MASTER

How assets influence sustainability by time reduction

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How Assets influence Sustainability by Time reduction
Abstract

This report focuses on the relationship between assets of an organization and the factors influencing time. The data is analyzed using multiple techniques, namely correlation matrices, exploratory factor analysis, multiple regression, and analysis of variance.

This resulted in (partially) confirmed or rejected hypotheses, namely that the socialization assets influence all time-influencing factors.

These results conclude that the A-Lanes’ strategy is Resource Enrichment, which is valuable in the long run as the structure of A-Lanes has settled over time.
Summary

This report will focus on how assets influence sustainability by time reduction. This analysis will be divided by different chapters, each explaining an important aspect. First the case description will be given, whereby the situation is sketched. It shows that the research is conducted in A-Lanes which is a consortium of 4 companies, namely Strukton, Ballast Nedam, John Laing, and Strabag. It also shows the size of the project, namely €1.5B and the character of the contract. The contract is based on the DBFM principle, which stands for Design, Build, Finance, and Maintain. These aspects are all the responsibility of A-Lanes.

Hereafter is focused on the shift of paradigms. Instead of a physical object based paradigm, the world shifts towards a knowledge based paradigm. This results in a change of models, for instance the model People, Planet, Profit, changing into People, Planet, Prosperity, and focusing more on 2-way communication. The 7-P application model of Jonathan Scott is explained, analyzed, and adjusted. This adjustment is based on the relation between the strategy of a company, its assets and the capitals this company has. A-Lanes’ strategy is internally focused, whereby the assets are of an Intellectual, Socialization, Commercial, and Material base. The capitals, which form the origin of the assets are the Cultural, Social, Human, and Economic capitals.

The adjustment of the 7-P application model results in 8 hypotheses related to the dynamics between the assets and the relation between the assets and the factors influencing time. These hypotheses are tested in an environment, which is explained in chapter 3. The project TP03, the design process, is the testing environment. It is explained that TP03 exists out of 3 different layers with multiple steps involving different departments. Hereafter the data is analyzed. First the data is validated by using correlation matrices. Hereafter the data is reduced with explanatory factor analysis, hereby conserving as much data as possible. The results of the reduced data are then used to analyze the relation between the assets and the factors influencing time, by conducting a multiple regression. This technique validates the model on a scientific base. In order to create recommendations an analysis of variance was conducted, to specify which difference in department or education has an effect on the assets. Hereby creating handles for the company to improve.

Chapter 4 gives the results of the analysis and present the (partially) confirmed or rejected hypotheses. It was concluded that the Socialization assets where most prominent present, as these assets where significant to each of the factors influencing time. It was also concluded, that in this specific context, the Material assets had no significant relation with any of the factors influencing time.

This report ends with a conclusion whereby a bird’s view is chosen to put the results of the research into the right perspective. The main conclusion is that the strategy of A-Lanes is Resource Enrichment, which captures value and focuses on change. This strategy is valuable in the long run as the structure of the organization has settled over time. The communication and cooperation has reached a certain level which can provide a good base for making profit in the long run.

All the background information that is used in order to create a sound base for this report can be found in the appendix, which shows the design process, scope, related departments, results, and survey. The used literature can be found in the bibliography.
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Introduction

The A15 Maasvlakte – Vaanplein (A15 MaVa) is in many aspects an important connection. It is the most important road that connects Europe’s biggest harbor with the European mainland. The road is also used by a lot of commuters, with their work located in that same harbor. The department of waterways and public works (Rijkswaterstaat) is going to widen the A15 between the Maasvlakte and Vaanplein. This widening assures the flow, and increases the safety of the traffic. By contracting this project out based on a Design, Build, Finance, and Maintain (DBFM) principle, the department of waterways and public works gave the responsibilities to another party. This party is the A-Lanes consortium, consisting of Strukton, Ballast Nedam, John Laing, and Strabag.

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The character of the DBFM-principle leads to a high pressure on the aspect of time, without decreasing the quality of the product. Delay in finishing the project will have significant negative effects on a financial basis, namely €10M per month, which is €300,000 per day. Not only the financial aspect will be negatively influenced, a delay will also hurt A-Lanes’ reputation as a trustworthy partner. Therefore A-Lanes focuses on the reduction of time.

J. Scott proposed a model whereby wasted time can be reduced, without compromising on quality, namely the 7-P Application Model. This model focuses on making companies more sustainable, thus doing more with less. This model is validated in many companies, but focuses on the practical side of the situation. It does not take the different intangible assets of an organization into account. These assets and its origin are incorporated in the complemented model, resulting in a model including Intellectual, Socialization, Commercial and Market assets.

How these extra assets influence the process of the model leads to the following research question:

How are the factors, causing waste of time, influenced by the assets of a project group?

In order to answer this research question, a questionnaire will be conducted within the project group responsible for the Design Process (TP03) in the A15 MaVa project, whereby the focus is on the added assets.

The results of the research will be documented in an essay, which will 1) function as my master thesis, 2) serve A-Lanes, as it will provide handles to reduce the wasted time, and 3) serve Science, as it will validate the complemented model.

I would like to thank the following people for their insights, knowledge, and opinions. First of all I would like to thank prof. dr. Leo Verhoef and dr. Jimme Keizer for their help, patience, and guidance resulting in this essay. I would also like to thank A-Lanes for giving me the opportunity to prove myself in a working environment. This change is supported by the managers of the different departments with their willingness to help me with this project, especially Don Postma, Ewoud de Vries, and Frank Schuitemaker. Special gratitude goes out to my daily supervisors dr. Frits Willems and Lita de Wilde for their help and readiness to support.

At last I would like to thank my mother, girlfriend and special friends, which I still congratulate with their beautiful daughter Faye.
1 Case description

A-Lanes is a consortium build up out of 4 companies, namely Strukton, Ballast Nedam, John Laing, and Strabag. A-Lanes is responsible for the design, build, finance, and maintenance of the A15 MaVa project. This project covers the widening of the A15 between the Maasvlakte and Vaanplein, with a length of around 40 kilometers. The government tries to reach a better and safer flow of traffic from Rotterdam’s harbor to the European mainland.

A-Lanes won the contract as they proposed the best offer, hereby taking the quality, time, and costs into account.

The character of this contract results in a situation whereby the quality of the product is fixed. If the project does not meet certain requirements, A-Lanes will not receive their financial reward. This reward is necessary to pay off the bank, because the initial money is loaned, as the financial responsibilities also lay with A-Lanes. The financial responsibilities make the delivery date also fixed. As soon as A-Lanes delivers the product (according to the set requirements) the government will pay out the financial reward. The sooner this reward is received by A-Lanes, the less interest has to be payed to the bank. This is vice versa, as the pay-out is delayed, A-Lanes has to pay more interest to the bank.

With a total value of €1.5 Billion and a total duration of 30 years, this project is the biggest DBFM-based project ever to take place in The Netherlands. Due to the significant weight of the financial aspect, time is of the essence. Every day that the delivery date differs, costs are €300,000, which is €10M per month.

Due to the high financial value and the long duration the project has to be viable. Profit has to be made with the project, but the product cannot be in conflict with the environment, as this may have catastrophic effects on the environmental life around the A15 and the reputation of A-Lanes. The project also has to equitable, as A-Lanes is obliged to pay the employees their salaries. This project also has to take the relation between the people and the planet into account, as the project has to be bearable. The product may not have a significant negative effect on the environmental life around the A15, for instance, the flow of traffic may not be negatively interfered. The widening of the A15 has to be completed without the loss of flow of traffic.

The main philosophy that incorporates the 3 aspects, bearable, viable, and equitable, and respects these aspects is Sustainability. This philosophy takes the People, Planet, Profit, and their interrelations into account.
2 Sustainability

Sustainability is mostly defined as “development that meets present needs without compromising the ability of future generations to meet their needs” (Report of the World Commission on Environment and Development, 1987). This chapter will first focus on the paradigm of People, Planet, Profit, followed by focusing on the 7-P Application Model of Jonathan Scott (Scott, 2008) (Scott, 2010). This model describes the waste-reduction aspects of sustainability in a business application context and is explained and analyzed. Following this analysis, remarks are made about its incompleteness. This chapter concludes with a complemented model and hypotheses about the correlation between the added elements.

2.1 People, Planet, Profit

The paradigm of People, Planet, Profit (PPP) relates 3 aspects and tries to balance these. The three aspects must be balanced in order to become sustainable. If only 2 out of 3 aspects are balanced, a different status is reached, such as equitable, bearable, or viable, see Figure 2.1: People Planet Profit.

![Figure 2.1: People Planet Profit by www.gertjanschop.com, 2012](image)

The first aspect, People, stands for the people in and outside the organization. This aspect can be measured according to social participation, health, art, culture, living environment, safety, education, economic and political participation. The second aspect, Planet, stands for the relationship with earth, water, air, biodiversity and the consequences for the (living) environment. This aspect is measured according to earth, air, mature, surface water, groundwater and landscape. The third aspect, Profit, stands for the production and economic effects of goods and services. This aspect can be measured according to spatial location conditions, capital, knowledge, energy, raw and auxiliary materials, labor, economic structure, infrastructure and accessibility (Dagevos & Smeets, 2007). In 2002 at a World Summit, the third aspect was changed into Prosperity, hereby covering not only the economic but also the social field (Commission, 2002). The measurements of the aspects are related to the capitals an organization possesses, namely the Economic, Social, Human and Cultural capital (Dagevos & Lamoen, 2009).
The balance between the aspects is very important, as the focus on 2 or even just 1 aspect has negative effects on the other aspects. The main paradigm, of the Industrial Revolution, was based with the focus on profit of physical objects. Businesses tried to gain the biggest profit, year after year, with a negative influence on the other 2 aspects. There was only a monologue with the consumer, as it was assumed that the company knew what the customer wanted. The natural resources of the planet were running out and the planet was polluted by the waste of extensive production.

As the balance is very important, business are shifting from a physical object based paradigm towards a knowledge based paradigm. This knowledge based paradigm is captured in a balance between People, Planet and Prosperity. There is conversation with the people, the pollution decreases, the natural resources are used more efficient and the Prosperity is shared more as in a collaboration Figure 2.2: Paradigm shift towards balance.

![Figure 2.2: Paradigm shift towards balance (www.frankwatching.com, 2012)](image)

### 2.2 7-P Application Model by Jonathan Scott

This model describes the waste-reduction aspects of sustainability in a business application context, see figure 2.3. It does that based on a seven-synonyms-alliteration, analyzing the physical objects (material resources), displaying multiple interventions and aiming on four goals. The model has a loop incorporated in it, to represent the never-ending aspect of sustainability.
The seven-synonyms-alliteration forms the understanding of sustainability. It covers the strategy, catalyst and tactics by Preparation, Processes, Preservation, People, Place, Product, and Production. A short explanation of these 7 synonyms is given in table 2.1.

<table>
<thead>
<tr>
<th>Synonyms</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation</td>
<td>Setting the stage for change, accepting the breadth and depth of sustainability and understanding what the reformer is up against when trying to implement profitable, long-term practices.</td>
</tr>
<tr>
<td>Processes</td>
<td>Sustainable belief systems, philosophies, business models and thought patterns that help match a business with customer demands, core capabilities and best practices.</td>
</tr>
<tr>
<td>Preservation</td>
<td>Collecting and displaying real-time measurement (internal) and keeping ahead of laws, pending legislation, trends, and developments (external).</td>
</tr>
<tr>
<td>People</td>
<td>Accepting the importance of training and education and working diligently to avoid the wasting of people (employees, stakeholders, customers, and the world community).</td>
</tr>
</tbody>
</table>
Place | The buildings and places where work is performed and/or products are sold.
---|---
Product | Goods and services that is free from unnecessary waste and toxins which are designed so that the materials, energy, and manpower that comprise them are treated as investments and continuously reused.
Production | The physical, mechanical, biological, and chemical processes used to transform raw materials into products or services - and transport them.

Table 2.1: 7 synonyms and explanation

The steps Understanding, Material resources, Implementation, and Goals are in a logical sequence. The Goals are reached by the Implementation of interventions to reduce the waste of Material resources, which are necessary for the seven P’s. The material resources are necessary to perform processes by the people at a certain place for a certain product.

The 7-P Application Model can be applied to a lot of situations, for instance electronic business (Yahoo), logistics (UPS), retail (local businesses), and commercial products manufacturers (Interface Inc.) (Scott, 2010). It shows how to “do more with less”, thus increase the efficiency.

As the model can be applied to a lot of situations, there is one main factor underlying the application; it is aimed at the practical side of the situation, thus the physical objects. At Yahoo, the model was applied in decreasing costs by cutting down on electricity, by opening a window instead of running the air-conditioning. At UPS the model was applied by rerouting the routes for the truck drivers. But how can this model be adjusted according to the paradigm shift and make it applicable for a project, whereby the product delivered is not only a result of physical objects (energy and material resources), but also the intangible (intellect and cooperation) capabilities of the employees?

2.3 **Complementation with assets**

To complement the model in a way that it can also be applied to a project-only situation, it must be noted that the incompleteness lies between the Understanding and the Material Resources. The Understanding consists out of the Strategy and the Tactics which are catalyzed by the People. The Material Resources are a result of the Tactics. They are the tools to act out the Tactics. But what are the tools for Strategy? What makes a contribution to the progress of a project besides energy and Material Resources? The answer to this question is given by T. W. Hardjono, who relates the assets of a company and the strategy it follows (Hardjono, 1995), see figure 2.4. He proposes the four assets of a company; Material assets, Commercial assets, Socialization assets, and Intellectual assets.
These assets are related to the strategy a company follows, whereby strategy is classified over 2 dimensions, namely whether the value is internal or external, thus whether the value is created or captured and whether the strategy is based on change (entrepreneurship), or stabilization (management). Considering the situation and the character of the DBFM contract, the focus will be internal. Value does not have to be created, as the value is already stated and must be captured. This leads to the following 2 strategies: Resource Enrichment and Operational Excellence. Resource Enrichment focuses on Internal Change and is characterized by a market whereby the customers are very demanding. They are not willing to communicate with the suppliers about the requirements and specifications of the product. The price is not really important as the product has to apply to the set specifications. An organization can only prepare itself to respond fit when the request is made. The typical leadership style in this situation is the participating style. The model of the organization is very flat as management negotiates and co-operates on the same level with the employees. Decisions are made based on total discussion, known as the Arena model or the Dutch Poldermodel. These models are linked to a model of a family discussion whereby the whole family sits at the dinner table and everybody can share their opinion. The focus points of this strategy are re-evaluating means, recognizing change, generating ideas, and evaluating (Hardjono, 1995), see figure 2.5.

