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OPTIMIZATION OF THE
RELATION BETWEEN
FINANCIAL AND SPORTIVE
PERFORMANCE FOR
FOOTBALL CLUB GO AHEAD
EAGLES

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Optimization of the relation between financial and sportive performance for football club Go Ahead Eagles.

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Preface

Dear reader,

This research is done for the completion of the bachelor's degree Industrial Engineering and Management. This study indicates the rapidly evolving financial market in the Football industry. To conduct this research, I worked at Football club Go Ahead Eagles from May 2021 until September 2021.

I want to thank all the people that helped me perform this research over the past few months. Firstly, I want to thank Rogier Harmelink, my first supervisor at the University of Twente, for the support and guidance and helping me answering all of my questions. Secondly, I want to thank Erwin Hans for the time and effort to help me finalize this research. Lastly, I want to thank Alex Kroes for giving me the opportunity to perform my Bachelor thesis at Go Ahead Eagles and for all the help with steering me in the right direction.

I sincerely hope that you will enjoy reading this thesis and that it will generate new insights into the relation between the financial and sportive performance in the football industry.

Kind regards,

Leon Kingma

Enschede, November 2021

Management summary

Go Ahead Eagles is a Dutch professional football club, located in Deventer. Go Ahead Eagles plays in the highest division (Eredivisie) since the promotion in 2021.

The problem that Go Ahead Eagles is facing is that they believe more is to be gained in the relation between financial and sportive performance, because the financial strategy should improve the on-field sporting successes of the club. Go Ahead Eagles desires a detailed model to create the best financial environment to reach place number 14 in the highest Dutch professional football competition. Go Ahead Eagles finished 2nd in the second highest Dutch professional football competition last season. To create a solution design, the following research question is formulated:

How can Go Ahead Eagles optimize the relation between financial performance and on-field sportive performance to achieve place number 14 in the Dutch football pyramid?

This research follows the principles of the method of managerial problem solving method (Heerkens & van Winden, 2016). The norm of this research is that GAE needs a model which must help them optimize their financial investments so that the best on-field performance can be guaranteed. The research started by studying the relevant literature. The next step was to analyse the current situation of Go Ahead Eagles. Interviews were held to understand the structure of the company and, both a financial as well as a sportive overview are given so that the situation of the club became clear. These interviews contributed to the research with all the knowledge and information gained in this step.

After the current situation is described, a detailed analysis is done to find financial indicators that will likely play a role in the sportive performance of the club. Four different financial indicators were expected to have a big impact on the sportive results: Personnel percentage, Players percentage, Players budget & Staff budget. Also, sportive indicators are determined such that the relation between the financial performance indicators and the sportive performance can be calculated, the sportive indicators found were: Points total, Rank & ECI. The calculation results are used as input for the hypotheses tests to determine the financial key performance indicator. This resulted in *players budget* as the financial key performance indicator.

After the calculations the model is made. This model is created around the players budget and it tries to optimize this financial indicator to realize the sporting success the club desires. With the model GAE can find the fitting players budget for their goals, also the probabilities of reaching positions in the rankings are worked out in the model. A Monte-Carlo simulation is also included in the model, with the mean and standard deviation of the player budgets, from the seasons up till 2016, as input. With this simulation the expected needed players budget can be determined. The problem, of not understanding the relation and optimizing the relation between financial and sportive performance, is now solved. The norm is met and Go Ahead Eagles will continue to use this model yearly in the future.

This research contributes to the literature with new discoveries and clear calculations. Two of the four financial indicators that have been found have a statistically significant relation with the sportive results (significance = 0,05), players budget & staff budget. The relation is theoretically supported with this research and also a simulation model (Monte-Carlo simulation) is used to determine the optimal value for the players budget. This model and this approach can be used for other professional football clubs in the Netherlands as well. For further research on this subject some modifications need to be added, this research is based on the data of the Dutch football competitions, so the results cannot be used to predict values in other competitions. The approach that this research took is applicable to other competitions, but the results will differ. However, the correlation-values indicate the relations relative within the competition, so the expected outcome of the correlation-values will not differ much between different competitions

List of abbreviations

GAE	<i>Go Ahead Eagles</i>
MPSM	<i>Managerial problem solving method</i>
KPI	<i>Key Performance Indicator</i>
BPM	<i>Business process management</i>
BPMN	<i>Business process modelling notation</i>
RPS	<i>Ranked Probability Score</i>

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Chapter 1 Introduction

The first chapter of this research is the introduction part. The company and the problem context will be touched upon, also the methodology used in this research will be described. Furthermore, the steps that are made during the research, are worked out in an (visual) overview.

1.1 Go Ahead Eagles

Go Ahead Eagles is a Dutch professional football club that promoted to the highest professional football league (Eredivisie) in season 2020-21. Go Ahead Eagles (From now on: GAE) is a club that is battling for promotion to the highest division each year, and in the season 2020/21 they managed to achieve the promotion to the desired competition. A tough season is waiting for GAE, they need to perform well every week to try to stay in the Eredivisie for the future. The well-known phrase is applicable for the situation at Go Ahead “*It is more difficult to stay on top, than it is to get there.*”

In the Netherlands we work with two professional football leagues: The Eredivisie & the second division. It is also possible to look at the professional football leagues as a pyramid, both leagues are included in this pyramid so the results can be seen relative to all the professional football clubs in the Netherlands. For example, a third place in the second division equals a 21st place in the Dutch football pyramid, because the Eredivisie already has a ranking of 18 teams. Every year the clubs ranked 18th and 17th in the Eredivisie relegate to the second division without any strings attached, the club placed 16th will join a promotion/relegation play-offs competition with clubs of the second division for a spot in the Eredivisie.

Go Ahead Eagles is a club with a large fanbase (attendance of 10.000 +), who are recognised for their passion for the club. The stadium is not located near a highway to attract tourists from all over the world to watch a game, but the stadium is located in the centre of Deventer and so it is a real ‘city-club’.

1.2 Problem context

The financial aspect in the sports industry is getting bigger year by year. Things like strategic planning, risk management and financial models are getting more important every day. According to Forbes (2018), the 20 most valuable clubs are worth an average of €1.43 billion, this is 5% more than the year before. Using samples from English football it has been shown that sporting success has a significant positive impact on revenues, and that national sporting success is mainly driven by team investments (Rohde & Breuer, 2016). This story motivates the reasoning behind this thesis, how does financial performance influence the on-field performance of the football clubs?

For clubs who do not have much money to spend, it is important to choose the clubs budgets wisely. GAE beliefs there exists a relation between the financial performance and the sportive performance, and GAE want to know this relation so that the club knows where and how to invest their capital. This relation can be worked out to determine how much should be invested in several financial indicators to achieve the on-field performances the club desires. GAE is ambitious and their goal is to reach place number 14 in the Dutch football pyramid, the promotion of last season is a big step towards this goal and GAE needs to continue to develop. The step that will bring GAE to a higher level is to get a good understanding of this relation. When GAE understands the relation and knows how to act in financial situations, then the best possible environment can be created where it is possible to secure place number 14 in the Dutch football pyramid.

1.3 Research Methodology and approach

The research design will follow the guidelines of the *Managerial Problem Solving Method* (MPSM). The book *Solving managerial problems systematically* (Heerkens & van Winden, 2016) explains what can be seen as action problems, an action problem is anything or any situation that is not how you want it to be. This implies that the ‘reality’ differs from the ‘norm’, this discrepancy is perceived by the problem owner. The problem owner for the bachelor thesis is the chosen company, Go Ahead Eagles.

MPSM is a process consisting of seven steps that will lead towards the solution, Figure 1 illustrates this process. The norm of an action problem is key for performing a MPSM research. The norm of this research is that GAE wants to make use of a model which can help them optimize their financial investments so that the best on-field performance can be guaranteed. The first step is the *Problem Identification*, see Chapter 1.2. The next step is the *Problem Solving Approach*, this part will be worked out in this section. The third step contains the problem analysis, in Chapter 3 all the information needed to perform this research is worked out. In step 4 all the possible solutions of the action problem will be stated, and in step 5 the best possible solution will be chosen. In this research, step 4 and 5 can be found in Chapters 4 & 5. After the best solution is chosen, the results will be used in the model in Chapter 6. The model will also be described in Chapter 6, the MPSM circle will be finished with the implementation and evaluation of the model in the last Chapters finished of this research.

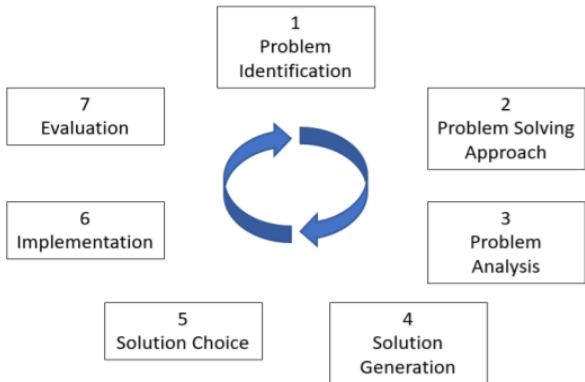


Figure 1 MPSM

The steps needed to perform the research are summarized in *table 1*.

Step 1: Problem Identification	Step 2: Problem solving Approach	Step 3: Problem Analysis	Step 4: Solution Generation	Step 5: Solution Choice	Step 6: Implementation	Step 7: Evaluation
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Describe company</div> <div style="border: 1px solid black; padding: 2px;">Describe problem context</div>	<div style="border: 1px solid black; padding: 2px;">Describe the 7 steps following MPSM</div>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Map out how GAE works</div> <div style="border: 1px solid black; padding: 2px;">Map out current financial and sportive situation</div>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Defining Financial performance indicators</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Defining Sportive performance indicators</div> <div style="border: 1px solid black; padding: 2px;">Calculating relation financial indicators and on-field performance</div>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Defining financial Key Performance Indicator</div> <div style="border: 1px solid black; padding: 2px;">Determination of criteria for the model</div>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Explain the model to GAE</div> <div style="border: 1px solid black; padding: 2px;">Let GAE use the model daily</div>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Evaluate together with GAE</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Give advice with the support of the model</div> <div style="border: 1px solid black; padding: 2px;">Draw conclusions</div>

Table 1 Research Approach

1.3.1 Current situation analysis

This section will be the third step of the MPSM; Problem analysis. Several interviews with employees at Go Ahead Eagles will take place, to get all the useful information. The interviewees will all be

working in different departments to understand the way of working in this company, also interviews with the financial manager and the major-shareholder will be done in order to get the current financial situation clear. To make these business processes clear for everyone, some visual representations of processes at GAE will be made. Also, the current financial and sportive results will be mapped out in this chapter, though, this will not be very detailed as in chapter 4 the analysis part will take place.

1.3.2 Data analysis & Benchmarking

In the fourth step of the MPSM a more detailed analysis will be conducted, all the financial information will be analysed and worked out in excel. Only the most important findings will be stated in the report to prevent the report from being unreadable. however, some tables and graphs will be shown in the report to support the text. At the end of the analysis, important financial performance indicators will be found, also sportive performance indicators will be found. The relation between the financial and the sportive indicators will be researched in the remainder of this research.

