idle	○	○	○	○	○

22. Equipment idle. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of equipment idle	○	○	○	○	○
Opportunity of having no idle	○	○	○	○	○

23. Production. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of production disruption	○	○	○	○	○
Opportunity of having no production dirsuptions	○	○	○	○	○

24. Production. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of production disruption	○	○	○	○	○
Opportunity of having no production dirsuptions	○	○	○	○	○

25. Design. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of having poor design of new products	○	○	○	○	○
Opportunity of having improved design of new products	○	○	○	○	○

26. Design. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of having poor design of new products	○	○	○	○	○
Opportunity of having improved design of new products	○	○	○	○	○

27. Know-how. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of losing own know-how	○	○	○	○	○
Opportunity of gaining new know-how and developing own know-how	○	○	○	○	○

28. Know-how. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of losing own know-how	○	○	○	○	○
Opportunity of gaining new know-how and developing own know-how	○	○	○	○	○

29. Documentation. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of having insufficient documentation & increased documentation handling time	○	○	○	○	○
Opportunity of having sufficient documentation & decreased documentation handling time	○	○	○	○	○

30. Documentation. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of having insufficient documentation & increased documentation handling time	○	○	○	○	○
Opportunity of having sufficient documentation & decreased documentation handling time	○	○	○	○	○

Economic

31. Finance. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of locking money in investments	○	○	○	○	○
Opportunity of getting money out of investments	○	○	○	○	○

32. Finance. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of locking money in investments	○	○	○	○	○
Opportunity of getting money out of investments	○	○	○	○	○

33. Invocing. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of having improper & not flexible payment terms	○	○	○	○	○
Opportunity of having proper & flexible payment terms	○	○	○	○	○

34. Invocing. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of having improper & not flexible payment terms	○	○	○	○	○
Opportunity of having proper & flexible payment terms	○	○	○	○	○

35. Cash flow. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of negative impact to the cash flow	○	○	○	○	○
Opportunity of positive impact to the cash flow	○	○	○	○	○

36. Cash flow. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of negative impact to the cash flow	○	○	○	○	○
Opportunity of positive impact to the cash flow	○	○	○	○	○

37. Margin. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of increased costs	○	○	○	○	○
Opportunity of decreased costs	○	○	○	○	○

38. Margin. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of increased costs	○	○	○	○	○
Opportunity of decreased costs	○	○	○	○	○

39. Raw material cost. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of increased raw material cost	○	○	○	○	○
Opportunity of decreased raw material cost	○	○	○	○	○

40. Raw material cost. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of increased raw material cost	○	○	○	○	○
Opportunity of decreased raw material cost	○	○	○	○	○

41. Production cost. Likelihood

	Impossible	Unlikely	Rare	Possible	Often
Risk of increased production costs of the process	○	○	○	○	○
Opportunity of decreased production costs of the process	○	○	○	○	○

42. Production cost. Severity of consequences / outcomes

	Insignificant	Barely noticeable	Significant	Severe	Highly significant
Risk of increased production costs of the process	○	○	○	○	○
Opportunity of decreased production costs of the process	○	○	○	○	○

Strategic Importance Survey

From Organisational Point of View

Consider the importance of points from organisational point of view

None	The selection of processing alternative will show now effect
Small	The selection of processing alternative will show slight effect that is believed to have insignificant change of the current state
Considerable	The selection of processing alternative will show some effect that is believed to slightly change the current state
High	The selection of processing alternative will show significant effect that is believed to change the current state
Matter of survival	The selection of processing alternative is the only option to keep or change the current state