![Figure 2.5: Resource Enrichment (Hardjono, 2005)]

Operational Excellence focuses on Internal Control and is characterized by a market whereby the customer has knowledge about the product it wants, and mostly states the specifications of the product. Besides the specifications, the price is also set by the customer. Companies following this strategy must ensure that they are the cheapest, have the best price/quality ratio, or are the most experienced in that area. The typical leadership style in this situation is the selling leadership style, connecting clear orders and directions to the organization. The base for this leadership style is centralization of power, thus decision making known as the bureaucratic model, based on formalization, planning and control. The focus points of this strategy are explaining and predicting, structuring, regulating, and yielding (Hardjono, 1995), see figure 2.6.
2.3.1 Material assets

The Material assets reflect the tangible resources an organization possesses or controls and enable employees to process their findings. The Material assets are related to the working area of an employee, as this supports the work process. Examples of material assets are a laptop and a desk, but also electricity, water, and space. In this situation Time is also a Material asset. Due to the character of the DBFM contract, every day that is saved by delivering the project ahead of schedule, results in extra revenue of €300,000. The statement “Time is Money” has never been more true than in this situation, therefore Time is also seen as a Material asset. As the Material assets cover the preceded Material Resources, these are the dimensions which the produced questions relate to.

2.3.2 Commercial assets

The Commercial assets cover the ability to have access to and to act on markets, and the skills to execute commercial transactions. These Commercial assets are also known as “good will”. The importance of these assets appear in acquisition situations, whereby the price to be paid for a product is determined. The internal Commercial assets influence the market forces between department, as external Commercial assets influence the market forces between companies. The external Commercial assets effect the growth of the market share and the growth of experience. The growth of experience influences the trustworthiness of an organization (Hardjono, 1995).

2.3.3 Socialization assets

The Socialization assets reflect the ability to motivate and inspire people, accept the conditions under which employees work, collegiality, mutual trust and safety. These assets are very important in a project-based organization as projects are mostly a group process, whereby socialization enables the synergy effect (Hardjono, 1995).

The Socialization assets can be measured by the presence of clear goals, understood and accepted hierarchy, organizational cohesion and entrepreneurship. The socialization assets are seen as the cooperation and communication capabilities, but also as “cultural capital” (Barrett, 2005), “social capital” (Fukuyama, 1999), and “organizational architecture and the genetic code of organizations” (Prahalad & Hamel, 1990).
The dimensions of Socialization assets are taking risks, anticipating on the social environment, setting goals, generating ideas (Hardjono, 1995).

The dimensions of social capital are trust (Coleman, 1988) (Putnam, 1993), rules and norms governing social action (Coleman, 1988) (Portes & Sensenbrenner, 1993), types of social interaction (Collier, 1998) (Snijders, 1999), network resources (Falk & Kilpatrick, 2000) (Snijders, 1999), and other network characteristics (Burt, 1997) (Putnam, 1995).

Narayan and Cassidy have created a model of social capital and its dimensions as can be seen in figure 2.7 and appendix 6 (Narayan & Cassidy, 2001).

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**2.3.4 Intellectual assets**

The Intellectual assets are based on the collective intellect of the members of an organization and enables generation of intellectual capital. It does this by the accessibility of knowledge, the learning capabilities, and the capacity of the learning capabilities, represented by the dimensions: lateral thinking, explaining and predicting, evaluating, and self-examination (Hardjono, 1995). Intellectual capital is defined as knowledge that can be exploited for some money-making or other useful purpose (Amiri, Jandaghi, & Ramezan, 2011), which can be theoretical and practical (Spender, 1996). This knowledge in a project-only organization relies heavily upon the employees in the project, thus the value that the employees provide through the application of skills, know how, and expertise (Maddocks & Beaney, 2002). Besides these areas, the creativity and innovation capability of the employees also provide value (Amiri, Jandaghi, & Ramezan, 2011). The use for this value is to increase the capability to solve business problems. Another important aspect that influences the intellectual assets is the managerial support.

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**2.4 Complementation with capitals**

These assets are based on the capitals of an organization, whereby capital is defined as “material wealth that is owned, or that can be used to generate further wealth, and to normally describe the monetary value of that wealth (Bullock et al., 1988), but also encompassing a set of non-financial assets and resources (Firkin, 2001)”. The 4 types of capital are Economic capital, Social capital, Human capital and Cultural capital.

**2.4.1 Economic capital**

Economic capital is the financial assets directly convertible into money (Bourdieu, 1986) (Jary & Jary, 1995), but also the equity of a business (Reynolds & White, 1997). The usage of the Material assets is made possible by the Economic capital of an organization.
2.4.2 Social capital
Social capital is the aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition – in other words, to membership of a group (Bourdieu, 1986). Social capital uses resources that are embedded in social networks, accessed and used by actors for actions (Lin, 2001). As the name implies, Social capital enables the usage of the Social-, but also the Intellectual assets.

2.4.3 Human capital
Human capital is the compendium of all traits and abilities that make human beings economically productive in a society (Shanahan & Tuma, 1994). These traits can be innate or acquired (Firkin, 2001). Human capital can be divided into general and specific Human capital. General Human capital is focused at formal education and prior work experience, whereby specific Human capital is focused at training and skills (Becker, 1993). Human capital enables the usage of the Intellectual- and Commercial assets.

2.4.4 Cultural capital
Cultural capital consists out of 3 stages, namely the embodied-, objectified-, and the institutional state (Bourdieu, 1986). The first stage comprises “long lasting dispositions of the mind and body” thus shared knowledge and values, tacit understandings, common language usage, collective styles and so on, that contribute to the presentation of the self in particular ways (Harker, 1990) (DiMaggio, 1994). The second stage encompasses “cultural goods” such as pictures, books, dictionaries, instruments, and machines. These goods have a symbolic value as they are viewed, interpreted, understood, and appreciated in a particular way. The third stage focuses on the educational attainment and qualifications, thus the formal education and acquired titles. Culture capital enables the usage of the Intellectual- and Socialization assets.

2.5 Complemented model
These assets and capitals are not self-contained, but interrelated as any conversion that does eventuate is likely to occur across considerable periods of time and be the outcome of a complex, multifarious and contingent process (Firkin, 2001). Organizations are striving to increase the total competencies in a continuous process of exchanging one competence for another. For instance, setting up an advertising campaign costs money, thus Material assets, but may increase the Commercial assets. Commercial assets maybe decreased by excluding certain customers, but hereby increasing the Socialization assets, as the exclusion may be based on ethic grounds (Hardjono, 1995).

The 4 assets and capital do not always have to be exchanged, they can also amplify eachother, such as an increase in Socialization assets results in increased Intellectual assets. Another example is the amplifying relation between the Intellectual assets and the Commercial assets (Nahapiet & Ghoshal, 1998).

As the increase of all competencies is a continuous process, the relation between the assets and between the capital (reinforcing or opposite) will vary in time. The advertising campaign has an opposite effect between the Material assets and the Commercial assets. But if the campaign is successful, the increased Commercial assets will increase the Material assets, thus the relation will be reinforcing.

The complemented model is shown in figure 2.8.
Figure 2.8: Adapted 7-P Application Model (Jonathan Scott, 2010)

<table>
<thead>
<tr>
<th>UNDERSTANDING</th>
<th>CAPITAL</th>
<th>ASSETS</th>
<th>IMPLEMENTATION</th>
<th>THE GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRATEGY</td>
<td>Preparation</td>
<td>Social</td>
<td>Intellectual</td>
<td>Assign responsibility</td>
</tr>
<tr>
<td></td>
<td>Processes</td>
<td>Cultural</td>
<td>Socialisation</td>
<td>Display appropriate measurements</td>
</tr>
<tr>
<td></td>
<td>Preservation</td>
<td></td>
<td></td>
<td>Waste Minimisation</td>
</tr>
<tr>
<td>THE CATALYST</td>
<td>Human</td>
<td>Commercial</td>
<td>Educate and involve all employees</td>
<td>Resource Maximisation</td>
</tr>
<tr>
<td></td>
<td>Economic</td>
<td>Material</td>
<td>Put agreed ideas into action</td>
<td>Cost Minimisation</td>
</tr>
<tr>
<td>TACTICS</td>
<td></td>
<td>Energy</td>
<td>Tabulate the results – make improvements, keep going...</td>
<td>Resource Deficit Prevention</td>
</tr>
<tr>
<td></td>
<td>Place</td>
<td>Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Product</td>
<td>Raw Materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Production</td>
<td>Physical Waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tools &amp; Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>System Performance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Achieving optimal outputs with minimal inputs (doing more with less)

- Obtaining 100% value from purchases and investments
- Economically reusing inputs and outputs for as long as possible
The goal of the model is four-fold, namely Waste Minimisation, Resource Maximisation, Cost Minimisation, and Resource Deficit Prevention. Due to the importance of Time for A-Lanes, the focus is on Waste Minimisation, with Time as Waste.

In order to understand the waste of time, the time that an activity needs must be understood. The time an activity needs is not only the actual amount of time spend on performing the activity, but also the time that it takes before an activity is started. These periods of time are respectively the Work in Progress- (WiP) and the Queuing Time (QT).

There are many factors influencing these two time periods such as, unclear priorities (Stack, 2008), interruptions, lack of organization and untidiness, not enough time-off (Gothberg, 1986), variability due to rework and downtime (Schonberger, 1986) (Hopp, Spearman, & Woodruff, 1990), and no clear start and stop times (Butler & Hope, 1995) (Snell, 2009).

These factors are categorized by Mossman (2012) whereby the 3 most important factors leading to waste of time are:

- unclear information \( (T_1) \)
- not enough operatives \( (T_2) \)
- no promise to deliver \( (T_3) \)

### 2.6 Hypotheses

The assets are interrelated with both positive (reinforcing) and negative (weakening) relations. All hypotheses are related to the given specific context, namely A-Lanes executing the A-15 MaVa project. Hereby focusing at A-Lanes being a consortium, and therefore having a wider base of resources, but also a wider range of obstacles to be taken, such as miscommunication, friction, stress, and control.

It is hypothesized that the effect of the Material assets on the Intellectual, Socialization, and Commercial assets is negative. In order to increase the Intellectual, Socialization, and Commercial assets, an investment has to be made, which decreases the Material assets. For example: the Intellectual assets can be increased by providing employees with an educational course. This course will have a positive effect on the Intellectual asset, as it increases the Human capital, but it will decrease the Economic capital and thus the Material assets of an organization. Following hypothesis 1

**H1**: *The relation between Material assets and Intellectual, Socialization, and Commercial assets is negative.*

The relation between the Intellectual assets and the Socialization, Commercial and Material assets is positive. The more intellectual capital an organization has, the more capable it is to create social capital, access and act on a market, and eventually increases the Material assets. For example: the educational course provided for the employees may be graded by a group assignment. This assignment requires employees to work together and eventually increase the Socialization and Commercial assets. With a good working team, the efficiency is increased, and thus the Material assets. Following hypothesis 2

**H2**: *The relation between Intellectual assets and Socialization, Commercial, and Material assets is positive.*

The relation between the Socialization assets and the Intellectual, Commercial and Material assets is positive. The more social capital an organization has, the more capable the organization is to use the Intellectual assets of the communicating party, become aware of opportunities to access and act on a market, and eventually increase the Material assets. Following hypothesis 3
H3: The relation between Socialization assets and Intellectual, Commercial, and Material assets is positive.

The relation between the Commercial assets and the Intellectual, Socialization, and Material assets is positive. The more Commercial assets an organization has, the more capable it is to know where the intellectual capital is located, how to communicate with it, and eventually increase the Material assets. For example: A-Lanes can apply its Commercial assets to locate intellectual capital among the different companies and departments. If this is done right, the intellectual capital is located efficiently and can be quickly and correctly applied. This may result in a timesaving as the right person is found to do a certain activity. As the DBFM contract states, every month time saved equals €10M, thus every time saved will result in increased Material assets. Following hypothesis 4.

H4: The relation between Commercial assets and Intellectual, Socialization, and Material assets is positive.

An abstract representation is given in the figure 2.9.

![Figure 2.9: Abstract representation of hypotheses 1](image)

Intellectual assets are related to the intellect of a person/organization, but also the capability to learn. A person with a high level of Intellectual assets will be able to solve problems quickly in a right manner. For example: an employee that has successfully followed a Spanish language course, will be able to understand a Spanish written request. The request can be processed without the help of an interpreter. This means that with the Intellectual asset of the employee, the information is clear, and that there are enough operatives to process the work. Following is hypothesis 5.

H5: The level of Intellectual assets is positively related with $T_1$ and $T_2$.

The Socialization assets are related to cooperation and communication. A person with a high level of Socialization assets will be able to react on problems and communicate them towards other parties. That person will also be able to come to an agreement for a problem. Following is hypothesis 6.

H6: The level of Socialization assets is positively related with $T_1$ and $T_3$. 
The Commercial assets cover the ability to have access to and to act on markets. It also covers the skill to execute commercial transactions, these assets are also known as “good will”. An organization with a high level of Commercial assets will be able to promote and offer its product in a positive way. It will have a clear view on the situation it is in. Following is hypothesis 7.

**H7**: *The level of Commercial assets is positively related with T₂.*

The Material assets are related to the ability of a person to perform its activity. A person with a high level of Material assets will be able to perform an activity in more efficient, thus faster and better, way. Following is hypothesis 8.

**H8**: *The level of Material assets is positively related with T₂.*

An abstract representation is given in the figure 2.10.

![Diagram](image)

**Figure 2.10**: Abstract representation of hypotheses 5 to 8
3 Research Design

This chapter will first focus on the scope, namely the design process of 2 of the 4 disciplines of the A15 MaVa project. Hereafter the methodology is described which will be used to analyze the data. This chapter will conclude with a description of the measures and a planning of the project.

3.1 Scope

The focus of this research will be on the design process, because this process is the core of the project. The design process delivers the product according the set requirements, thus the approval for the financial reward. This design process is documented in the management system of A-Lanes and titles TP03 (see appendix 1).

The process consists out of multiple steps, which can be divided into 3 layers. The first layer is the main layer and consists out of 7 steps. The first step is focused at quality management and includes defining a company manual, evaluating and documenting customer satisfaction, defining an audit plan and planning these audits, executing these audits and reviewing this first step. The second step is focused at evaluating the project and controlling the process. This step includes evaluating the contract, the quality, and the environmental vision, the minimal delay of traffic flow, the risks, time, subcontract, sustainability, safety, and costs.