1.3.3 Correlation calculation

The relation between the financial indicators and the sportive indicators will be calculated with the statistics that will be explained later on. The correlation will help identify the most influential financial performance indicator. The correlation between the on-field performance of the team and the financial KPI will then be calculated, so that it is possible to work with this KPI and to give advice. The model will only work with one financial indicator, that is why it is important to find the *Financial KPI*.

1.3.4 Model

A detailed model will be made in excel, in this model all the financial variables are included that are of influence on the incomes or the expenses. With this model it is possible to determine how much to invest in a certain variable to achieve the best on-field performance of Go Ahead Eagles. This model will help with giving advice to GAE.

1.4 Research questions

GAE has encountered an action problem, the fact that they believe more is to be gained in the relation between financial performance and sportive performance. To conduct a sufficient research, a lot of information and knowledge is used. Knowledge problems are the descriptions of the knowledge that is needed (and missing) to solve the action problem. To get a good framework for all the knowledge that is needed for this research, several research questions are written down. These questions will be divided into the chapters of this research.

How can Go Ahead Eagles optimize the relation between financial performance and on-field sportive performance to achieve place number 14 in the Dutch football pyramid?

Chapter 2: Theoretical framework

This chapter contains all the relevant theory that will be explained with the help of a literature study. This chapter will explain the theory objectively.

- ❖ *What theory is needed to successfully perform the analysis, the calculation of the correlation and to make the model?*
- ❖ *What can be found in the literature about the relation between financial performance & sportive performance?*

Chapter 3 : Current situation at Go Ahead Eagles

After this chapter the current situation of GAE must be clear. Both the structure and the financial situation as well as the sportive performance must be worked out.

- ❖ *How is Go Ahead Eagles, both sportively and financially, currently performing?*
- ❖ *How does the financial/ business structure look like at Go Ahead Eagles?*

- ❖ *How do competitors of Go Ahead Eagles, both sportively and financially, currently perform?*

Chapter 4 : Data analysis & Benchmarking

In this Chapter the key indicators, for both the financial situation as well as the sportive situation, must be determined.

- ❖ *What are the key indicators regarding the financial situation?*
- ❖ *What are the key indicators regarding the sportive situation?*

Chapter 5 : Correlation Calculation

In this chapter the correlations of the financial and sportive indicators will be calculated. With this information the Financial KPI must be chosen.

- ❖ *Which financial indicator influences the sportive results the most?*
- ❖ *Which financial indicator is the financial Key Performance Indicator?*
- ❖ *What is the correlation between the financial Key Performance indicator and the sportive results be calculated?*

Chapter 6 : Model

In this chapter the model will be made and implemented at GAE. The model will be made with the criteria set by GAE. GAE will use the model daily to help optimize the relation between financial and sportive performance.

- ❖ *How must a model be made that works with the relation between financial and on-field sportive performance?*
- ❖ *How can the model help GAE to determine the best financial strategy?*

1.5 Stakeholders

A Stakeholder in an organisation is (by definition) any group or individual who can affect or is affected by the achievement of the organisation's objectives (Sharp, et al., 1999). The stakeholders are members of groups without those support the organization would cease to exist. Most primary stakeholders in typical corporations are its investors, employees, customers, and suppliers. Below are the stakeholders explained that play a role in this research. The stakeholders are described following their influence (power), their interest and the impact of the research. The stakeholders are separated at Micro, the stakeholders that are confronted by the problem and/or have a big influence in the decision making. Meso, other stakeholders that are affected within the organisation, and Macro, other stakeholders that are affected outside the organisation. All these stakeholders will be visually shown in a Power-Interest Matrix, so that the power/ interest relations are more clear. The categories where all the stakeholders are divided in are *Keep satisfied, manage closely, monitor and keep informed* (Varvasoysky & Brugha, 2000)

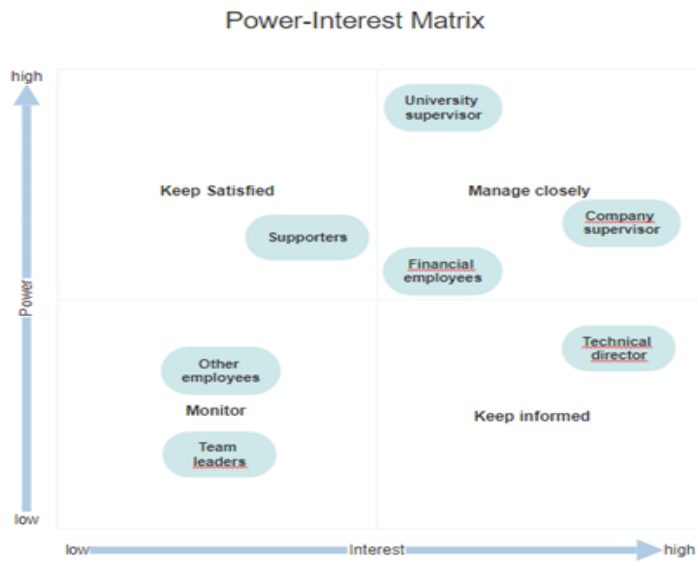


Figure 2 Power-interest matrix

The remainder of the Stakeholder analysis can be found in Appendix A.

Chapter 2 Theoretical framework

This chapter will provide all necessary information to perform the research, this Chapter is divided into separate parts. Each part has its own theory explained with the support of relevant literature.

2.1 Interviews

The first few steps of the research are to know how the people at GAE work and what the focus points are at the club. Also, the financial situation they are in right now as well as their sportive results are important to understand to be able to perform this research.

The interviews will be done with the *Critical incident technique*, this technique starts with (a) determining of the general aim of the activity. (b) Development of plans and specifications for collecting factual incidents regarding the activity. (c) Collection of the data, the interview will be recorded and transcribed in the appendix, it is essential that the reporting will be objective and include all relevant details. (d) Analysis of the data, the purpose of this analysis is to summarize and describe the data in an efficient manner so that it is effectively used in the report. (e) Interpretation and reporting of the statement of the requirements of the activity (Flanagan, 1954). This technique does fit well with this research because this way of interviewing will ensure that all topics will be discussed and that all the relevant results are being obtained.

After performing the interviews, the qualitative results need to be transcribed truthful and accurate. A Transcript is a tool that helps qualitative researchers make sense of and understand interviewees' experiences and perceptions (McLellan, et al., 2003). Before the interviews start, a transcript must be written. With a transcript the core of the interview is clear, so the most important pieces of information will be retrieved in each interview. The transcript can be found in Appendix C.

2.2 Business Process Modelling Notations

The interviews will provide a lot of information, so a good visual model will help the reader being engaged more. Visually representations will help understanding the business processes easier, all the decisions and the people involved will be shown in these visual representations. A lot of models and tools are possible to showcase business process, in this research the technique of *Business Process Modelling Notations (From now on: BPMN)* will be used. Cases descriptions and documentation of complex procedures are often very difficult to understand and error prone. Since a (more or less) clear picture depicting either a workflow or a business process is in most cases self-explaining, many users aim to enrich descriptions of processes with diagrams in order to convey the intended meaning associated to the process (Chinosi & Trombetta, 2011).

The real definition of BPMN is that it makes it possible to create graphical models of business process operations. A Business Process Model, then, is a network of graphical objects, which are activities (i.e., work) and the flow controls that defines their order of performance (White, 2004)



Start event: This symbol indicates the start of an event/ process.



Data object: This symbol indicates that there is input to/ output from activities in the process.



Task, subprocess: This symbol indicates an activity within the process.



Exclusive gateway: This symbol allows the representation of splitting and joining of sequence flows.



End event: This symbol indicates the end of an event/ process.

2.3 Financial & Sportive analysis

Financial analysis

One of the most important steps to measure and evaluate the success of the organization is its financial results; the growth and progress can be achieved only by the achievement of a certain performance. Financial performance is usually measured by profits and profitability ratios (Hornungová & Milichovský, 2019). The term “performance” is increasingly being used to explain various company terms such as growth, turnover, profitability & competitiveness (Colasse, 2009; Sebestova, 2018)

Scanning all the data first is essential, otherwise it would take way too long to only read all the data that is available. Scanning documents provides a familiarity with the broad spectrum of documents, and the grouping of documents with similar themes (Rowley & Slack, 2004) Scanning documents may give some insights into key themes that need to be included as stated earlier.

The process of analysing data includes looking for patterns and themes. *DeSantis and Ugarizza (2000)* defined a theme as “an abstract entity that brings meaning and identity to a recurrent experience and its variant manifestations”. When dividing the data in themes the focus can be better divided, which will generate an easier readability.

At a football club such as Go Ahead Eagles, they are dealing with a lot of financial data, most of this data can be seen as *Time series data*, this data is collected at specific points in time (Gary Koop, 2006). Football clubs do not work with a year starting in January and ending in December, most of the clubs start the year in the beginning of June.

Sportive data analysis

The economic aspects of football receive increasingly more attention in the research literature; however, in most studies of this field a lack of literature of direct relevance to football business can be noticed (Karpavicius & Jucevicius, 2009). That is why a sportive analysis is so important in this research. A first glimpse of the relation between financial performance and the sportive performance can be found in the Systematic Literature Review in Appendix B. The sportive results indicate how the financial performance changes over time. Depending on the available data, different sorts of analysis can be executed. In this research most of the data is with event data, events are defined as actions being match-relevant and happening during the match (Stein et al., 2016). Also descriptive (Statistical) data is available in this instance. The best technique for the sportive analysis is the statistical analysis, because of the available data and the aim of this analysis. With this technique the situation of the club can be explained in detail and this analysis will be useful to find key indicators According to the paper of *Manuel Stein*.

2.4 Statistical correlation

This research will use the *Pearson correlation coefficient* and the *Spearman correlation coefficient* depending on which variables are used. These coefficients indicate how strong the relation is between samples. So, it will be calculated whether the two different samples are related or not. Where $r=1$ means a perfect positive correlation and the value $r=-1$ means a perfect negative correlation. (Zhou & Deng,

2016) Values ranging between (-) 0,1 – 0,3 indicate a small (negative) relation between the samples. Values ranging from (-) 0,3 – 0,6 indicate a medium (negative) relation between the samples. And lastly, values greater than (lower than -) 0,6 indicate a strong (negative) relation between the samples.