1. Having operations to maintain the current state

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

2. Having operations to allow the growth of the company

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

3. Having operations to increase the competitiveness of the business

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

4. Having operations to maintain current customers

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

5. Having operations to acquire new customers

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

6. Having operations to penetrate new markets and market niches

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

7. Having operations to improve the image (status) of the company

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

8. Having operations to deliver higher customer value

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

9. Having operations to develop partnerships with suppliers

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

10. Having operations to develop the advantage over suplier's clients (more power against the supplier)

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

From Personal Point of View

Consider the importance of points from your personal point of view

11. Having operations to maintain the current state

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

12. Having operations to allow the growth of the company

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

13. Having operations to increase the competitiveness of the business

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

14. Having operations to maintain current customers

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

15. Having operations to acquire new customers

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

16. Having operations to penetrate new markets and market niches

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

17. Having operations to improve the image (status) of the company

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

18. Having operations to deliver higher customer value

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

19. Having operations to develop partnerships with suppliers

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

20. Having operations to develop the advantage over suplier's clients (more power against the supplier)

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

From Customer's Point of View

Consider the importance of points from customer's point of view

1. Having operations to increase the price attractiveness

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

2. Having operations to increase organisational attractiveness

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

3. Having operations to improve final products

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

4. Having operations to allow custom solutions

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

From Local Society's Point of View

Consider the importance of points from local society's point of view

5. Having operations to facilitate to the development of local society

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

6. Having operations to allow work places for local society

	None	Small	Considerable	High	Matter of survival
Flat (cutting + punching) (IN HOUSE)	○	○	○	○	○
Flat (cutting + punching) (OUTSOURCING)	○	○	○	○	○
Sheet metal bending (IN HOUSE)	○	○	○	○	○
Sheet metal bending (OUTSOURCING)	○	○	○	○	○
Painting (IN HOUSE)	○	○	○	○	○
Painting (OUTSOURCING)	○	○	○	○	○
All together (IN HOUSE)	○	○	○	○	○
All together (OUTSOURCING)	○	○	○	○	○

Generalised Equipment Quotations

Aste:

Area availability: 200 m^2

Rent cost per year: 14.5 EUR/m^2

Turnover: EUR 10 M

Sheet metal cutting:

Capacity with the respect of the turnover and product structure EUR 20 M

Equipment cost: EUR XX K

Tooling cost: EUR XK

Area required: 100 m^2

Sheet metal bending:

Capacity with the respect of the turnover and product structure: EUR 15 M

Equipment cost: EUR XX K

Tooling cost: EUR XK

Area required: 75 m^2

Sheet metal painting:

Capacity with the respect of the turnover and product structure: EUR 30 M

Equipment cost: EUR XXX K

Tooling cost: EUR XXK

Area required: 570 m^2

Resource Audit Tool

		Current state	Possibility of acquisition
Physical resources	Office facilities		
	Production facilities		
	Warehouse facilities		
	Office equipment & tools		
	Production equipment & tools		
	Warehouse equipment & tools		
	Raw material		
	Energy & Heat		
Human resources	Top Management & HR		
	Production management & planning		
	Production support & equipment setting personnel		
	Sourcing management		
	Logistics management		
	Warehousing management		
	Production (line personnel)		
	Warehouse (line personnel)		
	Finance		
Reputation resources	Ability to initiate partnership with suppliers		
	Power in negotiation with suppliers		
	Ability to justify changes to the customers		
Other resources	Management know-how		
	Production management know-how		
	Technology know-how (production)		
	Technology know-how (design)		
	Sourcing & supply know-how		
	Warehousing know-how		
	Logistics know-how		
	Applicable law and regulation know-how		
	Financing know-how (ability to initiate and operate investments)		
	Investment Resources		