The third, fourth and fifth step are focused at the design and are the Integral Design (IO), Definitive Design (DO), and Detail Engineering (DE). These three steps are built up out of the same 7 steps (the second layer) and after every iteration, there is more focus for detail. The three design steps follow the sequence of first implement improvement points, followed by specifying the design. Hereafter there is an optional kick-off meeting followed by the actual designing. After designing the design is verified and closed out. The final step is evaluating the forgoing process.

The three most important steps of the second layer are “specifying the design”, “designing”, and “verifying the design”. Just as with the second layer, these three steps are build up out of similar steps (the third layer) and after every iteration, the level of detail is increased.

Specifying the design starts with decomposing the demands and managing the areas of contact. Hereafter the demands and functions are allocated, followed by setting up a verification plan. This verification plan is set up by defining the boundaries and assumptions. Hereafter a start-document is made, checked, finalized and eventually cleared for further processes.

Designing starts with setting up a Trade-off matrix, reviewing this matrix and choosing an alternative. Hereafter the design is worked out and the documents of the design are made, checked, finalized and eventually cleared for further processes.

Verifying the design starts with setting up, controlling, and finalizing a verification document. Hereafter a design-document is setup, controlled, finalized, reviewed, and cleared for further processes.

The sixth and seventh step of the first layer are the finalizing steps and are focused at evaluating the forgoing process, defining and documenting improvement points, and create documents of recommendation for future projects.
An abstract representation of the 3 layers of the TP03 process is presented in figure 3.11.

Layer 1

Layer 2

Layer 3

Figure 3.11: Abstract representation of the 3 layers of the TP03

The A15 MaVa project includes 4 disciplines related to development, namely Roads, Botlek Corridor, Crossings, and Technical Installations. The disciplines Roads and Crossings are chosen to be the focus of the research. This decision is made with the Processmanager of TP03 and is based on the degree of complexity and the availability of respondents. The discipline Technical Installations consists mainly out of subcontractors and is, besides hard to contact, not a representative sample for A-Lanes. The discipline Botlek Corridor is so complex that it would not be manageable to conduct a survey and analysis that is thorough enough to be valid.

The TP03 process consists out of different steps, which all require input. The input of every step is the output of the previous step. External inputs are also taken into account whereby “external input” is defined as activities that are not included by, but are influencing the TP03 process. The TP03 process is executed by the designing team. The departments that influence the TP03 process, but are not included in the designing team are external actors that produce the external input. An example of an external actor is the department “Document Control”. This department does not actually designs, but has a supporting role for the design department. It must be noted that these external actors are departments
of A-Lanes. In order to keep the scope manageable, only the first degree of external inputs of the TP03 is taken into account (see figure 3.12). This leads to including not only designers and managers into the scope, but also document controllers, contract managers, and human resource managers.

![Diagram of TP03 process]

**Figure 3.12: Abstract representation of the first external input of the TP03 process**

The steps of TP03, the first external input, and the functions involved are deducted from the flowchart of the management system (see appendix 1). The employees involved are deducted from the organization charts of the organizations (see appendix 2), whereby the different functions are linked to the names of employees.

This process is worked out into a process map which includes all the steps, in sequential order, of the 3 layers of the TP03 process of the 2 disciplines (see appendix 3). In the legend the functions and the names of the employees are shown (see appendix 4).

### 3.2 Methodology

The aspects researched are the assets (Intellectual, Socialization, Commercial, and Material), and the factors influencing time (clear information, enough operatives, and promise to deliver). These aspects and their abbreviation are shown in table 3.2.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual assets</td>
<td>I</td>
</tr>
<tr>
<td>Socialization assets</td>
<td>S</td>
</tr>
<tr>
<td>Commercial assets</td>
<td>C</td>
</tr>
<tr>
<td>Material assets</td>
<td>M</td>
</tr>
<tr>
<td>Clear information</td>
<td>T&lt;sub&gt;1&lt;/sub&gt;</td>
</tr>
<tr>
<td>Enough operatives</td>
<td>T&lt;sub&gt;2&lt;/sub&gt;</td>
</tr>
<tr>
<td>Promise to deliver</td>
<td>T&lt;sub&gt;3&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

**Table 3.2: Aspects and Abbreviation**
These aspects are variables that are latent variables, thus not directly measureable. In order to create a value related to these latent variables, a questionnaire is conducted among the employees involved with the TP03 process. This questionnaire is build up out of questions related to the 8 areas in interest, namely the identification, I, S, C, M, T₁, T₂, and T₃ and are answered according to a 7-point Likert scale. The questionnaire is shown in appendix 5.

It assumed that the assets are an accumulation of the capitals, whereby the relation between the capitals and assets is shown in table 3.3.

<table>
<thead>
<tr>
<th>Asset</th>
<th>Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Cultural, Human, Social</td>
</tr>
<tr>
<td>S</td>
<td>Cultural, Social</td>
</tr>
<tr>
<td>C</td>
<td>Human</td>
</tr>
<tr>
<td>M</td>
<td>Economic</td>
</tr>
</tbody>
</table>

Table 3.3: Assets and Capitals

These capitals are measured by questions divided over the assets, whereby the relation between the questions posed and the capitals is shown in table 3.4.

<table>
<thead>
<tr>
<th>Capital</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural</td>
<td>1, 8, 10, 12, 13, 15, 17, 19</td>
</tr>
<tr>
<td>Social</td>
<td>4, 5, 7, 9, 11, 14, 16, 18</td>
</tr>
<tr>
<td>Human</td>
<td>2, 3, 6, 20, 21, 22, 23, 24, 25</td>
</tr>
<tr>
<td>Economic</td>
<td>26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36</td>
</tr>
</tbody>
</table>

Table 3.4: Capitals and Questions

As the capitals are the foundation of the assets, the capital should be coherent. To validate this coherence, a correlation matrix is analyzed. This correlation matrix analyzes the significane of the correlation between the questions posed.

In order to proceed with the data analysis, the data has to be manageable and a data reduction technique is applied.

The two main data reduction techniques are Principal Component Analysis (PCA) and Factor Analysis (FA) (Field, 2009).

The commonality between PCA and FA is that they both reduce data, thus convert a set of observations into a smaller set of variables. The difference between PCA en FA is that PA does not take correlation between variables into account, as does FA. Another, more significant, difference between PCA and FA is the direction of influence. The direction of influence by PCA is from the observations to the latent variables, thus the observations identify the latent variables. The direction of influence of FA is from the latent variables to the observations, thus FA assumes that the observations are based on the latent variables (DeCoster, 1998). As the produced questions are based on the variables they should indicate, FA is the technique chosen for the analysis in this situation.

Factor Analysis can be divided into Confirmatory and Exploratory Factor Analysis (CFA and EFA). CFA is a theory-testing technique, instead of a theory-generating technique such as EFA (Stapleton, 1997) (DeCoster, 1998). CFA uses a model a priori, supported by theory or previous research, the number of factors, end which items load on each factor. It allows the researcher to test the hypothesis that a relationship between the observed variables and their underlying latent construct(s) exists (Suhr, 2004).

EFA determines the factor structure and explains a maximum amount of variance. It allows the researcher to determine the number of latent variables (Suhr, 2004).
The situation would indicate the application of CFA, as a model is present, the number of factors is known, and which item loads on which factor. However, the main goal of CFA is to test the hypothesis that a relationship exists between the observed variable and the underlying latent variable. This is not the main goal of the statistical analysis in this situation. The items related to the latent variables are questions that are related to the different assets. If CFA would be applied, it would only test whether the questions actually represent the latent variables.

The data reduction step in the statistical analysis is not a goal, but a mean. The items on the latent factors are mere validation of the latent variables. By the increased number of related items on a latent variable, the validation of this latent variable is increased, whereby the guideline for the number of observations per latent variable lies between the 3 and 10 observations (Suhr, 2004) (DeCoster, 1998). It is necessary to take as much information from the data into account when giving a measure to the latent variable, thus explain a maximum amount of variance. The technique chosen to be applied EFA.

The main steps for EFA are:

1. Initial extraction: This is the basic data reduction step. Each factor accounts for a maximum amount of variance that has not been accounted for by the other factors.
2. Determine number of factors to retain: This can be done based on the Eigen-value, analysis of the scree-plot or by a set number of factors.
   - The Eigen-value is a value of the relative importance of a factor. By a set cut-off value, the factors can be retained (Field, 2009). This approach is the least accurate method (Velicer & Fava, 1990). A scree plot is a graph of eigenvalues against the factor it is associated with. At the bending point is the biggest difference in relative importance between factors.
   - The set number of factors to be retained is based on previous assumptions. In this situation there are 7 factors that are retained.
3. Rotate factors: Rotation of the factors is to simplify the interpretation of the factors, by loading the factors maximally to only one factor.
4. Interpret factor structure: By interpreting the structure of the factors, an analysis of the direction of the factors appears. The direction of the factor can be reversed by multiplying the factor by -1. This will reverse a factor “unhappy” into a factor “happy”.
5. Construct factor scores for further analysis: Altering the factor scores in order to meet requirements for further analysis.

To check the quality of the analysis the Kaiser-Meyer-Olkin (KMO) value should be higher than 0.5 and the Bartlett’s test of sphericity should be significant. A KMO value higher than 0.5 indicates that the data may be grouped into a smaller set of underlying factors based on the (partial) correlation, thus measuring a common factor. As an example:

- If the partial correlation is 0.0, the variables are measuring a common factor and the KMO = 1.00
- If the partial correlation is 1.0, the variables are NOT measuring a common factor and the KMO = 0.00
The KMO should be higher than 0.5 to be sufficient, but there are gradations. These gradations are displayed in the table 3.5 (Hutcheson & Sofroniou, 1999).

<table>
<thead>
<tr>
<th>KMO value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>Bare minimum</td>
</tr>
<tr>
<td>0.5 – 0.7</td>
<td>Mediocre</td>
</tr>
<tr>
<td>0.7 – 0.8</td>
<td>Good</td>
</tr>
<tr>
<td>0.8 – 0.9</td>
<td>Great</td>
</tr>
<tr>
<td>0.9 &lt;</td>
<td>Superb</td>
</tr>
</tbody>
</table>

Table 3.5: KMO value and Description

Bartlett’s test of sphericity should be significant as it tests whether the correlation matrix is an identity matrix. If the test is significant, the correlation matrix is not an identity matrix, and thus appropriate (Field, 2009).

Hypotheses 1 to 4 require a dynamic analysis, thus an analysis over time. In order to create the first step in this dynamic analysis, the average of the weight of the assets is taken and presented. These weights form the first snapshot of the film, which will reject or confirm hypotheses 1 to 4.

The further analysis, mentioned in step 5, is in this situation a Multiple Regression (MR). This analysis allows an outcome variable to be predicted by several prediction variables. The quality of the analysis is analyzed by the goodness of fit and is presented with the parameter $R^2$. $R^2 = \frac{SS_m}{SS_T}$, whereby this is the ratio between the Model sum of squares and the Total sum of squares. The Total sum of squares represents the difference between the observed values and the values predicted by the mean. The Model sum of squares represents the difference between the Total sum of squares and the Residual sum of squares ($SS_R$) which stands for the difference between the observed data point and the value predicted by the regression line. The Model sum of squares is an improvement in prediction as it reduces the inaccuracy of the model by using the regression line instead of the mean as a base for comparison (Field, 2009). Multiple Regression will be conducted on the following situations:

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Independent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>I, S, C</td>
</tr>
<tr>
<td>T2</td>
<td>I, M</td>
</tr>
<tr>
<td>T3</td>
<td>S</td>
</tr>
</tbody>
</table>

Table 3.6: Dependent and Independent variables

The product of a multiple regression is in this situation:

$$T = b_0 + b_1 \text{Asset} + b_2 \text{Asset} + b_3 \text{Asset}$$

The last step in this analysis forms the base for the recommendations. The recommendations are based on the significant effect resulting from the Multiple Regression, and the significant impact of a division on the input variables. This last step is performed by conducting an Analysis of Variance (ANOVA). An ANOVA compares the mean of one or more groups based on one independent variable (or factor), in this case the department, focus, company and education. If the sig. <.05 the means differ significantly. To test the homogeneity of variance, Levene’s statistic is analyzed. If this statistic is not significant, thus sig. >.05, the groups have approximately equal variance on the dependent variable.
An abstract representation of the data analyzing process is shown in figure 3.13.

![Diagram of data analyzing process]

**Figure 3.13: Abstract representation of the data analyzing**
3.3 Measures

The factors that are analyzed are known, namely the Identification, Intellectual-, Socialization-, Commercial-, Material assets, Clear information, Enough operatives, and Promise to deliver. From these input factors, some are latent. These latent factors are Intellectual-, Socialization-, Commercial-, Material assets, Clear information, Enough operatives, and Promise to deliver.

To discover these latent factors, observations should be made. These observations are made in the form of answered questions. Some of the variables are build up out of capitals, whereby the questions produced are related to the different capitals. As shown in chapter 2.2 the number of observations per variable lays between the 3 and 10 observations, thus 3 to 10 questions for each of the 7 variables.

The variables Intellectual-, Socialization-, Commercial-, and Material assets are already described in chapter 2.3. The posed questions will related to different dimensions of these assets. These dimensions are enumerated in the following subchapters.

The latent variables which are not yet described are Clear information, Enough operatives, and Promise to deliver. These variables are described in the following subchapters.

3.3.1 Intellectual assets

In order to measure the intellectual assets, questions are produced related to

- Lateral thinking
- Explaining and predicting
- Evaluating
- Self-examination
- The application of skills of the employee
- Know-how
- Expertise
- Creativity
- The innovation capability of the employee
- Managerial support

3.3.2 Socialization assets

In order to measure the Socialization assets, questions are produced related to the dimensions:

- Taking risks
- Anticipating on the social environment
- Setting goals
- Generating ideas
- Trust
- Rules and norms governing social action
- Types of social interaction
- Network resources
- Volunteerism
- Neighborhood connections
- Everyday sociability
- Togetherness
- Generalized norms
- Group characteristics
3.3.3 Commercial assets
The dimensions of Commercial assets are:
- Acknowledge changes
- Generate demand
- Knowledge development
- Generating experience

3.3.4 Material assets
The Material assets cover the preceded Material Resources, these are the dimensions which the produced questions relate to.

3.3.5 Clear information
Unclear information is the main reason of waste of time. Unclearity can be caused by incomplete and unreadable pieces of information. If a piece of information is unreadable, this can be because of the language that is used, or the handwriting. A different format can also be the cause for the piece being unreadable. In order to measure the level of clarity of the information, questions are produced related to these causes.