2.4.1 Pearson Correlation Coefficient

The formula to calculate the linear coefficient can be seen in Equation 1. This formula is applicable if the following statements are met regarding the variables:

- Over the entire range of observed values, there must be a linear relationship between the independent variable X and the ‘dependent’ variable Y. This can be done by first making a scatter plot to explore the nature of the relationship between X and Y.
- As for the type of data, the X variables may be discrete or continuous. One of the dependent variables may only be continuous.

$$r = \frac{\sum_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_i (x_i - \bar{x})^2} \sqrt{\sum_i (y_i - \bar{y})^2}}$$

Equation 1 Pearson correlation coefficient

2.4.2 Spearman Correlation Coefficient

When the Pearson correlation Coefficient is not applicable, another statistic must be used, based on the sort of variables (interval, nominal, ordinal, ratio etc.) different statistics must be used. When dealing with Ordinal variables, the *Spearman correlation coefficient* is useful. Ordinal questions should be answered ordinally, instead of trying to answer them with Pearson correlations, mean differences, and parametric techniques (Winter, et al., 2016). Ordinal variables are a form of data which is ordered in categories and the distance between the categories are not known, the data exist on ordinal scale. An example is the ranking in a competition, the ‘distances’ between places cannot be explained. The differences between rank one and rank two could be 19 points, but also 2 points. When dealing with this kind of data, the *Spearman correlation coefficient* is needed to determine the relation between the samples. In Equation 2 the formula can be seen. This formula is applicable if the following statements are met regarding the variables:

- Scale of measurement must be ordinal (or interval, ratio)
- Data must be in the form of matched pairs

$$r_s = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)},$$

Equation 2 Spearman correlation coefficient

The r number is not fully decisive, the interpretation of this number is key for understanding the correlation. One of the most important things in empirical work is knowing how to interpret your results. It is not enough just to report a number for a correlation (e.g., $r_{XY} = 0.54$). Interpretation requires a good intuitive knowledge of what a correlation is in addition to a lot of common sense about the financial phenomenon under study. (Koop, 2006)

2.5 Fisher z-transformation

In statistics it is not possible to average multiple correlation values, especially not when using different statistical methods. The Fisher z-transformation can be used to test hypotheses about the value of the population correlation coefficient between two different variables. Regardless of sample size, average z is always less biased; therefore, the use of the z transformation is recommended when averaging correlation coefficients. (Silver & Dunlap, 1987). The fisher z-transformation converts correlations

into an (almost) normally distributed measure. The formula used to convert the correlation value (r) into a Fisher z - value (z) is given by:

$$z = \frac{1}{2} \ln\left(\frac{1+r}{1-r}\right) = \text{artanh}(r),$$

After finding the average Fisher z -value, it is important to back-transform this value into a correlation value (r). The formula used to back-transform the Fisher z -value (z) into a correlation value (r) is given by:

$$r = \frac{\exp(2z) - 1}{\exp(2z) + 1} = \tanh(z),$$

2.6 Hypothesis testing

Hypothesis testing will help show whether the financial indicators have a relation with the on-field performance of the club or not, the hypothesis tests will be performed on the average correlation values. Significance test and hypothesis test are based on the assumption of a (statistical) null hypothesis, i.e., a statement that there is no relationship. This is a mere technical requirement giving a statistical context that is required to apply probabilistic calculations. (Sacha & Panagiotakos, 2016). The steps that are used in this report for the hypothesis tests are:

1. Define Null and Alternative Hypotheses
2. State Alpha
3. Calculate Degrees of Freedom
4. State Decision rule
5. Calculate Test Statistic
6. State Results
7. State Conclusion

Chapter 3 Current situation of Go Ahead Eagles

This chapter is part of step 3 in the MPSM cycle: Problem analysis. The current situation at the club will be explained so that the problem context is described in detail. The current situation of the club is important for the remainder of this research, because the goals of this research can be formulated. To get the best image of the current situation, several interviews will take place with employees at Go Ahead Eagles, all from different departments. The interviews will help with gaining insights how GAE works and how they currently make their financial decisions. The interviews are fully described in the Appendices D till H, below are the main results stated together with a visual representation of a process that shows how an important financial decision is made and who are involved in this decision.

3.1 Interview results

All the interviews are done with the help of the interview transcript which can be seen in *Appendix C*.

Every interviewee indicated the passion they have for football and especially for Go Ahead Eagles. Many employees at GAE are former footballer or supporter of the club, which explains the passion for the club. GAE does not have a lot of employees working at the office (± 25), but they are all working towards the same goal which makes the dynamic interesting. All the interviewees agreed that financial steps must be made if GAE wants to reach their goals. It became clear that Deventer is not a city where a lot of big companies are based to sponsor the club, and the few big companies that are based in Deventer do not want to interact with GAE. The collaboration with sponsors is not sufficient enough for a club in the Eredivisie, a quote from Paul Bosvelt (Technical manager) implies this: *“Marketing and finance are departments where there is still a lot to be gained, it is unfortunate that there are few large companies in Deventer that are associated with us. There is still a lot to be done here, the main stand is often not sold out at a home game, while this stand must be the first stand to be filled with sponsors and companies.”* In the next few years, the sponsor income is a variable that needs to improve. Also, the target group of the club must be expanded, GAE currently mainly focusses on Deventer.

For this research it is extremely important to get the potential and the goals of the club clear, so that the end goal of this research can be established. The main goal of the club is clear, Jan Willem van Dop explained this well: *“We have to take steps to lay down a financial basis so that we can put together a team which is capable to secure place number 14 in the Eredivisie.”* The goal of the club is staying up in the Eredivisie, place 15 and the higher placed teams will stay up directly, every rank below will not guarantee a place in the Eredivisie for next year. The goal for this season of Go Ahead Eagles is therefore to focus on staying up in the Eredivisie and this will be realised with rank 15 and above. The financial goal of the club is to create an environment where it is reasonable to think we will rank 14th. The most important decisions and the ambitions of the employees, of course, diverge from each other. It is good to have insights of how they work and where their focus lies. In the next section a visual representation of a business process is shown.

3.2 Business processes of Go Ahead Eagles

Every interviewee was asked: *“What are the most important decisions you have to make during a year?”* Follow-up questions were asked to find out who are involved in these decisions and how these decisions came to light. One process that stood out is modelled and shown below to indicate how this process takes place at a football club. The visual representation is made in Lucidchart with the help of BPMN *Business Process Modelling Notations*, See Chapter 2.2 in the theoretical framework.

The most important process during the year for technical manager Paul Bosvelt is to get the best first selection ready for the upcoming season. This process can be complicated because a lot of steps must be completed in order to attract a new player to the club. Paul is involved by making sure everything develops smoothly and without bottlenecks, in the last phase of the scouting process Paul gets in contact with the player and the player agent. Paul makes sure that the player will be a match with GAE and that the player has the qualities that the head trainer is looking for.

Below in *Figure 3* a BPM model is shown of this process. The process begins with a tip about the player or the player shows up on the radar in a different way, this can happen with the use of the data scout for example. All the players who are interesting for Go Ahead will be forwarded to the data scout, based on three grades (The Sci-Sports rating, the Go Ahead rating and the Go Ahead Potential rating) he will assess the players and make an action list. Paul will get in contact with the players agent and he will check the feasibility of the player. The scouts will then follow the player for several weeks and grade the player (A,B,C,D), A & B are grades for Eredivisie level and B & C are grades for a player in the second division. The grade needs to be A or B before Alex will get in contact with the player and negotiate about the contract.

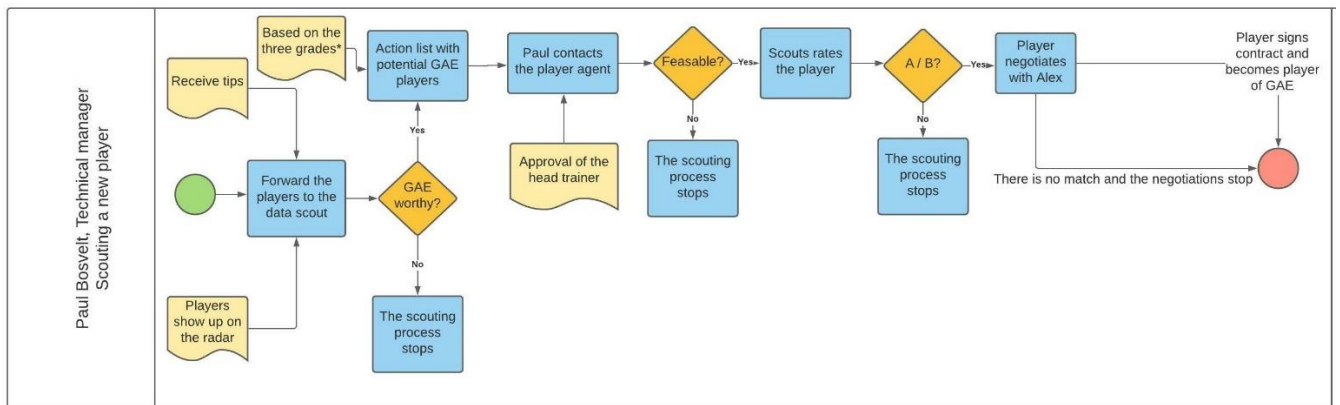


Figure 3 Business process of scouting new player

3.3 Sportive results

In this section the current sportive results will be shown with. This Chapter will not have a big impact on the results of this research, but this Chapter rather gives an overview of the situation that GAE is currently in. In the data analysis of Chapter 4, the club will be analysed in more depth.

GAE ended last season in 2nd place in the second division, which exceeded everyone's expectations. GAE was expected to secure a place in the play-offs for promotion/relegation, a ticket for the play-offs means that you have to finish ± in the top 8. So, the second place was only a dream before last season started, even more so because of the tough start of the competition. In *Figure 4* the progress of GAE is shown in a graph where the x-axis represents the matchdays and the y-axis represents the current position in the competition. It is safe to say that GAE progressed a lot during the year, with the absolute climax at the end of the season. Only the first two places earn a direct promotion ticket to the Eredivisie and GAE were only in second place at the last matchday, which is decisive.

GAE has never collected more points during a season than the 77 points they managed to collect last season. The sportive results were great last season, but we need to look at these stats in perspective, because last season was played in the second division.

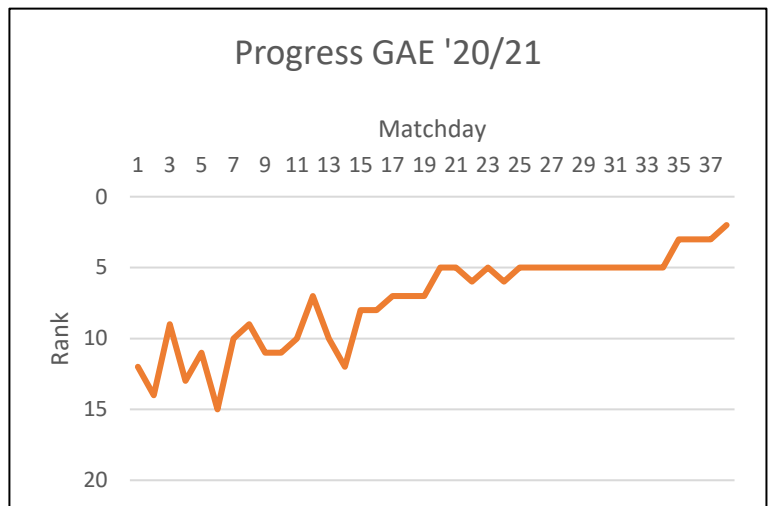


Figure 4 Progress GAE 2020/21

3.3.2 Goals per game

Go Ahead Eagles did not excel in the number of goals scored last season, 62 goals in the whole season with an average of 1,6 per game. To put this in perspective, if the competition was ranked in order from highest number of goals scored to least the least number of goals scored, GAE would finish 10th. Looking at the number of goals conceded last season, GAE was outstanding. The keeper only needed to pick the ball out of his goal 25 times, this gives an average of only 0,7 goals conceded per game. GAE would be ranked 1st if the competition was based on the least number of goals against.

3.3.3 Youth academy

The youth academy is playing a big part in world football at the moment, and the importance of a solid youth academy will only grow in the upcoming years. New talented players can help to improve the first selection, or they can be sold to boost the financial situation of the club. Eric Whittie (Head of the youth academy of GAE) explained that GAE has three KPIs regarding the youth academy:

“The youth need to play in the highest division as possible, there are 4 divisions in which the youth can play. At the moment, the majority are in the third and fourth division and one team plays in the second division. We want to ensure that the average level is at least 2.5, which means that at least half of the teams plays in the 2nd division and the other half plays not lower than the 3rd division.” Currently the average level is 3,00 so the club needs to ensure promotions of teams in the youth academy to reach the desired level.