Risks vs Opportunities. Full list

Political		
Local state and government	Risk of losing current local state and government support & meeting resistance	Opportunity of gaining local state and government support
Socio-Cultural & Environmental		
Environment	Risk of environmental damage cause by the activity	Opportunity of proper material handling and improving the environment
Local environment	Risk of disrupting local environment & meeting resistance from local society	Opportunity of developing local environment & meeting support from local society
Legal		
Legal	Risk of legal issues	Opportunity of having less legal issues
Supply & Demand		
Customers	Risk of losing customers	Opportunity of attracting new customers
Partnership	Risk of inability to initiate new partnership & risk of losing current partnerships	Opportunity of initiating new partnerships & retaining current partnerships
Cultural differences	Risk of issues due to cultural differences	Opportunity of improvements due to cultural differences OR Opportunity of having no cultural differences
Dependency on current suppliers	Risk of increased dependency on new suppliers	Opportunity of decreased dependency on current suppliers
Sole source	Risk of having sole source of supply	Opportunity of having multiple sources of supply
Industry	Risk of the disruption of related industry	Opportunity of growth of related industry
Supply	Risk of insufficient supply	Opportunity of developing sufficient supply chain
Transportation	Risk of transport disruption	Opportunity of transportation development
Demand forecasting	Risk of poor demand forecasting	Opportunity of better demand forecasting
Supply forecasting	Risk of poor supply forecasting	Opportunity of better supply forecasting
Lock-in	Risk of lock-in, when the equipment limits other activities (design, planning, management, development)	Opportunity of development, when the equipment initiates new activities (design, planning, management, development)
Human Resources		
Labour pool	Risk of having insufficient labour pool	Opportunity of having sufficient labour pool
High quality employees	Risk of high quality employees having no interest in joining company	Opportunity of high quality employees motivated in joining company
Safety	Risk of decreased employee safety	Opportunity of increased employee safety
Morale	Risk of decreased employee morale	Opportunity of increased employee morale
Personnel transition, retention and attrition	Risk of personnel attrition to other companies and transition to suppliers	Opportunity of personnel attrition from other companies and transition from suppliers
Trade unions	Risk of worsen relations with trade unions	Opportunity of better relations with trade unions
Design & Production		
Quality	Risk of losing final product quality (ease of manufacture, colour, shape, overall quality)	Opportunity of achieving higher product quality
Component defect	Risk of increasing component defect rate	Opportunity of decreasing component defect rate
Final product defect	Risk of increasing final product defect rate	Opportunity of decreasing final product defect rate
Scrap & machine idle	Risk of increasing scrap & machine idle	Opportunity of increasing scrap & machine idle (e.g. joining several orders together)
Equipment idle	Risk of equipment idle	Opportunity of having no idle
Production	Risk of production disruption	Opportunity of having no production dirsuptions
Design	Risk of having poor design of new products	Opportunity of having improved design of new products
Know-how	Risk of losing own know-how	Opportunity of gaining new know-how and developing own know-how
Documentation	Risk of having insufficient documentation & increased documentation handling time	Opportunity of having sufficient documentation & decreased documentation handling time
Economic		
Finance	Risk of locking money in investments	Opportunity of getting money out of investments
Invocing	Risk of having improper & not flexible payment terms	Opportunity of having proper & flexible payment terms
Cash flow	Risk of negative impact to the cash flow	Opportunity of positive impact to the cash flow
Margin	Risk of increased costs	Opportunity of decreased costs
Raw material cost	Risk of increased raw material cost	Opportunity of decreased raw material cost
Production cost	Risk of increased production costs of the process	Opportunity of decreased production costs of the process

Strategic Importance. Full List

From organisation's point of view

Having operations to maintain the current state

Having operations to allow the growth of the company

Having operations to increase the competitiveness of the business

Having operations to maintain current customers

Having operations to acquire new customers

Having operations to penetrate new markets and market niches

Having operations to improve the image (status) of the company

Having operations to deliver higher customer value

Having operations to develop partnerships with suppliers

Having operations to develop the advantage over suplier's clients (more power against the supplier)

From personal (top management's) point of view

Having operations to maintain the current state

Having operations to allow the growth of the company

Having operations to increase the competitiveness of the business

Having operations to maintain current customers

Having operations to acquire new customers

Having operations to penetrate new markets and market niches

Having operations to improve the image (status) of the company

Having operations to deliver higher customer value

Having operations to develop partnerships with suppliers

Having operations to develop the advantage over suplier's clients (more power against the supplier)