3.3.6 Enough operatives
The number of operatives influences the amount of activities processed in a certain amount of time. If there are not enough operatives, the operatives that are available will have to perform to much activity in that same certain amount of time. The pressure on the operatives will be high and might lead to stress. Stress is a good indicator to check if there are enough operatives. The 4 dimensions of stress are:
- Cognition (Beehr & Newman, 1978) (Beehr & Bhagat, 1985): A high level of stress can lead to a decrease of concentration, focus, and organization.
- Affection (Christopher, Bauman, & Veness-Meehan, 2000): A high level of stress can lead to irritability, anger, and sadness.
- Physical (Burke, 1991) (Suedfeld & Steel, 2000): A high level of stress can lead to change in appetite, less sleep, weight gain or loss, and high bloodpressure.
In order to measure whether there are enough operative, questions are produced related to these dimensions.

3.3.7 Promise to deliver
The promise to deliver enables the receiving party to conduct some pre-work, and hereby reducing the time. If the delivery is not promised, the receiving party will only be able to start the work, when the pre-work is handed to them. This will result in a no-time-winning-situation, as the receiving party will not be able to create an advantage by producing a buffer.
The promise to deliver is related with deadlines. Deadlines enable the providing party to create a bounded timeline wherein the work has to be done. Deadlines enable the receiving party to create a buffer by performing some activities in advance.
The aspect deadline is the main dimension in order to measure whether there is a promise to deliver.
4 Results

There are 111 surveys handed out to the people involved with the TP03 process. This number is divided over 3 areas, namely the disciplines Roads and Crossing and the first external input. Respectively 40, 10, and 61 surveys were handed out. The number of surveys returned is respectively 33, 8, and 40, which results in the following response rate 82.5% ; 80% ; and 65.6%. Overall a response rate of 73% was reached. This chapter will first focus on the correlation matrices, followed by the Exploratory Factor Analysis. Hereafter is focused on the Multiple Regression, followed by the ANOVA’s. This chapter will close with the conclusion taken from these results.

4.1 Correlation Matrix

A priori the assumptions is made that the assets are an accumulation of the capitals. The relation between the capitals and the assets is shown in table 4.7.

<table>
<thead>
<tr>
<th>Asset</th>
<th>Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Cultural, Human, Social</td>
</tr>
<tr>
<td>S</td>
<td>Cultural, Social</td>
</tr>
<tr>
<td>C</td>
<td>Human</td>
</tr>
<tr>
<td>M</td>
<td>Economic</td>
</tr>
</tbody>
</table>

Table 4.7: Assets and Capitals

In order to validate that the capitals itself are measured correctly, a correlation matrix is analyzed. This correlation matrix analyzes the significance of the correlation between the questions posed. Table 4.8 shows which questions relate to which capital.

<table>
<thead>
<tr>
<th>Capital</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural</td>
<td>1, 8, 10, 12, 13, 15, 17, 19</td>
</tr>
<tr>
<td>Social</td>
<td>4, 5, 7, 9, 11, 14, 16, 18</td>
</tr>
<tr>
<td>Human</td>
<td>2, 3, 6, 20, 21, 22, 23, 24, 25</td>
</tr>
<tr>
<td>Economic</td>
<td>26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36</td>
</tr>
</tbody>
</table>

Table 4.8: Capitals and Questions

The correlation matrix related to the Cultural capital, see Appendix 7, shows 12 significant correlations, 7 significant at the 0.05 level and 5 at the 0.01 level (2-tailed). The correlated questions are shown in table 4.9.
Table 4.9: Correlation matrix Cultural capital

<table>
<thead>
<tr>
<th>Improvement points</th>
<th>Easily planned activities</th>
<th>Know who to talk to</th>
<th>Tasks / responsibilities</th>
<th>Miscommunication</th>
<th>Space for error</th>
<th>Opinion during a meeting</th>
<th>Part of A-Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement points</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easily planned activities</td>
<td>-.085</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Know who to talk to</td>
<td>.068</td>
<td>-.063</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tasks / responsibilities</td>
<td>.222**</td>
<td>.326**</td>
<td>.236*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscommunication</td>
<td>.004</td>
<td></td>
<td>-.047</td>
<td>.229*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space for error</td>
<td>.235*</td>
<td>-.024</td>
<td>.208</td>
<td>.214</td>
<td>.080</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opinion during a meeting</td>
<td>.035</td>
<td>.829</td>
<td>.063</td>
<td>.053</td>
<td>.476</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part of A-Lanes</td>
<td>-.131</td>
<td>.190</td>
<td>.275*</td>
<td>.331**</td>
<td>.202</td>
<td>.343**</td>
<td>.275*</td>
</tr>
<tr>
<td></td>
<td>.242</td>
<td>.089</td>
<td>.013</td>
<td>.003</td>
<td>.071</td>
<td>.002</td>
<td>.013</td>
</tr>
</tbody>
</table>

The most remarkable correlation is between question 1 and 15, as the correlation is negative by -.235. By an increased space for error, the number of noticed improvement points decreases. This is explained by the fact that an increased space for error increases the number of improvement points accepted and labeled in the space for error. As an individual is accepted to make a lot of errors, he/she will not see improvement points as the errors are accepted, and thus are not seen as errors which need intervention.

The other correlations are mainly a confirmation that the questions posed actually measure the Cultural capital. For instance the correlation of .326 between the ease of planning activities and knowing which tasks/responsibilities a person has. In order to plan a person’s activities, this person first has to be aware about these tasks/responsibilities. Another correlation is between “knowing who to talk to” and “being afraid to give an opinion during a meeting” with a correlation of .474. It must be noted that “being afraid to give an opinion during a meeting” is negatively posed and therefore computed vice versa (1=7 and 7=1). A person who knows who to talk to when something goes wrong is likely to not be afraid to give his/hers opinion during a meeting. It could be that this person is an extrovert person, who is not afraid to talk to people.

The same goes for the correlation between “being afraid to give an opinion during a meeting” and “I feel a part of A-Lanes” with a correlation of .275. A person who feels he/she is a part of A-Lanes will have a lower threshold to speak up during a meeting. This is because it is easier to comment in a group, and thereby positioning yourself vulnerable, who you are familiar with, then a group who you are not.

“There is a lot of miscommunication” is also negatively posed and has a significant correlation with “my activities can easily be planned” of .379. When there is a good communication with other departments, activities involving these departments will be easier to plan.
The correlation matrix related to the Social capital, see Appendix 8, shows 12 significant correlations, 5 significant at the 0.005 level and 7 at the 0.01 level (2-tailed). The correlated questions are shown in table 4.10.

<table>
<thead>
<tr>
<th></th>
<th>Act not outside work area</th>
<th>New ideas</th>
<th>New ideas (manager)</th>
<th>Smalltalk</th>
<th>Lunch</th>
<th>Discuss personal issues</th>
<th>Coffee</th>
<th>Clear feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Act not outside work area</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New ideas</td>
<td>0.367**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New ideas (manager)</td>
<td>0.081</td>
<td>0.174</td>
<td>0.563</td>
<td>1.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smalltalk</td>
<td>-0.087</td>
<td>0.109</td>
<td>0.162</td>
<td>1.147</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
<td>0.255**</td>
<td>0.343**</td>
<td>0.300**</td>
<td>0.256*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discuss personal issues</td>
<td>0.242**</td>
<td>0.087**</td>
<td>0.230*</td>
<td>0.230*</td>
<td>0.422**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>-0.031</td>
<td>0.110</td>
<td>0.104</td>
<td>0.123</td>
<td>0.110</td>
<td>0.213</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Clear feedback</td>
<td>-0.081</td>
<td>0.026</td>
<td>0.312**</td>
<td>0.487**</td>
<td>0.051</td>
<td>0.137</td>
<td>0.046</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.10: Correlation matrix Social capital

The correlation between “I often come up with new ideas” and “I do NOT act outside my own work area” is significant with a correlation of ,367. A person’s creativity might be sparked by practices it observes in other work areas, thus if a person acts outside its work area, this might be the base for new ideas. It must be noted that question 4 is negatively posed. Besides acting outside a personal work area, lunching with colleagues might also spark new ideas, due to new influences. This is represented in the significant correlation of ,343. The correlation between “receiving clear feedback” and having “small talk” is highly significant (.000) and is,478. A person who talks about the weekend with its colleagues, has the opinion that his/her manager gives clear feedback. This might be due to the social aspect. If a person is open about its weekend, it positions itself in an open conversation. This might enable the manager to give feedback in a way that is appropriate for that person. The way “feedback” is received is also correlated whether a “manager is open for new ideas” (.312). If a manager is open for new ideas he/she might also try to give feedback in a more personalized way, which increases the quality of receipt of this feedback. Another reason why these questions are correlated might be because an open manager has a relation with a person who brings new ideas. If a manager is willing to listen to new ideas, the subordinate is more willing to accept the feedback of the
manager. This is due to an increased mutual trust and volunteerism. The correlation between “getting coffee” and “discussing personal issues with colleagues” is not significant (,056) but is still very relevant with a correlation of ,213. A person who fetches coffee for his/her colleagues will send a positive message of investment in the relationship. This will form the base for trust to discuss personal issues. Although this correlation is not significant, it is relevant as it focuses very much on the Social capital, as this correlation encompasses very important dimensions of Social capital, namely mutual trust, volunteerism, togetherness, and frequency of participation in group characteristics.

The correlation matrix related to the Human capital, see Appendix 9, shows 13 significant correlations, 8 significant at the 0.05 level and 5 at the 0.01 level (2-tailed). The correlated questions are shown in table 4.11.

<table>
<thead>
<tr>
<th></th>
<th>Improvement points</th>
<th>Plan activities carefully</th>
<th>Use software in A-Lanes</th>
<th>Changes in department</th>
<th>Cooperation Lunchplaza presentation</th>
<th>Knowledge in own specialization</th>
<th>Knowledge outside own specialization</th>
<th>Attend presentations</th>
<th>Work experience outside my function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement points</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan activities carefully</td>
<td>0.092</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use software in A-Lanes</td>
<td>.172</td>
<td>.235*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes in department</td>
<td>.149</td>
<td>-.246*</td>
<td>.246*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperation Lunchplaza presentation</td>
<td>.246*</td>
<td>-.039</td>
<td>.251*</td>
<td>.084</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge in own specialization</td>
<td>.084</td>
<td>.167</td>
<td>.194</td>
<td>.031</td>
<td>.044</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge outside own specialization</td>
<td>.102</td>
<td>.230*</td>
<td>.246*</td>
<td>-.051</td>
<td>.454**</td>
<td>.400**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attend presentations</td>
<td>.242*</td>
<td>.063</td>
<td>.310**</td>
<td>-.047</td>
<td>.296**</td>
<td>.050</td>
<td>.217</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Work experience outside my function</td>
<td>.029</td>
<td>.638</td>
<td>.005</td>
<td>.680</td>
<td>.007</td>
<td>.956</td>
<td>.061</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.11: Correlation matrix Human capital

The most relevant correlation is between “cooperation with a Lunchplaza presentation” and “knowledge outside own specialization” with a significance of ,000 and a correlation of ,454. A person who attends presentations at Lunchplaza also often follows classes to gain more knowledge outside its own specialization. This is because the most presentations are given in Lunchplaza, thus if a person follows a class to gain more outside knowledge, this often occurs in Lunchplaza. Persons who often follow classes to gain more “knowledge outside its own specialization” often follow classes to gain more “knowledge about its own specialization”. This correlation is less relevant as the significance is the same (.000) but the correlation is lower, namely ,400. It must be noted that this
correlation is still very relevant as it relates to the motivation to self-education and self-development. Self-educating people are also more able to “plan their activities carefully” with a correlation of .230 and a significance of .039. This might be due to the perspective of a person. By following classes to gain more knowledge (inside or outside the own specialization) the perspective of this person is increased, hereby the relations between tasks get clearer, which helps to plan activities in the right order.

The correlation matrix related to the Economic capital, see Appendix 10, shows 18 significant correlations, 9 significant at the 0.05 level and 9 at the 0.01 level (2-tailed). The correlated questions are shown in table 4.12.

<table>
<thead>
<tr>
<th>Light</th>
<th>Fresh air</th>
<th>Heating</th>
<th>Fixed workplace</th>
<th>Computer performance</th>
<th>Software</th>
<th>ICT-support</th>
<th>Enough room</th>
<th>Administrative objects</th>
<th>Printing/Plotting</th>
<th>Email service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh air</td>
<td>.125</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td>.028</td>
<td>.378***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed workplace</td>
<td>.002</td>
<td>.000</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer performance</td>
<td>.212</td>
<td>-.061</td>
<td>.083</td>
<td>.187</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td>.261**</td>
<td>-.102</td>
<td>-.052</td>
<td>-.018</td>
<td>.566**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICT-support</td>
<td>.193</td>
<td>-.193</td>
<td>-.047</td>
<td>.101</td>
<td>.304***</td>
<td>.194</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enough room</td>
<td>.106</td>
<td>.243***</td>
<td>.258***</td>
<td>.279***</td>
<td>.030</td>
<td>-.012</td>
<td>.020</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative objects</td>
<td>.138</td>
<td>.029</td>
<td>.016</td>
<td>.012</td>
<td>.738</td>
<td>9.119</td>
<td>.862</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printing/Plotting</td>
<td>.244***</td>
<td>.231***</td>
<td>.197</td>
<td>.307***</td>
<td>.126</td>
<td>.139</td>
<td>.087</td>
<td>.241*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Email service</td>
<td>.028</td>
<td>.038</td>
<td>.077</td>
<td>.005</td>
<td>.280</td>
<td>.216</td>
<td>.438</td>
<td>.030</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.12: Correlation matrix Economic capital

The most remarkable correlation is between “there is enough fresh air” and “the heating does not work like it ought to” with a significant of .000 and a correlation of .378. The statement about the heating is negatively posed, thus the correlation states that a person who think that there is enough fresh air, is not satisfied about the heating. This might be because a lot of fresh air cools the area, and might be interpreted as the heating not working as it should be.

The highest correlation is between “satisfaction about computer performance” and “satisfaction about the used software” with a significant of .000 and a correlation of .555. A person who is satisfied with the performance of his/her computer is also satisfied with the software it uses. If a computer can perform well, people are satisfied about the software they use on that computer. If a computer is designed for 3-
D drawings, and the person uses his/her computer for 3-D drawings, the correlation is logic. This correlation is besides highly significant also very relevant. The Economic capital describes which resources an organization possesses or controls. In this situation the project focuses on intangible object, namely digital data, because of the design process. The most important resources that are required for this digital focus are computers and the software is uses. The correlation between “satisfaction about computer performance” and “satisfaction about ICT support” has a significance level os ,006 and a correlation of ,304. This correlation is also relevant as ICT support is very important because it will ensure that the computer will be up to date and will perform accordingly.