“We also want to deliver at least 2 players to the first selection every year, of which 1 is actually a starting player and the other makes the selection. Of these two, at least 1 must also become transferable.” This year GAE had 18,2% percent of youth players who played over 75% of the games, this is a record for Go Ahead Eagles. So, it is clear that the club is heading in the right direction, but there are also downfalls in the youth academy, the average length of stay of the people in the oldest team

in the youth academy is only 1 year. Eric Whittie explained that the KPI of GAE regarding the length of stay is a lot higher: “Another striven is to keep youth players at least 5 years in GAE's youth academy, we only start with children from 13 years old, because we believe that the children should play football with their childhood friends first and be the best on the field at their amateur clubs. When the children become 13, they are ready to join our youth academy”

3.4 Financial results

Same as for the sportive results, in this part the current financial results will be shown. Below the quantitative measures are stated, this part will be split in expenses and incomes. The data is from last season, so season 2020-21 in the second division.

3.4.1 Expenses

Table 2 is included to give an idea how the expenses of GAE look like.

Operating expenses	Euro (x 1000)
Personnel costs	2.849
Cost of sales	346
Housing	292
Match & training costs	410
General costs	288
Depreciation assets	470
total costs/ operating expenses	4.655

Table 2 Expenses GAE 2020/21

3.4.2 Income

Because of the COVID-19 regulations in the Netherlands stadiums could not open the doors for their supporters from March 2020 till the end of June in 2021. The incomes show that, because the revenue of ticketing is almost twice as low compared to previous years. The other incomes that had been generated over the last year can be seen in Table 3.

Revenue	Euro(x 1000)
Competition Income (ticketing)	820
Sponsoring	2.100
Media income & prize money KNVB	766
Subsidies & gifts	635
Merchandising	100
Food & Beverage	178
Other benefits	65
Total Revenue	4.664

Table 3 Revenue GAE 2020/21

3.4.3 Financial results

The revenue is almost $\frac{1}{5}$ smaller compared to previous years, but under the circumstances that the clubs have been this year, this is not bad. The operating result equals the Total Revenue – the Total Expenses, in this case we have positive operating result of 9000.

Now that GAE is promoted to the Eredivisie, the financial incomes and expenses will differ a lot. Salaries of players do not get boosted immediately, but GAE does work with a bonus scheme for the players. This entails that players receive a bonus if they play a certain amount of games. New players will be brought in, and these players often are more skilled because they need to perform on a higher level. These more skilled players will also cost more, so all in all, the personnel cost will be a lot higher. But not only the expenses will be higher than last season, also the revenue will be greater than last season. GAE will receive more from the sponsors and also the KNVB needs to pay the clubs in the Eredivisie more.

Chapter 4 Data analysis & benchmarking

This Chapter will contain all the information to work out step 4 of the *MPSM*. All the possible ‘solutions’ will be generated, only in this case finding key indicators (Both financial and sportive) are the solutions. All the data up until the season 2019/20 is available to analyse, the data of the season 2020/21 is still being processed by the *Koninklijke Nederlandse Voetbalbond (KNVB)* and will be available to all the clubs around October. For this research it does not change much, the main focus will be on the season 2019/20 and previous years will also be taken into account to reduce the chances possible outliers. The data is not available for everyone, only people working in a professional football club get access to all the data of all the competitions. This chapter will start with a financial analysis, so all the financial information of Go Ahead Eagles and the Eredivisie will be worked out to determine the most important financial indicators. Then a sportive analysis will be done to find sportive indicators, with these indicators it becomes possible to test the relation between the financial performance and the sportive performance of the club. The analysis will be supported with benchmarking, so the results will be relative to the competitors of GAE.

4.1 Financial analysis

GAE works with a policy to maintain a positive operating result, and they never want to put their club at risk. Other clubs sometimes do try a risky move, big mid-season transfers are an example of this. With these transfers they hope to improve their squad significantly to reach their goals (e.g., to achieve a certain place on the ranking). If these goals are not achieved a big loss can be expected because they miss out on the prize money they tried to collect with the mid-season transfers. The operating result of the season 2019/20 in *Table 4* indicates the policy of GAE very well, only GAE managed to obtain a positive operating result at the end of the year, while all the other clubs in the second division failed to do so.

Rank	Club	Operating Result	Interest Result	Operating Result after interest
1	Go Ahead Eagles	€ 503	€ -141	€ 362
2	Almere City FC	€ -91	€ -5	€ -96
3	Helmond Sport	€ -102	€ -1	€ -103
4	Top Oss	€ -99	€ -4	€ -103
5	FC Dordrecht	€ -86	€ -21	€ -107
6	Sc Telstar	€ -130	€ -20	€ -150
7	De Graafschap	€ -135	€ -34	€ -169
8	S.B.V. Excelsior	€ -200	€ -31	€ -231
9	FC Eindhoven	€ -266	€ -16	€ -282
10	NAC Breda	€ -312	€ -41	€ -354
11	MVV Maastricht	€ -421	€ -2	€ -423
12	SC Cambuur	€ -573	€ -36	€ -609
13	Roda JC Kerkrade	€ -606	€ -7	€ -613
14	FC Volendam	€ -627	€ -35	€ -662
15	FC Den Bosch	€ -881	€ -25	€ -907
16	N.E.C. Nijmegen	€ -1.381	€ -554	€ -1.935
	Total	€ -5.406	€ -974	€ -6.380
	Average	€ -338	€ -61	€ -399

Table 4: Operating Results (all values x 1000)

This policy is working for GAE as they were able to maintain a positive operating result, while also competing sportively with the top teams in the second division. The turnover of GAE after the season 2019/20 is shown in *Figure 5*, the main sources of income are the match earnings and the Sponsors, with respectively 28 and 45 percent of the total turnover.

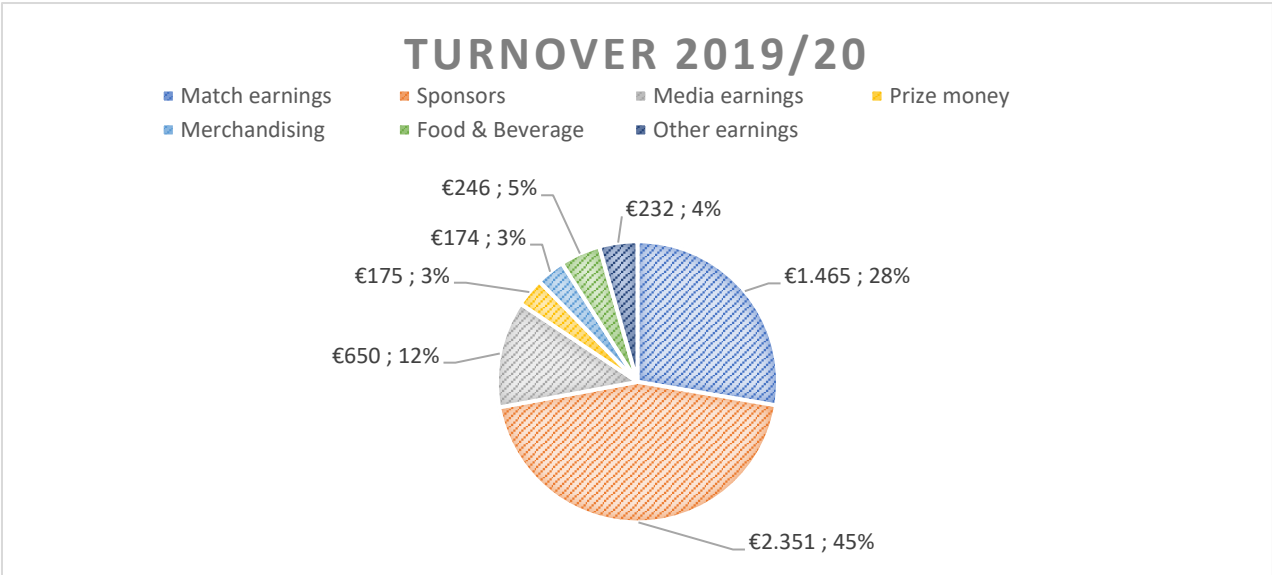


Figure 5 Turnover 2019/20 (all values x 1000)

This analysis must not only show the financial status of GAE, but also the financial situation compared to the competition. Comparing can indicate strong points as well as points where GAE can improve. The turnover compared to the rest of the competition can be seen in *Figure 6*, GAE is doing well compared to the average of the second division. However, the media earnings are below the average of the competition. This is a big improvement point, because of the growing importance of (Social) Media. According to Max Goldstein ,sports partnership manager for Google, “there are 3.5 billion football fans in the world”. He further underlines that “across all social media platforms, there’s a huge amount of interest in football” and that “as a way to engage people on our platforms, it’s certainly something to look at” (McGowan, 2015).

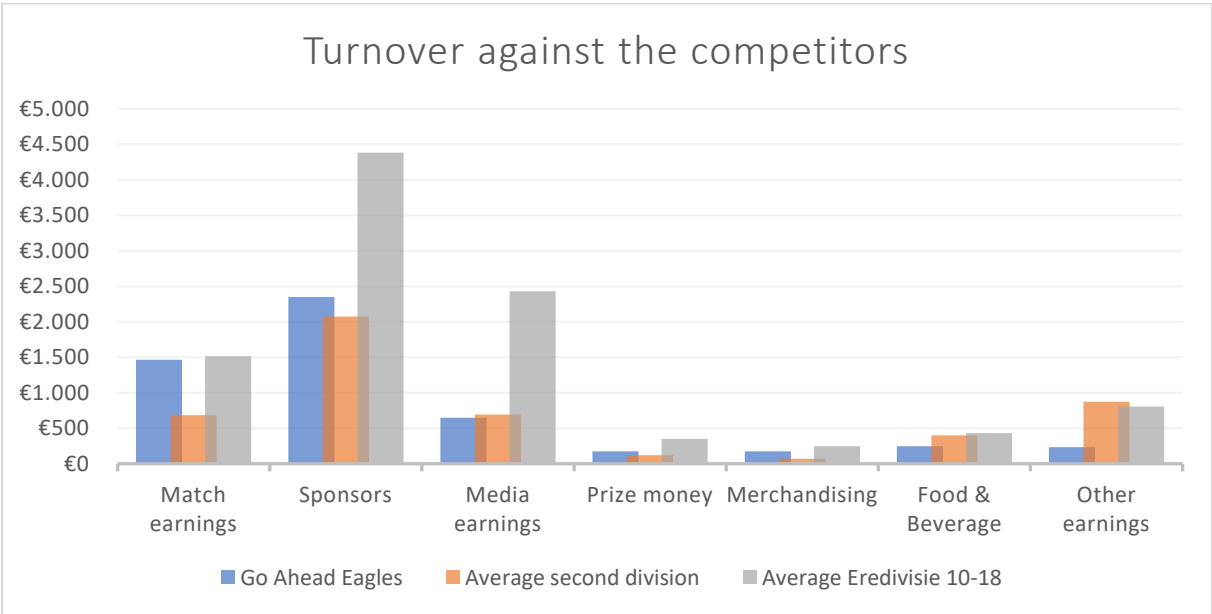


Figure 6 Turnover compared to the second division (all values x 1000)

GAE, especially compared to other clubs in the second division, is a club with a large fanbase. The followers spread over the different social media platforms shows this, in *Table 5* the total followers of each club in the second division are shown. The total followers equal the combined followers of Instagram, Twitter, Facebook & YouTube. The average followers of the competition is 90.779, which is significantly lower than the 113.200 total followers GAE has. More revenue can be obtained in this department, so there needs to be more time and resources invested in this. This will benefit the club regarding brand status, and an opportunity to boost the total turnover is always something to lie your focus on.