From customer's point of view

Having operations to increase the price attractiveness

Having operations to increase organisational attractiveness

Having operations to improve final products

Having operations to allow custom solutions

Form local society's point of view

Having operations to facilitate to the development of local society

Having operations to allow work places for local society

The Conceptual Framework and Tools

Detailed Payback Period Calculation

In-house Cutting. Payback period is 33 months

	Y1-1	Y1-2	Y1-3	Y1-4	Y1-5	Y1-6	Y1-7	Y1-8	Y1-9	Y1-10	Y1-11	Y1-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 10 M**
Investment, tot	EUR XX K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR XX K**
Rent	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	**EUR - XX K**

	Y2-1	Y2-2	Y2-3	Y2-4	Y2-5	Y2-6	Y2-7	Y2-8	Y2-9	Y2-10	Y2-11	Y2-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 13 M**
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Rent	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	**EUR - XX K**

	Y3-1	Y3-2	Y3-3	Y3-4	Y3-5	Y3-6	Y3-7	Y3-8	Y3-9	Y3-10	Y3-11	Y3-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR XXX K**	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 17 M**
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Rent	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR X K**	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - X K	**EUR X K**	EUR XX K	EUR XX K	EUR XX K	**EUR XX K**

In-house Bending. Payback period is 14 months

	Y1-1	Y1-2	Y1-3	Y1-4	Y1-5	Y1-6	Y1-7	Y1-8	Y1-9	Y1-10	Y1-11	Y1-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 10 M**
Investment, tot	EUR XX K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR XX K**
Rent	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	EUR - XX K	**EUR - XX K**

	Y2-1	Y2-2	Y2-3	Y2-4	Y2-5	Y2-6	Y2-7	Y2-8	Y2-9	Y2-10	Y2-11	Y2-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 13 M**
Investment, tot	EUR 0 K	**EUR 0 K**	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Rent	EUR 0 K	**EUR 0 K**	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR -X K	**EUR X K**	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	**EUR XX K**

	Y3-1	Y3-2	Y3-3	Y3-4	Y3-5	Y3-6	Y3-7	Y3-8	Y3-9	Y3-10	Y3-11	Y3-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 17 M**
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Rent	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	EUR XX K	**EUR XX K**

In-house Painting. Payback period is more than 36 months

	Y1-1	Y1-2	Y1-3	Y1-4	Y1-5	Y1-6	Y1-7	Y1-8	Y1-9	Y1-10	Y1-11	Y1-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 10 M**
Investment, tot	EUR XXX K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR XXX K**
Rent	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR X K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	**EUR - XXX K**

	Y2-1	Y2-2	Y2-3	Y2-4	Y2-5	Y2-6	Y2-7	Y2-8	Y2-9	Y2-10	Y2-11	Y2-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 13 M**
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Rent	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR 0 K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	**EUR - XXX K**

	Y3-1	Y3-2	Y3-3	Y3-4	Y3-5	Y3-6	Y3-7	Y3-8	Y3-9	Y3-10	Y3-11	Y3-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	**EUR 17 M**
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	**EUR 0 K**
Rent	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR X K**
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	**EUR XX K**
Project profit	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	**EUR - XXX K**

All Together In House. Payback period is more than 36 months

	Y1-1	Y1-2	Y1-3	Y1-4	Y1-5	Y1-6	Y1-7	Y1-8	Y1-9	Y1-10	Y1-11	Y1-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR 10 M
Investment, tot	EUR XXX K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR XXX K
Rent	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR XX K
Project profit	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K

	Y2-1	Y2-2	Y2-3	Y2-4	Y2-5	Y2-6	Y2-7	Y2-8	Y2-9	Y2-10	Y2-11	Y2-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR 13 M
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K
Rent	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR 0 K
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR XX K
Project profit	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K

	Y3-1	Y3-2	Y3-3	Y3-4	Y3-5	Y3-6	Y3-7	Y3-8	Y3-9	Y3-10	Y3-11	Y3-12	Total
Revenue	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR XXX K	EUR 17 M
Investment, tot	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K	EUR 0 K
Rent	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K
Savings	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR X K	EUR XX K
Project profit	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K	EUR - XXX K