In order to validate that the assets are an accumulation of the capitals, an exploratory factor analysis is conducted on the assets. This analysis answers the question whether or not a variable has underlying dimensions. The number of underlying dimensions and the amount of observation influence the slope of the scree-test. If a variable has multiple underlying dimensions which are observed by only a few observations, the scree-test will not be steep as a variable with only one underlying dimension and multiple observations. As noted before, the KMO should be above 0,5 and Bartlett’s test of sphericity should be significant.

4.2 Exploratory Factor Analysis

The scree-plot of the exploratory factor analysis of the Material assets, build up out of only Economic capital, has a KMO value of ,630 and a significant Bartlett’s Test of Sphericity, and is shown in Appendix 11. The scree-plot shows a nice elbow point after 3 underlying dimensions. The 3 dimensions are related to the workplace (whether it is fixed, there are enough administrative objects), the digital objects (computer performance, ICT-support, used software), and the work environment (heating and fresh air). The scree-plot of the exploratory factor analysis of the Commercial assets, build up out of only the Human capital, has a KMO value of ,512 and a significant Bartlett’s Test of Sphericity, and is shown in Appendix 12. The scree-plot shows a less steep elbow point in comparison with the Material asset, which is due to the fewer observations of the Commercial asset.

The scree-plot of the exploratory factor analysis of the Socialization assets, build up out of the Cultural and Socialization capital, has a KMO value of ,565 and a significant Bartlett’s Test of Sphericity, and is shown in Appendix 13. It can be concluded that the 2 underlying dimensions of the Socialization asset are indeed the Social and Cultural capital, as the related questions form the base for the division. The only question that is not according to the relation with its capital is question 13 (there is a lot of miscommunication with other departments).

The scree-plot of the exploratory factor analysis of the Intellectual assets, build up out of the Cultural, Human and Socialization capital, has a KMO value of ,562 and a significant Bartlett’s Test of Sphericity, and is shown in Appendix 14. The 3 underlying dimensions of the Intellectual asset are related to improvement points & creativity, planning, and feedback. According to the division of the questions related to the capitals, the Social capital has included a part of the Human capital and a part of the Cultural capital. The second underlying dimension is a combination of the Cultural and Human capital, whereby the third underlying dimension is solely based on the last Social capital observation. This interrelationship among underlying dimensions might be due to the interrelational and dynamic character of the capitals, see figure 2.5.

Because there is a good internal correlation within the capitals, and the exploratory factor analysis confirms that the assets are build up out of these capitals, the assumption that was made before is met and further analysis with computed assets is approved.
In order to deliver the first snapshot of the film for the dynamic analysis, the average of the assets is taken. These averages are shown in figure 4.14.

**Figure 4.14: Averaged Assets**

### 4.3 Multiple Regression

In order to test hypotheses 5 to 8, the related variables are combined into an average, leading to an average weight for the Intellectual, Socialisation, Commercial, and Material assets, and the 3 Time factors; T1, T2, and T3. Conducting a multiple regression on T1 with I, S, and C as independent variables resulted in a significant model \( (F_{3,77} = 13,259, p < 0.0005, \text{Adjusted R square } = .315) \), see Appendix 15. Significant variables are shown below:

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>B</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>.339</td>
<td>.223</td>
<td>0.046</td>
</tr>
<tr>
<td>S</td>
<td>.306</td>
<td>.200</td>
<td>0.041</td>
</tr>
<tr>
<td>C</td>
<td>.411</td>
<td>.370</td>
<td>0.001</td>
</tr>
</tbody>
</table>

This leads to the following equation:

\[ T_1 = 0.339 I + 0.306 S + 0.411 C, \text{ or standardized } T_1 = 0.223 I + 0.200 S + 0.370 C. \]

Conducting a multiple regression on T2 with I and M as independent variables resulted in a significant model \( (F_{2,78} = 11,769, p < 0.0005, \text{Adjusted R square } = .212) \), see Appendix 16. Significant variables are shown below:

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>B</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>.761</td>
<td>.480</td>
<td>&lt; 0.0005</td>
</tr>
</tbody>
</table>
The Intellectual assets are built up out of the Social capital, Cultural capital and Human capital. A multiple regression conducted on $T_2$ with Social-, Cultural-, and Human capital as independent variables resulted in a significant model ($F_{3,77} = 8.605, p < 0.0005$. Adjusted R square = .222), see Appendix 17. Significant variables are shown below:

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>B</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social capital</td>
<td>.400</td>
<td>.311</td>
<td>0.003</td>
</tr>
<tr>
<td>Cultural capital</td>
<td>.298</td>
<td>.206</td>
<td>0.042</td>
</tr>
<tr>
<td>Human capital</td>
<td>.306</td>
<td>.222</td>
<td>0.033</td>
</tr>
</tbody>
</table>

This leads to think that not only the Intellectual asset has a significant effect on $T_2$, but also the Socialization assets, as these assets are also built up out of the Social and Cultural capital. Conducting a multiple regression on $T_2$ with I and S as independent variables resulted in a significant model ($F_{2,78} = 15.500, p < 0.0005$. Adjusted R square = .266), see Appendix 18. Significant variables are shown below:

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>B</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>.661</td>
<td>.418</td>
<td>&lt;0.0005</td>
</tr>
<tr>
<td>S</td>
<td>.380</td>
<td>.239</td>
<td>0.019</td>
</tr>
</tbody>
</table>

This leads to the following equation:

$$T_2 = 0.661 I + 0.380 S,$$

or standardized $T_2 = 0.418 I + 0.239 S$.

Conducting a multiple regression on $T_3$ with S as independent variable resulted in significant model ($F_{1,79} = 22.212, p < 0.0005$. Adjusted R square = .210), see Appendix 19. Significant variables are shown below:

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>B</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1,744</td>
<td></td>
<td>0.012</td>
</tr>
<tr>
<td>S</td>
<td>.647</td>
<td>.468</td>
<td>&lt;0.0005</td>
</tr>
</tbody>
</table>

The Social and Cultural capital are the building blocks for not only the Socialization assets, but also the Intellectual assets. This leads to believe that the Intellectual assets also might have a significant effect on $T_3$. Conducting a multiple regression on $T_3$ with I and S as independent variables resulted in a significant model ($F_{2,78} = 11.018, p < 0.0005$. Adjusted R square = .200), see Appendix 20. Significant variables are shown below:

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>B</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1,890</td>
<td></td>
<td>0.029</td>
</tr>
<tr>
<td>S</td>
<td>.658</td>
<td>.476</td>
<td>&lt;0.0005</td>
</tr>
</tbody>
</table>

The Intellectual assets are not significant, as the Human capital, that is the difference between the Intellectual and Socialization assets, is not significant. A multiple regression on $T_3$ was conducted with Social-, Cultural-, and Human capital as independent variables which resulted in a significant model ($F_{3,77} = 8.121, p < 0.0005$. Adjusted R square is .211), see Appendix 21. Significant variables are shown below:

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>B</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2,234</td>
<td></td>
<td>0.011</td>
</tr>
<tr>
<td>Social capital</td>
<td>.256</td>
<td>.231</td>
<td>0.029</td>
</tr>
<tr>
<td>Cultural capital</td>
<td>.508</td>
<td>.406</td>
<td>&lt;0.0005</td>
</tr>
</tbody>
</table>
It is observed that the Human capital is not a significant variable, what explains the insignificant effect of the Intellectual assets on $T_3$.

The equation for $T_3$ is $1,744 + 0,658 S$, or standardized $T_3 = 0,476 S$.

### 4.4 ANOVA

In order to build the foundation for the recommendations, an ANOVA was conducted, which compares the mean of the assets, based on department, focus, company and education.

An Anova conducted based on the division of department resulted in a significant effect $I (F_{2,78} = 6,115, p = 0.003)$ and $C (F_{2,78} = 6,225, p = 0.003)$, see Appendix 22. The groups have approximately equal variance on the dependent variables as Levene’s statistic is not significant. The significant results are shown below:

<table>
<thead>
<tr>
<th>1=extern, 2=crossings, 3=roads</th>
<th>I</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5,0875</td>
<td>4,8</td>
</tr>
<tr>
<td>3</td>
<td>4,75</td>
<td>4,1364</td>
</tr>
<tr>
<td>2</td>
<td>4,3281</td>
<td>4,125</td>
</tr>
</tbody>
</table>

*Table 4.13: Anova on Department*

An Anova conducted based on the division of focus resulted in a significant effect $I (F_{1,79} = 9,032, p = 0.004)$, $S (F_{1,79} = 5,251, p = 0.025)$, and $C (F_{1,79} = 12,608, p = 0.001)$, see Appendix 23. The groups have approximately equal variance on the dependent variables as Levene’s statistic is not significant. The significant results are shown below:

<table>
<thead>
<tr>
<th>1=extern, 2=intern</th>
<th>I</th>
<th>S</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5,0875</td>
<td>5,0659</td>
<td>4,8</td>
</tr>
<tr>
<td>2</td>
<td>4,6677</td>
<td>4,7406</td>
<td>4,1341</td>
</tr>
</tbody>
</table>

*Table 4.14: Anova on Focus*

An Anova conducted based on the division of education resulted in a significant $S (F_{4,76} = 3,174, p = 0.018)$, see Appendix 24. The groups have approximately equal variance on the dependent variables as Levene’s statistic is not significant. The significant results are shown below:

<table>
<thead>
<tr>
<th>1=MBO, 2=HBO (bachelor), 3=WO (bachelor), 4=WO (master), 5=other</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5,2121</td>
</tr>
<tr>
<td>4</td>
<td>5,0752</td>
</tr>
<tr>
<td>1</td>
<td>4,9830</td>
</tr>
<tr>
<td>2</td>
<td>4,6786</td>
</tr>
<tr>
<td>3</td>
<td>3,9091</td>
</tr>
</tbody>
</table>

*Table 4.15: Anova on Education*

### 4.5 Conclusion from the results

It can be concluded from the forgoing results that hypothesis 5, hypothesis 6, and hypothesis 7 are fully confirmed. Hypothesis 8 is not confirmed as it had no significant effect.

Besides the confirmation of these hypotheses, it was noted that the Socialization assets also had a positive effect on $T_2$.

This resulting in the following statements:
$T_1 = 0,339 I + 0,306 S + 0,411 C$, or standardized $T_1 = 0,223 I + 0,200 S + 0,370 C$.

$T_2 = 0,661 I + 0,380 S$, or standardized $T_2 = 0,418 I + 0,239 S$.

$T_3 = 1,744 + 0,647 S$, or standardized $T_3 = 1,744 + 0,647 S$.

These statements are represented in the figure 15

![Diagram](image)

**Figure 15: Updated Abstract representation of hypotheses 5 to 8**

It can also be concluded that in this research, the Socialization assets are the most present assets, as these assets are effective on all time-factors. This might be due to the fact that A-Lanes is a consortium consisting out of 4 different companies and socialization places an important role in the functioning of the organization.

The results from the Anova showed a significant difference in the Intellectual assets and the Commercial assets, based on the department. It also shows a significant difference in the Intellectual assets, Socialization assets, and the Commercial assets, based on the focus, and a significant difference in the Socialization assets, based on education.

In order for A-Lanes to reduce time within the TP03-process it can focus improvement actions on the increase of the Intellectual, Socialization, and Commercial assets.

The Intellectual assets can be improved within the departments Roads and Crossings, as the weight is 4,75 and 4,33 (on a total of 7) and below the external departments. The difference between the Intellectual assets based on focus is 4,67 against 5,09. The question that scored the lowest from the Intellectual assets was question 8: My activities are easy to plan, with for every department respectively 3,8 ; 3,1 ; 4,1 and for external and internal focus respectively 3,8 and 3,9 (on a total of 7).

In order for A-Lanes to increase the Intellectual assets, it can focus it improvement actions on the planning of employees activities. This can be done by providing the employees with a guide, or give a presentation, how to efficiently use planning software, such as outlook.

Another way to increase employees’ planning efficiency is to provide the employees with a guideline to set priorities. As activities are prioritized right, the planning can be focused more on the core, and most important activities. Hereby ensuring that the biggest part of the job is done first, before the focus of the activities is switched to less, and mostly smaller, parts of the job.

The Socialization assets can be improved within the external and internal focus as the weight is respectively 5,1 and 4,7. The question that scored the lowest from the Socialization assets (after computation) was question 13: There is a lot of miscommunication with other departments with a weight for external and internal focus respectively 3,95 and 3,07 (on a total of 7).
The Socialization assets can be improved within education (other, WO\text{master}, MBO, HBO, WO\text{bachelor}) as the weight is respectively 5,2 ; 5,1 ; 5 ; 4,7 ; 3,9. The question that scored the lowest from the Socialization assets (after computation) was question 13: There is a lot of miscommunication with other departments with a weight of 3 ; 3 ; 1 ; 4 ; 4 (for MBO, HBO, WO\text{bachelor}, WO\text{master}, and other).

In order for A-Lanes to increase the Socialization assets, it can focus its improvement actions on the interdepartmental communication. This can be done by introducing a “tour-in-A-Lanes”. This tour would require every department to set up a short description of its tasks. This description could then be bundled and distributed among the employees. This bundle could also be in the starter package of new employees, so that they can get a good clear picture of the core activities of each department.

In line with a bundle of departmental descriptions, it could be extended to a real-life tour in A-Lanes. New employees will have to work with every department for a day. This would result in employees who are familiar with every step in the TP03-process and thereby also know what kind of input is used. It also helps new employees to get to know a lot of people in the organizations. This tour can be seen as a very short traineeship.

The Commercial assets can be improved within the departments Roads and Crossings, as the weight is 4,14 and 4,13 (on a total of 7) and below the external departments. The difference between the Commercial assets based on focus is 4,13 against 4,8. The question that scored the lowest from the Commercial assets for external department was question 23: I often follow classes to gain more knowledge that is outside my own specialization with weight 3,9. The question that scored the lowest for Roads and Crossings was question 21: I have cooperated with a Lunchplaza presentation with a weight of 2,45 and 2 (on a total of 7). The weight for the lowest scoring question is for external and internal focus 3,9 and 2,36.