Rank	Club	Total
1	NAC Breda	201.200
2	Roda JC Kerkrade	184.100
3	N.E.C. Nijmegen	170.600
4	SC Cambuur	131.100
5	De Graafschap	128.520
6	Go Ahead Eagles	113.200
7	S.B.V. Excelsior	89.100
8	MVV Maastricht	65.323
9	Almere City FC	58.680
10	FC Eindhoven	53.683
11	FC Volendam	50.669
12	FC Den Bosch	49.490
13	FC Dordrecht	46.400
14	Top Oss	39.683
15	Helmond Sport	35.609
16	Sc Telstar	35.100

Table 5 Social media followers second division

The financial situation of clubs in the second division and the Eredivisie differs a lot, to compare GAE with the average of the Eredivisie will not be useful. This has to do with the financial situation of clubs like Ajax, PSV and Feyenoord. These clubs form outliers in the data that is available, an example is that Ajax after season 2019/20 managed to obtain a total turnover of 158 million. The club with the least turnover generated that season in the Eredivisie, Fortuna Sittard, generated just above 6.5 million. That is a difference of 151.5 million (!) between the first place and the last place in the Eredivisie. For GAE it is important to know how the direct competitors of the clubs in the Eredivisie work financially, that is why the benchmark clubs of this analysis will be the clubs who finish in places 10th to 18th. Also the clubs who will be relegated (place 17, 18 and potentially place 16) are included in the benchmark, this can give an idea where things went wrong or where GAE needs to keep an eye on. Figure 6 indicates that the merchandising and match earnings are variables which GAE has under control, even so that the difference between the Eredivisie clubs are very small.

A large part of the expenses are the personnel costs, in the season 2019/20 53% of the total expenses were spent on the personnel costs. Spending such high percentages on a certain department needs to be checked. Do other clubs work similar or does GAE take a risk with this policy? The personnel costs are divided: players, staff & office and organisation. In *Figure 7* the allocation of the personal costs can be seen. A football club always tries to get the highest percentage possible of the allocation of their money on their first selection. These variables could be important financial performance indicators, that is why the personnel percentage and the players percentage will be worked out further in this analysis.

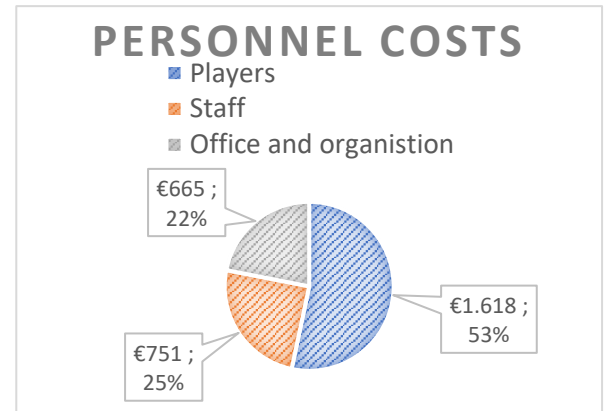


Figure 7 Chart pie personnel costs (all values x 1000)

So, the personnel percentage is the percentage of the total costs that is allocated to all the employees at the club (staff, players, etc. are all included). The players percentage is the percentage of the personnel costs that is allocated to the players (first selection). The formulas below describe the relation:

$$\text{Personnel percentage} = \frac{\text{Personnel costs}}{\text{Total costs}}$$

$$\text{Players percentage} = \frac{\text{Player costs}}{\text{Personnel costs}}$$

Over the last few years GAE has managed to keep their percentages relatively constant (*Table 6*). To compare the percentages used in the second division and the Eredivisie, season 2016/17 is also added. This season GAE played Eredivisie and relegated to the second division. In that year the players percentage is extremely high (68% compared to the 49,53,53 and 54 percent of the other years) and maybe this was one of the reasons why this season did not end well for GAE. The average of the personnel percentage and players percentage in the Eredivisie and Second division is respectively 59% & 57% and 52% & 53%.

SEASON	PERSONNEL PERCENTAGE	PLAYERS PERCENTAGE
2020/21	61%	49%
2019/20	56%	53%
2018/19	57%	53%
2017/18	59%	54%
2016/17*	65%	68%

Table 6 Percentages personnel costs,

* this season was played in the Eredivisie

To determine whether these percentages are correlating with the teams that are relegating, from the Eredivisie to the second division, an overview will be shown for the last few seasons. The percentages that the teams are using who had been relegated that season can be seen in *Table 7*.

SEASON	RELEGATED CLUBS	PERSONNEL PERCENTAGE	PLAYERS PERCENTAGE
2019/20**	Ado Den Haag	54%	47%
	RKC Waalwijk	62%	64%
2018/19	Excelsior	66%	62%
	De Graafschap	56%	53%
	NAC Breda	56%	67%
	Roda JC	53%	61%
2017/18	Sparta Rotterdam	64%	55%
	FC Twente	53%	40%
	Go Ahead Eagles	65%	68%
2016/17*	NEC Nijmegen	60%	54%
	Go Ahead Eagles	65%	68%

Table 7 Percentages relegated clubs * this season was played in the Eredivisie ** no clubs relegated because of COVID-19

It is hard to say without making a calculation whether these percentages did influence the sportive results or not. The percentages will be used as a financial indicator for the remainder of this research. In chapter 5 the correlation between these indicators and the sportive performance will be measured and a statement can be made if one of these percentages is the financial key performance indicator.

These percentages definitely indicate how the clubs are working with their total budget, in *Figure 8* a comparison with other clubs can be seen regarding the expenses. Again, the data of GAE is compared to the average expenses of the second division and the average of place 10th to 18th of the Eredivisie. This will show how GAE did in that current season against the rest of the competition.

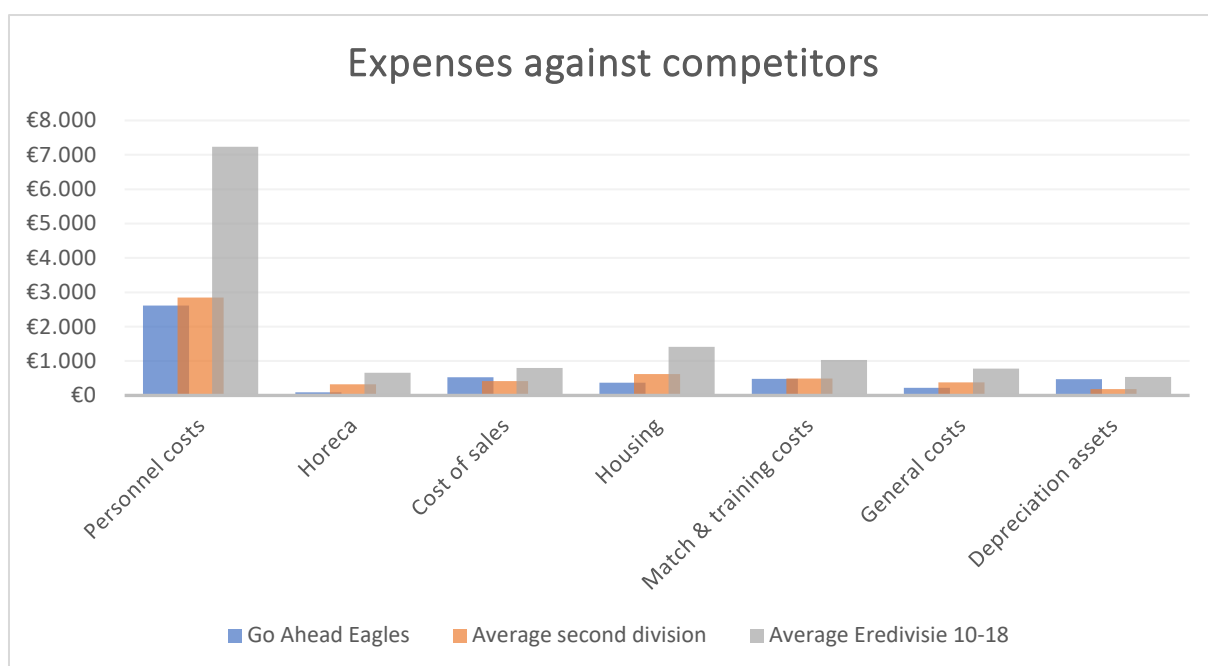


Figure 8 Expenses against competitors (all values x 1000)

The first big noticeable difference between GAE and the competitors in the Eredivisie is the personnel costs, this difference is mainly caused by the costs of the players in the club. Every club has to decide how much they want to spend on their players budget, GAE always tries to get this players budget as high as possible while also making sure all the other expenses can be made. There exists some form of a relation between the players budget and the sportive performance, this relation will be worked out in more detail to be able to say how much this financial indicator influences the on-field performance of GAE. The data shown below will only contain the teams ranked 10th – 18th in the Eredivisie of different seasons. To determine the correlation in chapter 5 all the data of all clubs will be used.

2019/20

Rank	Club	Players budget (x1000)
10 (9)	SC Heerenveen	€ 5.908
11 (16)	Sparta Rotterdam	€ 4.175
12 (11)	FC Emmen	€ 5.116
13 (14)	VVV-Venlo	€ 4.527
14 (7)	FC Twente	€ 8.134
15 (8)	PEC Zwolle	€ 6.210
16 (17)	Fortuna Sittard	€ 3.543
17 (10)	ADO Den Haag	€ 5.122
18 (18)	RKC Waalwijk	€ 2.768

2018/19

Rank	Club	Players budget (x1000)
10 (15)	Willem II	€ 3.784
11 (7)	SC Heerenveen	€ 5.737
12 (14)	VVV-Venlo	€ 3.939
13 (9)	PEC Zwolle	€ 5.070
14 (18)	FC Emmen	€ 2.173
15 (13)	Fortuna Sittard	€ 4.343
16 (16)	S.B.V. Excelsior	€ 3.119
17 (17)	De Graafschap	€ 2.815
18 (10)	NAC Breda	€ 4.886

2017/18

Rank	Club	Players budget (x1000)
10 (12)	Heracles Almelo	€ 4.403
11 (18)	S.B.V. Excelsior	€ 2.894
12 (13)	FC Groningen	€ 4.352
13 (15)	Willem II	€ 3.928
14 (17)	NAC Breda	€ 3.187
15 (16)	VVV-Venlo	€ 3.565
16 (14)	Roda JC Kerkrade	€ 4.215
17 (10)	Sparta Rotterdam	€ 4.619
18 (6)	FC Twente	€ 6.834

2016/17

Rank	Club	Players budget (x1000)
10 (13)	Heracles Almelo	€ 3.960
11 (12)	ADO Den Haag	€ 4.187
12 (18)	S.B.V. Excelsior	€ 2.900
13 (14)	Willem II	€ 3.361
14 (11)	PEC Zwolle	€ 4.386
15 (17)	Sparta Rotterdam	€ 2.912
16 (16)	N.E.C. Nijmegen	€ 3.220
17 (10)	Roda JC Kerkrade	€ 4.463
18 (15)	Go Ahead Eagles	€ 3.354

Table 8 Players budget Eredivisie

The tables show the players budgets of all the teams that placed 10th to 18th used in that season. In the column of *Rank*, between the brackets, the place is shown where the club would be ranked if the table was ranked on the players budget. This gives an idea where the club was expected to finish. Also, Staff budget can be interpreted in the same way as the players budget. The staff budget is all the money that is allocated to the trainers etc.