In order for A-Lanes to increase the Commercial assets, it can focus its improvement actions on the cooperation with a Lunchplaza presentation and the willingness to follow vision widening classes. This can be done by providing employees with a list of external courses that can be followed. These courses can differ from technical courses, to ethical and art courses. An employee that attends a vision widening course, might spark a learning motivation, which can result in more courses that are followed. Another aspect related to the provision of courses is the certification of the employee. If an employee follows a course, and passes this course successfully, he/she must be awarded with acknowledgement, by a certification. A side effect of a certificate is that the employee can also prove outside the company that he/she has developed him/herself and achieved certain competences. If the courses are given, or kicked-off, with a Lunchplaza presentation, the participation in courses will also improve the cooperation with a Lunchplaza meeting.
Conclusion and Managerial Implications

The three main pillars that formed the base of sustainability were People, Planet, and Profit. When the relation between these pillars was balanced, sustainability was the product. This paradigm is based on physical objects, such as the production of cars, chairs, windows, etc. Businesses are shifting from a physical object based paradigm towards a knowledge based paradigm which results in a different combination of pillars, namely People, Planet, and Prosperity. The relation between the pillars has also changed, for example there is conversation with the people, the pollution decreases, the natural resources are used more efficient and the Prosperity is shared more as in a collaboration.

Jonathan Scott has proposed the 7-P Application model, wherein he models sustainability in a business. He focuses on the Understanding, Material Resources, Implementation, and Goals. This model can give guidelines in order to minimize waste, maximize resources, minimize costs, and prevent resource deficit. The main issue with this model is that it focuses on businesses based on the physical object paradigm. In order to adapt the 7-P Application model to the knowledge based paradigm, some adjustments were made. The Material Resources are added with the Intellectual, Socialization, and Commercial assets. These assets are based on the Cultural, Social, Human, and Economic capital. These assets are in relation with the strategy of an organization as it defines whether the company focuses on control or change, and whether it should create or capture value.

This added model is researched at A-Lanes in an attempt to validate the model. A-Lanes is an consortium of 4 companies which realizes the widening of the A15 commissioned by Rijkswaterstaat. The character of the contract provides a base for the strategy it follows. The value is already created as the value of the product is set and available. A-Lanes will receive this value when it delivers the product according to the set requirements, then it will capture this value. The strategy is thus internally focused.

The results of the research answer the research question “How factors, causing waste of time, are influenced by the assets of a project group” by confirming 2 hypotheses, adding 1 hypothesis, and not confirming the last hypothesis. The increase of Intellectual assets are positively related with the clearity of information and the number of capable operatives. The increase of the Commercial assets are positively related with the clearity of information. It also showed that the Socialization assets not only positively influence the clearity of information, and the promise to deliver, but also the number of capable operatives. The research also showed that the Material assets had no influence on the number of capable operatives.

As the researched showed that the most important assets in this organization are the Socialization assets, it is concluded that the leadership style for this organization is a participating style. This style is typical for Resource Enrichment, which focuses on change and value capturing. It does that by re-evaluating means, recognizing change, generating ideas, and evaluating. A-Lanes has grown to a coherent and consistent group, whereby communication problems decrease over time and people feel that they are a part of A-Lanes. The main point for opportunity for value capturing in this situation is that this organization has become acquainted to eachother. This results in a higher mutual trust, a better communication, less friction as the standards and values are known, and a higher efficiency as partners are quicker and better to respond. Capturing value should thus be performed in an organization with the same partners.
In the beginning of this report I stated that this report would 1) function as my master thesis, 2) serve A-Lanes, as it will provide handles to reduce the wasted time, and 3) serve Science, as it will validate the complemented model.

By considering the research and the results, thus confirming and adding hypotheses, I conclude that this research has functioned science as it validated the adjusted model. It showed that this model can be applied in situations whereby the paradigm has shifted from Physical object to knowledge.

By considering the data, thus the level of the assets and certain questions, I conclude that this research has functioned A-Lanes as it provides handles to reduce wasted time. It does that not only by practical implications made in chapter 4.5, but also providing A-Lanes with a direction to follow in the future. A value that A-Lanes created with this project is that of acquaintance: mutual trust, better communication, less friction, and a higher efficiency. This value should be respected and in the case a similar project occurs, I would advise A-Lanes to conduct this project with the same partners.

The last function of this report, my master thesis, is in my view also respected. I fully stand behind my research and feel that most of the knowledge and experiences gained throughout this project and program are reflected by this report. Therefore I see this report as a respectable and positive conclusion of my Innovation Management Master Program.
Limitations and Further Research

The main limitation of this research is the scientific scope wherein this research is conducted. This research is mainly focused at the effect on the time factors, which covers only one of the four goals, namely Waste minimization. Another limitation of this research is that this research is conducted in only one organization, A-Lanes, and only focused at one process, TP03. It must be noted that the TP03-process in A-Lanes is the core process of the organization. Both limitations are due to time restrictions, coming forth out of the boundaries of the master thesis.

This research is also limited as only one point in time is analyzed. The survey that was conducted focuses at one point in time, and can be seen as a snapshot of the situation. Due to this limitation, hypotheses 1 to 4 cannot be confirmed or rejected. This research forms the first observation in time for the analysis of the dynamics between the assets within an organization.

This snap-shot approach is also due to the time restrictions. It was not feasible to expect a significant change in assets within the researchtime of my master thesis.

Due to these limitations some directions for further research can be identified. The main direction for further research is to extend the scientific scope by adding the 3 other goals of the complemented 7-P Application Model, namely the Resource Maximization, Cost Minimization, and Resource Deficit Prevention. It is recommended to conduct this research in A-Lanes focused at the TP03-process, as this process in this organization is already partly analyzed. Focusing at the 3 other goals in relation with the TP03 process of A-Lanes will result in a more robust model, as the model is validated by different parties, covering multiple angles. Another effect is that the assets are analyzed again and that another snapshot is made. If this extended research focusing at the 3 goals, in 3 separate points in time, a timeline of 4 points is made. This might give a short film of the dynamics of the interaction of the assets.

The second direction recommended for further research is to conduct an extended research, thus analyzing the four goals, in different organizations. This will widen the base in which the complemented 7-P Application Model can be compatible with. This research can also be best conducted by 4 separate researches in 4 separate points in time, hereby creating a short film of the dynamics of the assets.
Appendix 1: TP03-process
<table>
<thead>
<tr>
<th>Reference</th>
<th>Input</th>
<th>Activity</th>
<th>Output</th>
<th>Reference</th>
<th>RASCi</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP01.01</td>
<td></td>
<td>Integral Voluitzorg-richarmanagementplan</td>
<td>Beoordeling Verrijk</td>
<td>PP02.01</td>
<td>R: Manager Integratie Voluitzorg, A: Projectleider, B: Projectcoördinator, C: Projectmanager</td>
</tr>
<tr>
<td>BP02.01</td>
<td></td>
<td>VOGA voldoening</td>
<td># zorgorganisatie</td>
<td>PP02.12</td>
<td></td>
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<tr>
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<td></td>
<td>VOGA voldoening</td>
<td># zorgorganisatie</td>
<td>PP02.12</td>
<td></td>
</tr>
<tr>
<td>BP02.11</td>
<td></td>
<td>Analyse en perfectie van contracten</td>
<td># verkoers-organisatie t.g.v. het project</td>
<td>PP02.12</td>
<td></td>
</tr>
<tr>
<td>BP03.12/21</td>
<td></td>
<td>Inspectie-reports (registratie)</td>
<td># verkoers-organisatie t.g.v. het project</td>
<td>PP02.12</td>
<td></td>
</tr>
<tr>
<td>BP06.17</td>
<td></td>
<td>Melding onveilige situaties/ongeuren</td>
<td>% speciaal voorbehoorden/inzetten</td>
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<td></td>
</tr>
<tr>
<td>BP06.20</td>
<td></td>
<td>Voorlichtingen</td>
<td>% speciaal voorbehoorden/inzetten</td>
<td>PP02.12</td>
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<tr>
<td>PP02.02.05</td>
<td></td>
<td>Notitie ROM</td>
<td>% speciaal voorbehoorden/inzetten</td>
<td>PP02.12</td>
<td></td>
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<td>BP04.15</td>
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<td>Interchange persoonlijke kennis</td>
<td>% speciaal voorbehoorden/inzetten</td>
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<tr>
<td>BP04.13</td>
<td></td>
<td>Evaluatie oplossing en oplossing</td>
<td>% speciaal voorbehoorden/inzetten</td>
<td>PP02.12</td>
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<tr>
<td>PP01.13</td>
<td></td>
<td>PMP -1 Financiën berekeningen voor contracten</td>
<td>% project IRK voor SPC</td>
<td>PP02.12</td>
<td>R: Financier, A: Projectleider, B: Projectcoördinator, C: Projectmanager, specifieke leiding en coördinatie van afdeling A Lanes A15</td>
</tr>
<tr>
<td>Pre 01</td>
<td></td>
<td>SAP</td>
<td>Margin variatie (N Co) in onderhoudsfacturen</td>
<td>PP02.13</td>
<td></td>
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</tbody>
</table>
Appendix 2: Organization charts
Committees

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<th>Name</th>
<th>Contactperson A Lanes A15</th>
</tr>
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<td>SU</td>
<td>Albert van Haastrecht</td>
<td></td>
</tr>
<tr>
<td>SA</td>
<td>Arnold Schenk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sven Linden</td>
<td></td>
</tr>
<tr>
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<td>Edwin Bouwes</td>
<td></td>
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<tr>
<td>SU</td>
<td>Dick van Heukelom</td>
<td></td>
</tr>
<tr>
<td>SA</td>
<td>Alexander Hemmanns</td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>Leondorff van Riechedoten</td>
<td></td>
</tr>
<tr>
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<td>Frank de Kock</td>
<td>Marco Janssen</td>
</tr>
<tr>
<td>SA</td>
<td>Karl Petrotti</td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>Anton Kersten</td>
<td></td>
</tr>
<tr>
<td>SU</td>
<td>Marcel Vader</td>
<td></td>
</tr>
<tr>
<td>SA</td>
<td>Beata Leszczyńska</td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>Ron Vliet</td>
<td>Cmâ Bâ</td>
</tr>
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<td>Uwe Streicher</td>
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Appendix 3: Process map
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<td>Uitwerken ontwerp managementplan</td>
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<td>pp02.01 Beoordeling contract</td>
<td>Technisch M.</td>
</tr>
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<td>Contract M.</td>
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pp02.10 Beoordeling kosten

pp02.11 Beoordeling maximale beschikbaarheid

pp02.12 Stel progress status rapport (PSR) op

pp02.13 Beheers project in lijn met project plannen

pp02.14 Stel construction report EPC op

pp02.15 LTA overleg

pp02.16 Stel RWS voortgangsrapport op

pp02.17 Contract overleg (CO)

pp02.18 Bevestig gereed zijn van (deel van) het project

pp02.19 Afronding project en archiveer projectdocumenten EPC (DB)

bp05.01 Opstellen company manual

bp05.02 Opstellen/inrichten/aanpassen/ managementsysteem

bp05.03 Beoordelen en rapporteren klanttevredenheid

bp05.04 Opstellen audit plan incl. auditplanning

HRM.
Cost controller
Project D.
Project S.
Project M.
Asset M.
Project D.
Project S.
Project M.

Project S.
Project D.
Project D.
Voorzitter Exco
Project M.
Project S.
Project D.
Project S.
Project M.
Project D.
Contract M.
Project D.
Project S.
Contract M.
Project D.
Project S.
Contract M.
Project D.
Project M.
Project M.
Contract M.
Contract M.

Document controller
Contract M.
Kwaliteits M.
Project D.
Process eigenaar
Integrale borging M.
Omgevings M.
Project D.
Kwaliteits M.
Kwaliteits M.
Project D.
Integrale veiligheid M.
bp05.05 Uitvoeren audits

bp05.06 Houden management review

bp05.07 Opstellen verbeterenplan en doorvoeren en monitoren verbeteringen

bp05.08 Registreren en beheren afwijkingen en tekortkomingen

03.a.01 Vaststellen system breakdown structure

03.a.02 Analyseren eisen

03.a.03 Analyseren functies

03.a.04 Decomponeren eisen

03.d.01 Analyseren raakvlakken

03.d.02 Vaststellen leidende discipline en ID

03.d.03 Opstellen raakvlak informatieblad (RIB)

03.d.04 Inventariseren af te stemmen aspecten raakvlak

03.d.05 Uitwerken raakvlakken

03.d.06 Vastleggen acties en afspraken

03.d.07 Afleiden raakvlakeisen

03.d.08 Controleren raakvlak informatieblad

03.d.09 Afronden raakvlak informatieblad

Kwaliteits M.
Integrale borging M.
Integrale veiligheid M.
Processeigenaren
Integrale borging M.
Project D.
Integrale veiligheid M.
Kwaliteits M.
Integrale borging M.
Processeigenaren
Kwaliteits M.
Integrale borging M.
Ontwerpleider
Ontwerp M.
System engineer
Ontwerpleider
Ontwerp M.
System engineer
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System engineer
Ontwerpleider
Ontwerp M.
System engineer
Ontwerpleider
System engineer
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Ontwerpleider
Ontwerp M.
System engineer
Ontwerper
Ontwerpleider
Ontwerper
Ontwerpleider
Ontwerp M.
Raakvlakken M.
Ontwerper
Ontwerpleider
Ontwerper
Ontwerpleider
Ontwerp M.
Raakvlakken M.
Ontwerper
Ontwerpleider
Ontwerper
Ontwerpleider
Ontwerp M.
Document controller
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Document controller
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Ontwerpleider
Raakvlakken M.
Ontwerper
Ontwerpleider
Ontwerper
Ontwerpleider
Raakvlakken M.
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Ontwerpleider
Ontwerper
Ontwerpleider
Raakvlakken M.
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ONTWERPER
Ontwerper
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Ontwerper
Ontwerpleider
CAD coordinator
Ontwerper
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<td>Beoordeling contract</td>
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<td>Beoordeling kwaliteit en goed imago</td>
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03.d.02  Vaststellen leidende discipline en ID
03.d.03  Opstellen raakvlak informatieblad (RIB)
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<td>Ontwerper Ontwerpleider Document controller</td>
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Reviewteam
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Document controller
Ontwerpleider
Ontwerp M.
Contract M.
Project D
Project S.
Project M.
HRM.
Project D.
Project S.
Project M.
Contract M.
Integrale borging M.
Omgevings M.
Project D.
Project S.
Project M.
Asset M.
Project D.
Project S.
Project M.
Project M.
Omgevings M.
Risico analist
Project D.
Project S.
Project M.
Project Control M.
Project D.
Project S.
Project M.
Inkoop M.
Project D.
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Project M.
Inkoop M.
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Project M.

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pp02.06 Beoordeling tijd

pp02.07 Beoordeling subcontract

pp02.08 Beoordeling duurzaamheid
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Project M.
HRM.
Cost controller
Project D.
Project S.
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pp02.11 Beoordeling maximale beschikbaarheid
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Project D.
Project S.
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Project S.
Project M.
Voorzitter Exco
Project M.
Project S.
Project D.