Four financial indicators have now been highlighted to further work out in Chapter 5: personnel percentage, players percentage, players budget & Staff budget. These variables seem to be having a relation with the on-field performance, in chapter 5 for all these financial indicators a correlation test will be done to determine the most influential financial indicator and thus the financial key performance indicator.

4.2 Sportive analysis

The sportive analysis represents, together with the financial analysis, step 4 in de MPSM cycle. Sportive performance indicators will be found in this section. So that after this chapter several financial and performance indicators have been found. After this chapter it will be possible to work out the relation between the financial performance indicators and the sportive performance indicators.

The main target for GAE in the upcoming season is staying up in the Eredivisie. So, this means that the main aspects of sportive performance is the place the club finishes and the amount of points the club gets in that season. Place number 15 will guarantee a place in the Eredivisie for next season. In *Table 9* the clubs that placed 15th over the past seasons are shown, the amount of points they managed to collect is also included in this table. In this table only seasons with 34 games are used. Moreover, all the games are converted to the three-point system because in the past, the clubs would only collect two points for a win, instead of the three points they get nowadays. The average points club number 15 collects over a season is 33,6. In fact, in the last 10 years no club with 35 points or higher relegated from the Eredivisie.

Later in this research (Chapter 5.5) a forecast will be made to determine how much points GAE should collect to finish 15th. The point total at the end of the season thus reflects the sportive performance very well, but only looking at the point total will also have downsides. As explained earlier in the report, the economic side of the football industry is getting bigger and bigger, and the influence of this financial growth can be seen in the results. Clubs as Ajax and AZ managed to improve their net profit with 69 and 43 percent respectively over the last 5 years. These improvements can be seen in the sportive results as these clubs are extremely dominant in the competition. The gap between the top clubs and the rest of the competition is growing hard and that's why the chances of winning against these clubs is also becoming harder each year. This is the reason why only looking at the points total is not sufficient to evaluate the sportive performance.

SEASON	RANK	CLUB	GAMES	POINTS	SEASON	RANK	CLUB	GAMES	POINTS
2020/21	15	RKC Waalwijk	34	30	1989/90	15	MVV Maastricht	34	34
2018/19	15	Fortuna Sittard	34	34	1988/89	15	Willem II	34	35
2017/18	15	VVV Venlo	34	34	1987/88	15	Roda JC	34	38
2016/17	15	Sparta Rotterdam	34	34	1986/87	15	AZ Alkmaar	34	34
2015/16	15	Excelsior	34	30	1985/86	15	Excelsior	34	34
2014/15	15	Excelsior	34	32	1984/85	15	Go Ahead Eagles	34	39
2013/14	15	NAC Breda	34	35	1983/84	15	FC Volendam	34	35
2012/13	15	NEC Nijmegen	34	37	1982/83	15	Helmond Sport	34	34
2011/12	15	ADO Den Haag	34	32	1981/82	15	PEC Zwolle	34	34
2010/11	15	Vitesse	34	35	1980/81	15	FC Groningen	34	33
2009/10	15	ADO Den Haag	34	30	1979/80	15	NEC Nijmegen	34	38
2008/09	15	Heracles Almelo	34	32	1978/79	15	NEC Nijmegen	34	35
2007/08	15	Willem II	34	31	1977/78	15	NEC Nijmegen	34	38
2006/07	15	Willem II	34	31	1976/77	15	FC Amsterdam	34	32
2005/06	15	ADO Den Haag	34	35	1975/76	15	Eindhoven	34	36
2004/05	15	NAC Breda	34	35	1974/75	15	FC Utrecht	34	34
2003/04	15	ADO Den Haag	34	34	1973/74	15	Roda JC	34	28
2002/03	15	FC Groningen	34	32	1972/73	15	AZ Alkmaar	34	33
2001/02	15	FC Groningen	34	37	1971/72	15	Excelsior	34	24
2000/01	15	De Graafschap	34	31	1970/71	15	Holland Sport	34	29
1999/00	15	NEC Nijmegen	34	27	1969/70	15	DWS Amsterdam	34	33
1998/99	15	SC Cambuur	34	32	1968/69	15	FC Volendam	34	29
1997/98	15	MVV Maastricht	34	32	1967/68	15	NAC Breda	34	35
1996/97	15	Willem II	34	35	1966/67	15	FC Utrecht	34	35
1995/96	15	FC Utrecht	34	28	1961/62	15	ADO Den Haag	34	38
1994/95	15	Sparta Rotterdam	34	34	1960/61	15	Fortuna Sittard	34	34
1993/94	15	FC Utrecht	34	35	1959/60	15	Elinkwijk	34	38
1992/93	15	Go Ahead Eagles	34	33	1958/59	15	DWS Amsterdam	34	34
1991/92	15	FC Dordrecht	34	34	1957/58	15	NOAD Tilburg	34	40
1990/91	15	MVV Maastricht	34	36	1956/57	15	FC Den Bosch	34	37

Table 9 Clubs that have been ranked number 15 in the Dutch Eredivisie

As stated before, it is not good enough to only take the points as a measure for the sportive performance because the points do not show how GAE performed against the competitors. A good measure for the sportive performance of a football club is the *Euro Club Index (ECI)*. This index shows the relative strengths of the football clubs at a given point in time, and the developments of playing strengths in time. The ECI makes it possible to calculate the probabilities of different match results (win, draw, loss) for football matches in the near future. The ECI-value of a football club represents the expected level of sporting success at that point in time, this value is getting updated after each game. The values are derived from historical and actual sporting results: in league matches, in national cup matches and in UEFA matches. The ECI-values are calculated, based on all relevant match results from several recent seasons, using statistical methods. The impact of more recent matches on the ECI-value is higher than that of older matches. The ECI is constructed in such a way, that its predictive force is maximized.

The result of a football match depends on three aspects: The playing strengths of the teams, the home advantage and the match performance. The playing strength, as stated earlier, is given by the ECI-values. The match performance will vary according to a normal distribution, this way it is possible to calculate the probabilities of the different match results.

The result of every match will influence the ECI-value of both teams that played against each other. The outcome of the match will be real number between -1 and 1 (1 for a home win, 0 for a draw, and -1 for an away win) the difference between the expected outcome and the real outcome is multiplied by a constant k . The result is added to the ECI of the home team and subtracted from the ECI of the away team. So, if GAE plays against Ajax (one of the best clubs in the Netherlands at this moment in time), and GAE wins, then the ECI-value of GAE increases a lot and the ECI value of Ajax decreases a lot, because GAE was not expected to win. If Ajax wins from GAE, then both the ECI-values do not change much, as this is the expected outcome of the match.

For example, a match between team X with $ECI_x = 2400$ and team Y with $ECI_y = 1900$ has an expected result of:

$$1 \times 66\% + 0 \times 19\% - 1 \times 15\% = 0,51$$

In *Table 10* the changes of the ECI are shown based on the match result (with constant $k = 35$)

MATCH RESULT	ECI-INCREMENT	ECI_x	ECI_y
HOME TEAM WIN	$35 \times (1 - 0,51) = 17$	$2400 + 17 = 2417$	$1900 - 17 = 1883$
DRAW	$35 \times (0 - 0,51) = -18$	$2400 - 18 = 2382$	$1900 + 18 = 1918$
AWAY TEAM WIN	$35 \times (-1 - 0,51) = -53$	$2400 - 53 = 2347$	$1900 + 53 = 1953$

Table 10 ECI calculation

The *Euro Club Index* is thus a good measurement for performance, following the RPS (Ranked Probability Score), the ECI method scores in the top three models that work with sports statistics as published in the WorldPress¹

In the last 5 years the ECI value of GAE slightly decreased with a percentage of -8%. This mainly has to do with the fact that GAE had an extremely bad season in 2017, finishing 17th in the second division.

Rank	Club	2019/'20	2018/'19	2017/'18	2016/'17	2015/'16	Trend
1	De Graafschap	1.494	1.311	1.203	1.138	1.343	11%
2	SC Cambuur	1.472	1.245	1.239	1.395	1.366	8%
3	NAC Breda	1.409	1.333	1.448	1.423	1.524	-8%
4	S.B.V. Excelsior	1.354	1.507	1.625	1.614	1.444	-6%
5	N.E.C. Nijmegen	1.288	1.327	1.483	1.657	1.861	-31%
6	Go Ahead Eagles	1.247	1.074	868	1.257	1.361	-8%
7	FC Volendam	1.165	895	938	1.091	1.044	12%
8	Almere City FC	1.116	1.118	1.015	988	976	14%
9	sc Telstar	1.096	977	958	751	803	37%
10	FC Den Bosch	1.062	1.021	785	792	817	30%
11	Roda JC Kerkrade	1.006	1.285	1.493	1.623	1.586	-37%
12	FC Eindhoven	950	946	907	1.086	1.221	-22%
13	MVV Maastricht	890	1.052	910	1.111	1.045	-15%
14	Top Oss	854	990	694	654	600	42%
15	FC Dordrecht	675	760	709	626	974	-31%
16	Helmond Sport	473	568	728	921	895	-47%
	Average	1.097	1.088	1.063	1.133	1.179	-3%

Season 2020/21 is not included yet in the data, the expectations are that the ECI-value of GAE increased a lot during this season, because the sportive performances were exceptional with the promotion as result. In *Table 11* the development of the ECI-values compared to the competition can be seen.

¹ cognitivefootball.wordpress.com

The main variable that indicates the sportive performance is of course the place the club finished in, this will always show the results relative to the competition. *Figure 10* shows how GAE performed over the last few seasons, this figure is not competition based, but indicates the Dutch Football pyramid. So, place 25 is the same as place 7 in the second division. GAE improved last season and because of the promotion GAE can improve further than the maximum of place 19 in the second division.

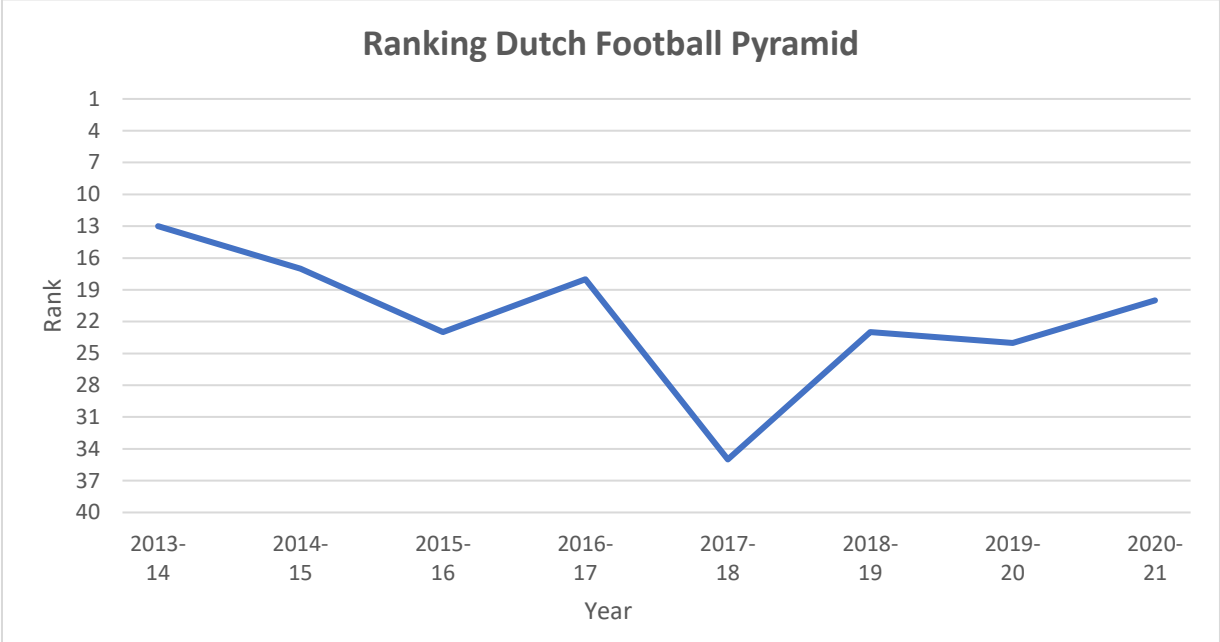


Figure 9 Ranking GAE in the Dutch Football Pyramid

The sportive performance indicators described in this analysis are: collected points, ECI-value and the ranking. These sportive indicators will be used in Chapter 5 to determine the correlation between the financial performance and the sportive performance. The relation between all the financial performance indicators and the sportive performance indicators will be calculated to determine the financial key performance indicator, this indicator will be used in the model.

Chapter 5 Correlation calculation

From the previous chapter (Financial & Sportive analysis) we introduced four financial performance indicators and three sportive performance indicators. In this chapter the correlations of the sportive and the financial indicators will be calculated. This indicates chapter 4 of the MPSM: *Solution generation*. When all the correlations are calculated the financial KPI can be determined which indicates step 5 of the MPSM: *Solution Choice*. This chapter will show if there is a potential significant correlation between the financial performance indicators and sportive performance indicators. To work out which of the financial performance indicators will influence the on-field performance the most, three sportive performance indicators were derived. With the two statistical methods described earlier, the *financial Key Performance Indicator* can be calculated. This financial KPI will be used in chapter 6 for the model. The indicators that will be used in this chapter with their correlating abbreviations are shown in the table 12 and 13 below.

5.1 Procedure for finding the financial KPI

Financial performance indicator	Variables
Personnel percentage	p
Players percentage	s
Players budget	b
Staff budget	t

Table 12 Financial performance indicators

Sportive performance indicator	Variables
Points total	X
Rank	R
ECI	E

Table 13 Sportive performance indicators

To calculate the relation between the indicators a *Correlation Coefficient method* will be used as explained in Chapter 2. The correlation will be calculated against the three sportive performance indicators, each financial indicator will have an average for every sportive indicator. This average is determined with the use of the Fisher's z-transformation (See chapter 2.5), because simply taking the average of different correlations is not possible in statistics. Hypothesis testing will show if the financial indicators and the sportive indicators are related at a significant level of $\alpha = 0,05$. With the results of the calculation the financial KPI can be chosen.

Table 14 is an example of how the tables will look like, this table is based on the personnel percentage, that is why a lower case p is used. The table shows all the correlation coefficients between the indicators as well as the average coefficients (after the Fisher z-transformation) per sportive indicator. The data will include the seasons 2019/20 till 2016/17, using four different seasons will reduce the biasness of the result. In Appendix I all the relevant data of the used seasons is well worked out, with this information the correlations are calculated.

	<i>Points total</i>	<i>Rank</i>	<i>ECI</i>
2019/20*	X_p	R_p	E_p
2018/19	X_p	R_p	E_p
2017/18	X_p	R_p	E_p
2016/17	X_p	R_p	E_p
<i>Average(After Fisher z)</i>	\bar{X} after Fisher z-transformation	\bar{R} after Fisher z-transformation	\bar{E} after Fisher z-transformation

Table 14 Example Pearson coefficient table

5.2 Examples of calculation

The Pearson correlation coefficient method will be used to calculate the correlations between the financial indicators with two of the three sportive indicators: Points total & ECI (green highlighted in Table 14). After looking at the scatter plots between these indicators, a linear relation can be seen. With these indicators the linear relationship can be calculated, that is why the Pearson correlation coefficient is used for these indicators. The Spearman correlation coefficient method will be used to calculate the correlations between the financial indicators and the Rank. The rank is an ordinal variable, which means that the linear method of Pearson is not applicable. That is why the Spearman correlation Coefficient is used for these indicators. Below two full worked out examples of a calculation with the two different statistical methods are shown., the examples will give an idea how all the values will be worked out.

5.2.1 Example Pearson correlation coefficient calculation

The Pearson correlation coefficient is calculated between the four different financial indicators and the Points total & ECI-values, the correlations are calculated for four seasons with the following formula:

$$r = \frac{\sum_i(x_i - M_x)(y_i - M_y)}{\sqrt{\sum_i(x_i - M_x)^2} \sqrt{\sum_i(y_i - M_y)^2}}$$

With this formula the relation between two samples can be calculated. In this example the correlation calculation between the *players budget* and the *points total* of season 2018/19 is made (Yellow highlighted in Table 19 of chapter 5.3.3). This calculation will give an understanding how the correlation is determined.

Below in the Key are the variables stated and explained. Next to the key the table of the samples is shown, the samples is in this case are the Players budget and the Total points from season 2018/19.

Club	X: Players budget	Y: Total points
Ajax	60.500	86
PSV	29.330	83
Feyenoord	18.263	65
AZ	9.122	58
Vitesse	10.532	53
FC Utrecht	6.216	53
Heracles Almelo	4.642	48
FC Groningen	4.694	45
ADO Den Haag	5.071	45
Willem II	3.784	44
SC Heerenveen	5.737	41
VVV-Venlo	3.939	41
PEC Zwolle	5.070	39
FC Emmen	2.173	38
Fortuna Sittard	4.343	34
Excelsior	3.119	33
De Graafschap	2.815	29
NAC	4.886	23

Key

X: X Values

Y: Y Values

M_x : Mean of X Values

M_y : Mean of Y Values

$X - M_x$ & $Y - M_y$: Deviation scores

$(X - M_x)^2$ & $(Y - M_y)^2$: Deviation Squared

$(X - M_x)(Y - M_y)$: Product of Deviation Scores

Table 15 Example players budget and points total 2018/19

In Figure 12 the graph of the sample is visualised, there is already a positive linear relation visible in the graph. Below the full calculation of the correlation-value is shown. The calculation is not necessary to understand for the remainder of the research, but it does give an insight of how the values are calculated.

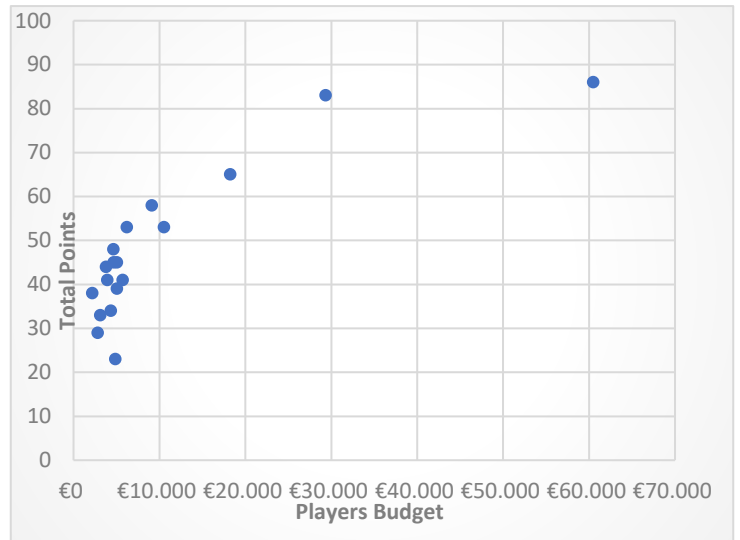


Figure 10 Total points vs Players budget

$X - M_x$	$Y - M_y$	$(X - M_x)^2$	$(Y - M_y)^2$	$(X - M_x)(Y - M_y)$
50.265	38.333	2526.537	1469.444	1926.812
19.095	35.333	364.606	1248.444	674.678
8.028	17.333	64.443	300.444	139.146
-1.113	10.333	1.240	106.778	-11.504
0.297	5.333	0.088	28.444	1.582
-4.019	5.333	16.155	28.444	-21.436
-5.593	0.333	31.285	0.111	-1.864
-5.541	-2.667	30.706	7.111	14.777
-5.164	-2.667	26.670	7.111	13.772
-6.451	-3.667	41.620	13.444	23.655
-4.498	-6.667	20.235	44.444	29.989
-6.296	-6.667	39.644	44.444	41.976
-5.165	-8.667	26.681	75.111	44.766
-8.062	-9.667	65.001	93.444	77.936
-5.892	-13.667	34.720	186.778	80.529
-7.116	-14.667	50.642	215.111	104.373
-7.420	-18.667	55.061	348.444	138.513
-5.349	-24.667	28.615	608.444	131.950
Mx: 10.235	My: 47.667	Sum: 3423.950	Sum: 4826.000	Sum: 3409.648

Result Details & Calculation
X Values
$\Sigma = 184.236$
Mean = 10.235
$\Sigma(X - M_x)^2 = SS_x = 3423.95$
Y Values
$\Sigma = 858$
Mean = 47.667
$\Sigma(Y - M_y)^2 = SS_y = 4826$
X and Y Combined
$N = 18$
$\Sigma(X - M_x)(Y - M_y) = 3409.648$
R Calculation
$r = \frac{\Sigma((X - M_x)(Y - M_y))}{\sqrt{((SS_x)(SS_y))}}$
$r = 3409.648 / \sqrt{((3423.95)(4826))} = 0.8388$
Meta Numerics (cross-check)
$r = 0.8388$

The value of r is 0.8388. This is a very strong positive correlation, which means that high X variable scores go with high Y variable scores (and vice versa). The value of r^2 , the coefficient of determination, is 0.7036. This value is a measurement used to explain how much variability of one factor can be caused by its relationship to another related factor. To show whether the r-value indicates a significant relation between the two samples, a hypothesis test (Explained in Chapter 2.6) will be conducted.

The next step is to perform a hypothesis test to find out if there exist a clear relation between the players budget and the total points.

1 Define Null and Alternative Hypotheses

H_0 ; $\rho = 0$ There is no correlation between the samples

H_1 ; $\rho \neq 0$ There is a correlation between samples

2 State Alpha

Alpha = 0,05

3 Calculate Degrees of Freedom

df = n-2 \rightarrow 18 - 2 = 16

4 State Decision Rule

With df = 16 and alpha = 0,05, in the *Pearson's Correlation Table* we find the critical value \rightarrow r = 0,468. This means that H_0 will be rejected if the calculated Pearson Correlation Coefficient (r) > 0,468 or the calculated Pearson Correlation Coefficient (r) < -0,468 because this is a two-tailed test.