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Project D.
Voorzitter Exco
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Project S.
Project D.

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pp02.15 LTA overleg
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Contract M.

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Contract M.

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Project M.
Project D.
Contract M.

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Document controller
Contract M.

03.a.01 Vaststellen system breakdown structure
Ontwerpleider
Ontwerp M.
System engineer

03.a.02 Analyseren eisen
Ontwerpleider
Ontwerp M.
System engineer
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Reviewteam  
Ontwerpleider  
Document controller

03.a.14  Vrijgave startnota  
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Ontwerp M.  
Document controller

03.05.03  Kick off  
Ontwerpleider  
Ontwerp M.  
Ontwerpleider

03.b.01  Uitwerken alternatieven  
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Ontwerpleider  
Raakvlakken M.

03.b.02  Opstellen trade-off matrix  
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Ontwerpleider  
Raakvlakken M.

03.b.03  Review trade-off matrix en keuze alternatief  
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Raakvlakken M.

03.b.04  Verificeren en uitwerken ontwerp  
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Ontwerpleider  
Ontwerper

03.b.05  Opstellen ontwerddocumenten  
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Ontwerpleider  
Ontwerper

03.b.06  Controleer ontwerddocumenten  
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Ontwerpleider  
CAD coordinator

03.b.07  Afronden ontwerddocumenten  
Ontwerper  
Ontwerpleider  
CAD coordinator

03.b.08  Vrijgave ontwerddocumenten  
Ontwerpleider  
Ontwerp M.  
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03.c.01  Opstellen verificatierapport  
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Ontwerpleider  
System engineer

03.c.02  Controle verificatierapport  
Ontwerper  
Ontwerpleider  
System engineer

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pp02.17  Contract overleg (CO)
pp02.18  Bevestig gereed zijn van (deel van) het project

pp02.19  Afronding project en archiveer projectdocumenten EPC (DB)

Project M.  
Project D.  
Contract M.  
Project D.  
Document controller  
Contract M.
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<td>Mahesh Moenielal</td>
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Michael van Bree
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Piet Langeveld
Lars Jonkman
Adriaan Louwers
Johan Spaan
Paul Renders
Mohammed Grida
Jacques Geel
Sander van den Brugghen
Sjoerd Kellen
Arjan Slotboom
Anton Jansen
Bart van der Gurp
Zeed Alshangi

Raakvlakken M.  Sjoerd Geijzen
Project D.        Erik Aal
                 John van Dongen
Project S.       Gerty Prins
Exco             Arjen de Geus
                 Jos Hegeman
                 Herwig Schwarz

Integrale borging Sander Lindemans
                  Frits Willems
Contract M.      Jasper Tiessens
                  Martijn Kuipers
                  Martin Eggink

Omgevings M.    Christine Davidse
                 Jacco Kwakman
                 Bregje van Rij
                 Ferry van de Coevering
                 Tom van Hoof
                 Bert van Adrichem
                 Marco Jurrius
                 Andre vogelaar
                 Ricardo Krul
                 Bas de Ridder
                 Thomas van der Lijke
                 Wim van Oudbroekhuizen
                 Peter Mathlener
                 Kevin Gravensteijn

Integrale veiligheid  Erik Bleichrodt
Erik Krops
Ali Aksu
Ben van den Horn

Risico analist: Jelle Benders
Lita de Wilde

Document Control: Barbara Askamp
Louis Hofkens
Marjan Ketting
Franciska ’t Hart

Project Control M.: Alexander Hermanns
Inkoop M.: Peter Molenaar
Technisch M.: Harm Boelens
Asset M.: Maurice Derks
Cost controller: Marco Jansen
Christopher Umathun

HRM: Ron Rombouts
Simonie van Elst
Corne Buijs

Kwaliteits M.: Uwe Schrecker
Madeleine Schenk
Jelle Wolters

Project M.: Peter Schaap
Appendix 5: Questionnaire
Survey – Design Team Lenny van Grootveld (room 2.15)

Department:

Function:

Parent company:
1 = Strukton
2 = Ballast Nedam
3 = Strabag
4 = John Laing
5 = other

Education:
1 = Intermediate vocational education
2 = Higher vocational education (bachelor)
3 = Scientific education (bachelor)
4 = Scientific education (master)
5 = other

Years work experience:

.................... years
Please fill in whether you disagree or agree with the proposition

<table>
<thead>
<tr>
<th>Proposition</th>
<th>1</th>
<th>2</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td>I see a lot of/I often see improvement points for A-Lanes.</td>
<td>1</td>
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</tr>
<tr>
<td>I see a lot of/I often see improvement points in my own work.</td>
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<tr>
<td>I plan my activities carefully.</td>
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<tr>
<td>I do NOT act outside my work area.</td>
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<tr>
<td>I often come up with new ideas.</td>
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</tr>
<tr>
<td>I am very able to cope with the used software in A-Lanes.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>My manager is open for new ideas.</td>
<td>1</td>
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<tr>
<td>My activities can be planned easily.</td>
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<tr>
<td>On Monday I talk about the weekend with the colleagues from my office.</td>
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<tr>
<td>I know who to talk to when something goes wrong.</td>
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<td>I often lunch with the colleagues from my office.</td>
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</tr>
<tr>
<td>I know my tasks / responsibilities.</td>
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<tr>
<td>There is a lot of miscommunication with other departments.</td>
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<tr>
<td>I can discuss personal issues with my colleagues.</td>
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</tr>
<tr>
<td>There is room for error.</td>
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<tr>
<td>When I fetch coffee, I also get coffee for the colleagues from my office.</td>
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<tr>
<td>I am afraid to give my opinion during a meeting.</td>
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<tr>
<td>My manager gives me clear feedback.</td>
<td>1</td>
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<tr>
<td>I feel that I am a part of A-Lanes.</td>
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<tr>
<td>I am capable to cope with changes in my department.</td>
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<tr>
<td>I have cooperated with a Lunchplaza presentation.</td>
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<tr>
<td>I often follow classes to gain more knowledge about my own specialization.</td>
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<tr>
<td>I often follow classes to gain more knowledge that is outside my own specialization.</td>
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<tr>
<td>I often attend presentations in the Lunchplaza.</td>
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<tr>
<td>I can use my work experience outside my current function.</td>
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<tr>
<td>There is enough light on my workplace.</td>
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<td>There is enough fresh air on my workplace.</td>
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<tr>
<td>The heating does NOT work like it is ought to.</td>
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<tr>
<td>I have a fixed workplace.</td>
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<tr>
<td>I am satisfied with the performance of my computer.</td>
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<tr>
<td>I am satisfied with the software I use.</td>
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<tr>
<td>I am satisfied with the ICT-support.</td>
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<tr>
<td>I do not have enough room for manoeuvre.</td>
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<tr>
<td>I have enough administrative objects (pens, note blocks, post-its, etc.)  .........................................................................................................................</td>
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<td>Printing/Plotting is easy.</td>
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<td>I am satisfied with the email service.</td>
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<td>I receive incomplete pieces...</td>
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<td>I receive unclear pieces...</td>
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<td>I receive pieces in a wrong format...</td>
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<td>The Relatics and Thinkproject introductions have helped me...</td>
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<td>I do NOT have to wait long on an answer...</td>
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<td>I know the right person to pose a question to...</td>
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<td>I can easily reach a person...</td>
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<td>I can easily be reached...</td>
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<td>I am able to focus at my work...</td>
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<td>I often get distracted from my work...</td>
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<td>It is clear when I don’t want to be disturbed...</td>
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<td>I don’t take my work back home...</td>
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<td>I am always open to question for my colleagues...</td>
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<td>I am very tired after a work week...</td>
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<td>I sometimes have to cancel my social activities because my work isn’t finished...</td>
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<td>I cannot get my daily work done in one day...</td>
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<td>I do not have a single moment of rest in my day...</td>
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<td>I know what the deadline of an activity is...</td>
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<td>I know what happens to my product/activity...</td>
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<td>I know who is depending on my output...</td>
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<td>I know who the input to my activity is...</td>
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<td>I am not delayed because I receive my input in time...</td>
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<td>I do not care about deadlines...</td>
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</table>
Appendix 6: Dimensions of Social Capital

- Number of memberships
- Contributions of money
- Frequency of participation
- Participation in decision making
- Membership heterogeneity
- Source of group funding

- Helpfulness of people
- Trustworthiness of people
- Fairness of people

- How well people get along
- Togetherness of people

- Everyday sociability

- Asking neighbors to care for sick child
- Asking for help for yourself if sick

- Have you volunteered
- Expectations of volunteering
- Conflict of not volunteering
- Face contribution to neighborhood
- Have you helped someone

- Trust of family
- Trust of people in neighborhood
- Trust of people from other tribes/ethnicities
- Trust of business owners
- Trust of Gov’t officials
- Trust of judges/courts/police
- Trust of Gov’t’s service providers
- Trust of local Gov’t
Appendix 7: Correlation matrix Cultural capital
<table>
<thead>
<tr>
<th></th>
<th>I see a lot of improvement points for A-Lanes</th>
<th>I know who to talk when something goes wrong</th>
<th>I know my tasks responsibly</th>
<th>There is a lot of miscommunication with other departments</th>
<th>There is room for error</th>
<th>I am afraid to give my opinion during a meeting</th>
<th>I feel that I am a part of A-Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I see a lot of improvement points for A-Lanes</td>
<td>Pearson Correlation</td>
<td></td>
<td></td>
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<tr>
<td>Sig. (2-tailed)</td>
<td>1</td>
<td>-0.05</td>
<td>0.066</td>
<td>0.222</td>
<td>0.04</td>
<td>-0.235</td>
<td>0.012</td>
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<tr>
<td>My activities can be planned easily</td>
<td>Pearson Correlation</td>
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<tr>
<td>Sig. (2-tailed)</td>
<td>-0.095</td>
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<td>-0.063</td>
<td>0.326</td>
<td>0.379</td>
<td>-0.024</td>
<td>-0.046</td>
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<td>Pearson Correlation</td>
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<tr>
<td>Sig. (2-tailed)</td>
<td>0.556</td>
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* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).
Appendix 8: Correlation matrix Social capital
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<th></th>
<th>I do NOT act outside my work area</th>
<th>I often come up with new ideas</th>
<th>My manager is open for new ideas</th>
<th>On Monday I talk about the weekend with the colleagues from my office</th>
<th>I often lunch with the colleagues from my office</th>
<th>I can discuss personal issues with my colleagues</th>
<th>When I fetch coffee, I also get coffee for the colleagues from my office</th>
<th>My manager gives me clear feedback</th>
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</table>

**Correlation is significant at the 0.01 level (2-tailed).**

* Correlation is significant at the 0.05 level (2-tailed).
Appendix 9: Correlation matrix Human capital
## Correlations

<table>
<thead>
<tr>
<th></th>
<th>I see a lot of improvement points in my own work</th>
<th>I plan my activities carefully</th>
<th>I am very able to cope with the used software in A-Lanes</th>
<th>I have cooperated with a lunchtime presentation</th>
<th>I often follow classes to gain more knowledge about my own specialization</th>
<th>I often follow classes to gain more knowledge that is outside my own specialization</th>
<th>I often attend presentations in the lunchtime</th>
<th>I can use my work experience outside my current function</th>
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<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>0.035</td>
<td>0.035</td>
<td>0.035</td>
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</table>

*Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).*
Appendix 10: Correlation matrix Economic capital
<table>
<thead>
<tr>
<th></th>
<th>There is enough light on my workplace</th>
<th>There is enough fresh air on my workplace</th>
<th>The heating does NOT work like it is ought to</th>
<th>I have a fixed workplace</th>
<th>I am satisfied with the performance of my computer</th>
<th>I am satisfied with the software I use</th>
<th>I am satisfied with the ICT-support</th>
<th>I do not have enough room for administrative objects</th>
<th>I have enough administrative objects</th>
<th>Printing/Putting is easy</th>
<th>I am satisfied with the email service</th>
</tr>
</thead>
<tbody>
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<td>There is enough light on my workplace</td>
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<td>There is enough fresh air on my workplace</td>
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<td>The heating does NOT work like it is ought to</td>
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<td>I have a fixed workplace</td>
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<tr>
<td>I am satisfied with the performance of my computer</td>
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</tr>
<tr>
<td>I am satisfied with the software I use</td>
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</tr>
<tr>
<td>I do not have enough room for administrative objects</td>
<td>.105</td>
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<td></td>
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</tr>
<tr>
<td>I have enough administrative objects (pens, notebooks, monitors, etc.)</td>
<td>.244</td>
<td></td>
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</tr>
<tr>
<td>Printing/Putting is easy</td>
<td>.022</td>
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<tr>
<td>I am satisfied with the email service</td>
<td>.237</td>
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<td>Sig. (2-tailed)</td>
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</table>
Appendix 11: EFA Material assets
### KMO and Bartlett's Test

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</td>
<td>0.630</td>
</tr>
<tr>
<td>Bartlett's Test of Sphericity Approx. Chi-Square</td>
<td>147.566</td>
</tr>
<tr>
<td>df</td>
<td>55</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
</tr>
</tbody>
</table>

### Scree Plot

![Scree Plot Image](image-url)
<table>
<thead>
<tr>
<th>Component</th>
<th>Component Matrix² 1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is enough light on my workplace</td>
<td>.568</td>
<td>.295</td>
<td>-.263</td>
</tr>
<tr>
<td>There is enough fresh air on my workplace</td>
<td>.398</td>
<td>-.557</td>
<td>.299</td>
</tr>
<tr>
<td>The heating does NOT work like it is ought to</td>
<td>.453</td>
<td>-.447</td>
<td>.406</td>
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<tr>
<td>I have a fixed workplace</td>
<td>.492</td>
<td>.117</td>
<td>-.683</td>
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<tr>
<td>I am satisfied with the performance of my computer</td>
<td>.424</td>
<td>.619</td>
<td>.368</td>
</tr>
<tr>
<td>I am satisfied with the software I use</td>
<td>.303</td>
<td>.668</td>
<td>.407</td>
</tr>
<tr>
<td>I am satisfied with the ICT-support</td>
<td>.280</td>
<td>.512</td>
<td>-.007</td>
</tr>
<tr>
<td>I do not have enough room for manoeuvre</td>
<td>.585</td>
<td>-.302</td>
<td>-.172</td>
</tr>
<tr>
<td>I have enough administrative objects (pens, note blocks, post-its, etc.)</td>
<td>.561</td>
<td>-.036</td>
<td>-.178</td>
</tr>
<tr>
<td>Printing/Plotting is easy</td>
<td>.514</td>
<td>-.310</td>
<td>.144</td>
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<tr>
<td>I am satisfied with the email service</td>
<td>.633</td>
<td>-.083</td>
<td>.050</td>
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</table>

Extraction Method: Principal Component Analysis.

a. 3 components extracted.
Appendix 12: EFA Commercial assets
KMO and Bartlett's Test

<p>| | |</p>
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<tr>
<td>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</td>
<td>.512</td>
</tr>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>59,946</td>
</tr>
<tr>
<td>df</td>
<td>15</td>
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<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

Scree Plot
### Component Matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am capable to cope with changes in my department</td>
<td>-.204</td>
<td>.840</td>
</tr>
<tr>
<td>I have cooperated with a Lunchplaza presentation</td>
<td>.684</td>
<td>.286</td>
</tr>
<tr>
<td>I often follow classes to gain more knowledge about my own specialization</td>
<td>.472</td>
<td>.178</td>
</tr>
<tr>
<td>I often follow classes to gain more knowledge that is outside my own specialization</td>
<td>.813</td>
<td>.165</td>
</tr>
<tr>
<td>I often attend presentations in the Lunchplaza</td>
<td>.499</td>
<td>.162</td>
</tr>
<tr>
<td>I can use my work experience outside my current function</td>
<td>-.498</td>
<td>.649</td>
</tr>
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</table>

Extraction Method: Principal Component Analysis.

a. 2 components extracted.
Appendix 13: EFA Socialization assets
KMO and Bartlett's Test

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<th>Value</th>
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<tbody>
<tr>
<td>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</td>
<td>.565</td>
</tr>
<tr>
<td>Bartlett's Test of Sphericity Approx. Chi-Square</td>
<td>144,481</td>
</tr>
<tr>
<td>df</td>
<td>55</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
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</table>

Scree Plot
<table>
<thead>
<tr>
<th>Component</th>
<th>Component Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Monday I talk about the weekend with the colleagues from my office</td>
<td>0.077 0.805</td>
</tr>
<tr>
<td>I know who to talk to when something goes wrong</td>
<td>0.655 -0.057</td>
</tr>
<tr>
<td>I often lunch with the colleagues from my office</td>
<td>0.284 0.475</td>
</tr>
<tr>
<td>I know my tasks / responsibilities</td>
<td>0.599 0.056</td>
</tr>
<tr>
<td>There is a lot of miscommunication with other departments</td>
<td>0.139 0.236</td>
</tr>
<tr>
<td>I can discuss personal issues with my colleagues</td>
<td>0.305 0.565</td>
</tr>
<tr>
<td>There is room for error</td>
<td>0.596 -0.075</td>
</tr>
<tr>
<td>When I fetch coffee, I also get coffee for the colleagues from my office</td>
<td>0.243 0.214</td>
</tr>
<tr>
<td>I am afraid to give my opinion during a meeting</td>
<td>0.624 -0.303</td>
</tr>
<tr>
<td>My manager gives me clear feedback</td>
<td>-0.132 0.680</td>
</tr>
<tr>
<td>I feel that I am a part of A-Lanes</td>
<td>0.660 -0.004</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

a. 2 components extracted.
Appendix 14: EFA Intellectual assets
KMO and Bartlett's Test

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .562 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 60,935 |
| df | 28 |
| Sig. | .000 |

Scree Plot
## Component Matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>Component</th>
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<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>I see a lot of/I often see improvement points for A-Lanes</td>
<td></td>
<td>0.636</td>
<td>-0.139</td>
<td>0.184</td>
</tr>
<tr>
<td>I see a lot of/I often see improvement points in my own work</td>
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<td>0.514</td>
<td>-0.063</td>
<td>-0.390</td>
</tr>
<tr>
<td>I plan my activities carefully</td>
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<td>0.169</td>
<td>0.702</td>
<td>-0.168</td>
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<tr>
<td>I do NOT act outside my work area</td>
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<td>0.624</td>
<td>-0.247</td>
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<tr>
<td>I often come up with new ideas</td>
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<td>0.670</td>
<td>-0.227</td>
<td>0.043</td>
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<tr>
<td>I am very able to cope with the used software in A-Lanes</td>
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<td>0.540</td>
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<td>-0.360</td>
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<tr>
<td>My manager is open for new ideas</td>
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<td>My activities can be planned easily</td>
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<td>0.001</td>
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Extraction Method: Principal Component Analysis.

a. 3 components extracted.
Appendix 15: MR $T_1$
### Variables Entered/Removed

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<thead>
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<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
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<tbody>
<tr>
<td>1</td>
<td>C, S, I&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>Enter</td>
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</tbody>
</table>

a. All requested variables entered.

b. Dependent Variable: T1

### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.584&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.341</td>
<td>.315</td>
<td>.83055</td>
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</table>

a. Predictors: (Constant), C, S, I

### ANOVA

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<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>3</td>
<td>9,146</td>
<td>13,259&lt;sup&gt;a&lt;/sup&gt;</td>
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<td></td>
<td>Residual</td>
<td>77</td>
<td>.690</td>
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<tr>
<td></td>
<td>Total</td>
<td>80</td>
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</tbody>
</table>

a. Predictors: (Constant), C, S, I

b. Dependent Variable: T1

### Coefficients

<table>
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<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
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</thead>
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<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
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</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>t</td>
</tr>
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<td>1</td>
<td>(Constant)</td>
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<td>-.387</td>
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<tr>
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<td>I</td>
<td>.339</td>
<td>.167</td>
<td>.223</td>
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<tr>
<td></td>
<td>S</td>
<td>.306</td>
<td>.147</td>
<td>.200</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>.411</td>
<td>.118</td>
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</tr>
</tbody>
</table>

a. Dependent Variable: T1
Appendix 16: MR $T_{2a}$
### Variables Entered/Removed\(^b\)

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M, I(^a)</td>
<td>•</td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.

b. Dependent Variable: T2

### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.481(^a)</td>
<td>.232</td>
<td>.212</td>
<td>.92712</td>
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</tbody>
</table>

a. Predictors: (Constant), M, I

### ANOVA\(^b\)

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<tr>
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<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>2</td>
<td>10,116</td>
<td>11,769(^a)</td>
<td>.000(^a)</td>
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<tr>
<td></td>
<td>Residual</td>
<td>78</td>
<td>.860</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

a. Predictors: (Constant), M, I

b. Dependent Variable: T2

### Coefficients\(^a\)

<table>
<thead>
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<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
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<td></td>
</tr>
<tr>
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<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>t</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>1.127</td>
<td>1.055</td>
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</tr>
<tr>
<td></td>
<td>I</td>
<td>.761</td>
<td>.157</td>
<td>.480</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>-.021</td>
<td>.133</td>
<td>-.016</td>
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</table>

a. Dependent Variable: T2
Appendix 17: MR $T_{2b}$
### Variables Entered/Removed

<table>
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<tr>
<th>Model</th>
<th>Variables Entered</th>
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<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hcapital, Ccapital, Scapital</td>
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<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.
b. Dependent Variable: T2

### Model Summary

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<th>Model</th>
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<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.501a</td>
<td>.251</td>
<td>.222</td>
<td>.92134</td>
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</tbody>
</table>

a. Predictors: (Constant), Hcapital, Ccapital, Scapital

### ANOVA

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<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>Regression</td>
<td>21,915</td>
<td>3</td>
<td>7,305</td>
<td>8,605</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>65,363</td>
<td>77</td>
<td>.849</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>87,278</td>
<td>80</td>
<td></td>
<td></td>
</tr>
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</table>

a. Predictors: (Constant), Hcapital, Ccapital, Scapital
b. Dependent Variable: T2

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
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<td>B</td>
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<td>Beta</td>
<td>t</td>
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<td>.983</td>
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<td></td>
<td>Scapital</td>
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<td>.132</td>
<td>.311</td>
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<tr>
<td></td>
<td>Ccapital</td>
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<td>.144</td>
<td>.206</td>
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<td></td>
<td>Hcapital</td>
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<td>.141</td>
<td>.222</td>
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</table>

a. Dependent Variable: T2
Appendix 18: MR $T_{2c}$
Variables Entered/Removed^b

<table>
<thead>
<tr>
<th>Model</th>
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<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S, I ^a</td>
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</tbody>
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a. All requested variables entered.
b. Dependent Variable: T2

Model Summary

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<th>Std. Error of the Estimate</th>
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<tr>
<td>1</td>
<td>.533</td>
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a. Predictors: (Constant), S, I

ANOVA^b

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<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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<td>.000 ^i</td>
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<td>78</td>
<td>.801</td>
<td></td>
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</tr>
<tr>
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<td>Total</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), S, I
b. Dependent Variable: T2

Coefficients^a

<table>
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<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
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<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>t</td>
</tr>
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<td>1</td>
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<td>-.359</td>
<td>.940</td>
<td>.382</td>
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<tr>
<td>I</td>
<td>.661</td>
<td>.157</td>
<td>.418</td>
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<td>S</td>
<td>.380</td>
<td>.158</td>
<td>.239</td>
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</table>

a. Dependent Variable: T2
Appendix 19: MR $T_{3a}$
### Variables Entered/Removed<sup>b</sup>

<table>
<thead>
<tr>
<th>Model</th>
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<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>Enter</td>
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</tbody>
</table>

a. All requested variables entered.
b. Dependent Variable: T3

### Model Summary

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<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.468&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.219</td>
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</table>

a. Predictors: (Constant), S

### ANOVA<sup>b</sup>

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<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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<td>14,376</td>
<td>1</td>
<td>14,376</td>
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</tr>
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<td>.647</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>65,506</td>
<td>80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), S
b. Dependent Variable: T3

### Coefficients<sup>a</sup>

<table>
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<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
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</tr>
<tr>
<td></td>
<td>S</td>
<td>.647</td>
<td>.137</td>
<td>.468</td>
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</table>

a. Dependent Variable: T3
Appendix 20: MR $T_{3b}$
### Variables Entered/Removed<sup>b</sup>

<table>
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<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
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<td>I, S</td>
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<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.
b. Dependent Variable: T3

### Model Summary

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<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>.220</td>
<td>.200</td>
<td>.80921</td>
</tr>
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</table>

a. Predictors: (Constant), I, S

### ANOVA<sup>b</sup>

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Regression</td>
<td>14,430</td>
<td>2</td>
<td>7,215</td>
<td>11,018</td>
<td>.000&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Residual</td>
<td>51,076</td>
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<td>.655</td>
<td></td>
<td></td>
</tr>
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<td>Total</td>
<td>65,506</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
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a. Predictors: (Constant), I, S  
b. Dependent Variable: T3

### Coefficients<sup>a</sup>

<table>
<thead>
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<th>Model</th>
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<th>Sig.</th>
</tr>
</thead>
<tbody>
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<td>Standardized Coefficients</td>
<td>Standardize Coefficients</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>t</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>1.890</td>
<td>.850</td>
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<tr>
<td></td>
<td>S</td>
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<td>.143</td>
<td>.476</td>
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<tr>
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<td>I</td>
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<td>.142</td>
<td>-.030</td>
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a. Dependent Variable: T3
Appendix 21: MR $T_3c$
### Variables Entered/Removed\(^b\)

<table>
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<th>Model</th>
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<th>Method</th>
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<tr>
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a. All requested variables entered.

b. Dependent Variable: T3

### Model Summary

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<th>Adjusted R Square</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>.490(^a)</td>
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<td>.211</td>
<td>.80390</td>
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</tbody>
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a. Predictors: (Constant), Hcapital, Ccapital, Scapital

### ANOVA\(^b\)

<table>
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<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
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<tr>
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<td>77</td>
<td>.646</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>65,506</td>
<td>80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Hcapital, Ccapital, Scapital

b. Dependent Variable: T3

### Coefficients\(^a\)

<table>
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<th>Model</th>
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<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
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<tbody>
<tr>
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<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
<td>t</td>
<td>Sig.</td>
</tr>
<tr>
<td>1</td>
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<td>2.605</td>
</tr>
<tr>
<td></td>
<td>Scapital</td>
<td>.256</td>
<td>.115</td>
<td>.231</td>
</tr>
<tr>
<td></td>
<td>Ccapital</td>
<td>.508</td>
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<td></td>
<td>Hcapital</td>
<td>-.216</td>
<td>.123</td>
<td>-.181</td>
</tr>
</tbody>
</table>

a. Dependent Variable: T3
Appendix 22: Anova on Department
### Test of Homogeneity of Variances

<table>
<thead>
<tr>
<th></th>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>2.554</td>
<td>2</td>
<td>78</td>
<td>.084</td>
</tr>
<tr>
<td>S</td>
<td>1.001</td>
<td>2</td>
<td>78</td>
<td>.372</td>
</tr>
<tr>
<td>C</td>
<td>.356</td>
<td>2</td>
<td>78</td>
<td>.702</td>
</tr>
<tr>
<td>M</td>
<td>2.366</td>
<td>2</td>
<td>78</td>
<td>.101</td>
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</tbody>
</table>

### ANOVA

<table>
<thead>
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<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Between Groups</td>
<td>4,714</td>
<td>2</td>
<td>2,357</td>
<td>6.115</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>30,067</td>
<td>78</td>
<td>.385</td>
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</tr>
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<td></td>
<td>Total</td>
<td>34,781</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Between Groups</td>
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<td>2.881</td>
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<td>Within Groups</td>
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<td>.410</td>
<td></td>
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<td></td>
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<td></td>
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<td>C</td>
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<td>Within Groups</td>
<td>56,245</td>
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<td>.721</td>
<td></td>
</tr>
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<td></td>
<td>Total</td>
<td>65,222</td>
<td>80</td>
<td></td>
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</tr>
<tr>
<td>M</td>
<td>Between Groups</td>
<td>2,008</td>
<td>2</td>
<td>1,004</td>
<td>1.670</td>
</tr>
<tr>
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<td>Within Groups</td>
<td>46,900</td>
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<td>.601</td>
<td></td>
</tr>
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<td>Total</td>
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</tbody>
</table>
Scheffe\textsuperscript{a,b}

<table>
<thead>
<tr>
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<td>33</td>
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<tr>
<td></td>
<td>1</td>
<td>40</td>
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<tr>
<td>Sig.</td>
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</table>

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 16,639.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

C

Scheffe\textsuperscript{a,b}

<table>
<thead>
<tr>
<th>1=extern, 2=crossings, 3=roads</th>
<th>N</th>
<th>Subset for alpha = 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>Sig.</td>
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</tbody>
</table>

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 16,639.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
Appendix 23: Anova on Focus
### Test of Homogeneity of Variances

<table>
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### ANOVA

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Appendix 24: Anova on Education
### Test of Homogeneity of Variances

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### ANOVA

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Scheffe$^{a,b}$

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Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 6,255.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
Bibliography