5 Calculate Test Statistic

The test statistic is the Pearson Correlation coefficient: r. The formula:

$$r = \frac{\sum_i(x_i - M_x)(y_i - M_y)}{\sqrt{\sum_i(x_i - M_x)^2} \sqrt{\sum_i(y_i - M_y)^2}} = 0,8388 \text{ in this case.}$$

6 State Results

If r is greater than 0,468 we reject the null hypothesis, 0,8388 > 0,468 so we reject the null hypothesis.

7 State Conclusion

We have shown that with a significance level of 0,05 there exists a relation between the two samples, players budget and total points. So, this implies that if the player budget increases, the amount of points that will be collected will also increase.

This example shows how all the numbers are being calculated and what these numbers mean, so from now on, not all the calculations of the Pearson method will be shown. In Appendix I & J the data of the calculations and the results can be found.

5.2.2 Example Spearman correlation coefficient calculation

The Spearman correlation coefficient is calculated between the Rank and the four financial indicators over four seasons with the following formula:

$$r_s = 1 - \frac{6 \sum D^2}{N^3 - N}$$

The financial indicators have to be ranked in order to perform the Spearman technique, this means that the highest value of the financial indicator sample gets a one, the second highest a two etc. The sample is thus ordered from 1 to 18.

With this formula the relation between two samples can be calculated. In this example the correlation calculation between the *ranked staff budget* and the *rank of season 2017/18* is made (Yellow highlighted in *Table 20* of chapter 5.3.4). This calculation will give an understanding how the correlation is determined.

Below in the *Key* are the variables stated and explained. Next to the key the table of the sample is shown, the sample is in this case the *Ranked staff budget* and the *Total points* from season 2018/19.

Club	X: Rank	Y: Ranked staff budget*
PSV	1	2
Ajax	2	1
AZ	3	4
Feyenoord	4	3
FC Utrecht	5	14
Vitesse	6	6
ADO Den Haag	7	9
SC Heerenveen	8	7
PEC Zwolle	9	11
Heracles Almelo	10	10
Excelsior	11	17
FC Groningen	12	13
Willem II	13	12
VVV-Venlo	14	16
NAC	15	18
Roda JC	16	15
Sparta Rotterdam	17	8
FC Twente	18	5

Calculation

$$R = \text{CoVariance} / (X_{Ra} \text{ St. Dev.} * Y_{Ra} \text{ St. Dev.})$$

Key

X_{Ra} = Ranks of X Values; Y_{Ra} = Ranks of Y Values

$X_{Ra} - M_x$ = X rank minus mean of X ranks

$Y_{Ra} - M_y$ = Y rank minus mean of Y ranks

Sum Diffs = $(X_{Ra} - M_x) * (Y_{Ra} - M_y)$

Table 16 Example Rank and Ranked staff budget 2018/19

*the values are ranked from high to low to get the ordinal variable

In Figure 14 the graph of the sample is visualised, there is already some form of a positive linear relation visible in the graph. Below the full calculation of the correlation-value is shown. The calculation is not necessary to understand for the remainder of the research, but it does give an insight of how the values are calculated.

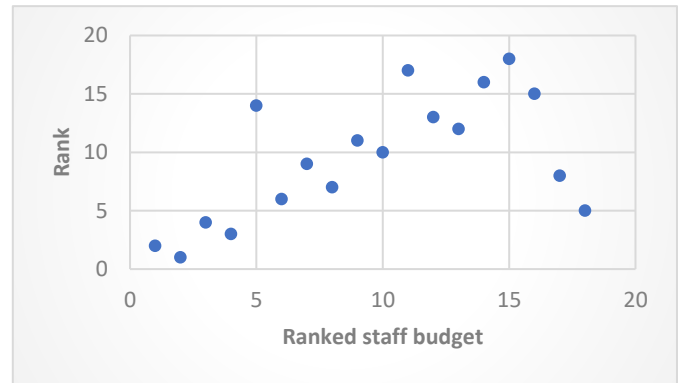


Figure 124 Rank against ranked staff budget

X Values	Y Values	X_{Ra}	$X_{Ra} - M_x$	Y_{Ra}	$Y_{Ra} - M_y$	Sum Diffs
1	2	1.00	-8.50	2.00	-7.50	63.75
2	1	2.00	-7.50	1.00	-8.50	63.75
3	4	3.00	-6.50	4.00	-5.50	35.75
4	3	4.00	-5.50	3.00	-6.50	35.75
5	14	5.00	-4.50	14.00	4.50	-20.25
6	6	6.00	-3.50	6.00	-3.50	12.25
7	9	7.00	-2.50	9.00	-0.50	1.25
8	7	8.00	-1.50	7.00	-2.50	3.75
9	11	9.00	-0.50	11.00	1.50	-0.75
10	10	10.00	0.50	10.00	0.50	0.25
11	17	11.00	1.50	17.00	7.50	11.25
12	13	12.00	2.50	13.00	3.50	8.75
13	12	13.00	3.50	12.00	2.50	8.75
14	16	14.00	4.50	16.00	6.50	29.25
15	18	15.00	5.50	18.00	8.50	46.75
16	15	16.00	6.50	15.00	5.50	35.75
17	8	17.00	7.50	8.00	-1.50	-11.25
18	5	18.00	8.50	5.00	-4.50	-38.25

Result Details

X Ranks

Mean: 9.5

Standard Dev: 5.34

Y Ranks

Mean: 9.5

Standard Dev: 5.34

Combined

Covariance = $286.5 / 17 = 16.85$

$R = 16.85 / (5.34 * 5.34) = 0.591$

The value of r is 0,591. This is a relative strong positive correlation, which means that high X variables most of the time go with high Y variables (and vice versa). The value of r^2 , the coefficient of determination, is 0.349. This value is a measurement used to explain how much variability of one factor can be caused by its relationship to another related factor.

The next step is to perform a hypothesis test to find out if there exist a clear relation between the ranked staff budget and the total points.

1 Define Null and Alternative Hypotheses

$H_0; P = 0$ There is no correlation between the samples

$H_1; P \neq 0$ There is a correlation between samples

2 State Alpha

Alpha = 0,05

3 Calculate Degrees of Freedom

$df = n-2 \rightarrow 18 - 2 = 16$

4 State Decision Rule

With $df = 16$ and $\alpha = 0,05$, in the *Spearman Correlation Table* we find the critical value $\rightarrow r = 0,503$. This means that H_0 will be rejected if the calculated Spearman Correlation Coefficient (r) $> 0,503$ or the calculated Spearman Correlation Coefficient (r) $< -0,503$ because this is a two-tailed test.

5 Calculate Test Statistic

The test statistic is the Spearman Correlation coefficient: r . The formula:

$$r_s = 1 - \frac{6 \sum D^2}{N^3 - N} = 0,591 \text{ in this case.}$$

6 State Results

If r is greater than 0,503 we reject the null hypothesis, $0,591 > 0,503$ so we reject the null hypothesis.

7 State Conclusion

We have shown that with a significance level of 0,05 there exists a relation between the two samples, Ranked staff budget and Rank. So, this implies that if the Staff budget increases, the amount of points that will be collected will also increase.

The two examples that have been worked out indicate how all the values of the tables are calculated. To prevent the report from being unreadable, no further explanations of the values will be shown.

5.3 Calculation of the correlation values

In this section all the correlation values will be calculated, in the previous section the two examples explained how the statistical methods are used. All of the four financial indicators will have their own part with tables and graphs that show the data.

5.3.1 Personnel percentage

The first financial indicator that will be worked out against the sportive indicators is the personnel percentage. In *Table 17* all the values are stated. A small negative correlation can be seen if we look at the values in the table. The graphs show the data of the different seasons, with orange being 2019/20, grey being 2018/19, yellow being 2017/18 and blue being 2016/17. All the graphs show chaos and there is no relation visible, also no difference can be seen in the results between the different seasons. This all makes clear that each club needs to choose a percentage that fits with their working policy of the club. There exist no minimum or maximum percentage GAE needs to work with in order to stay up in the Eredivisie.

	<i>Points total</i>	<i>Rank</i>	<i>ECI</i>
<i>2019/20*</i>	-0,158825625	-0,147574819	-0,199247506
<i>2018/19</i>	-0,152069931	-0,139318885	-0,199368594
<i>2017/18</i>	-0,202187079	-0,062951496	-0,360771399
<i>2016/17</i>	-0,252567653	-0,190918473	-0,245497184
<i>Average(after Fisher z)</i>	-0,191748161	-0,135466186	-0,252520287

Table 17 Correlation-values Personnel percentage

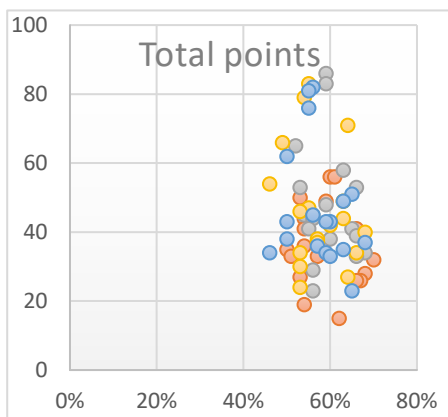


Figure 13 Total points against personnel percentage

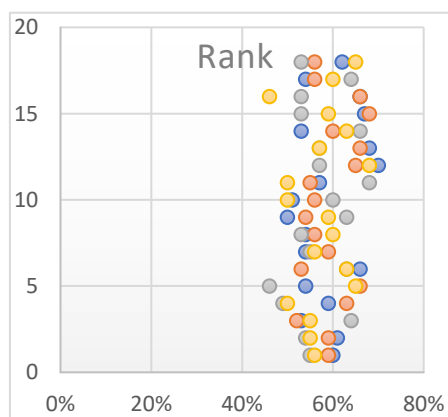


Figure 15 Rank against personnel percentage

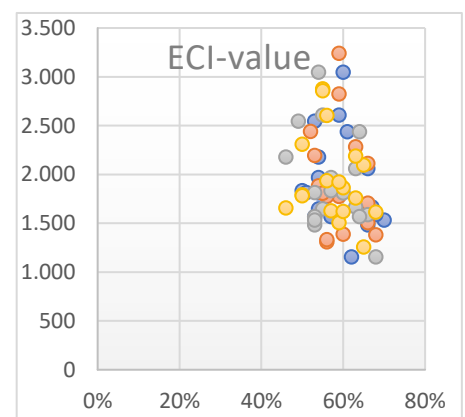


Figure 14 ECI-value against personnel percentage

5.3.2 Players percentage

The second financial indicator that will be worked out against the sportive indicators is the players percentage. The personnel percentage does not have a clear relation with the sportive performance shown in 5.3.1, so the expectation is that the players percentage will also not have a big correlation value, because the players percentage is part of the personnel percentage. In *Table 18* the Pearson values are stated, the values look similar to the correlation values of the personnel percentage. This indicates again that no clear relation between the players percentage and the sportive performance can be seen. The graphs show chaos and no clear trendline can be worked out in the graphs.

	<i>Points total</i>	<i>Rank</i>	<i>ECI</i>
<i>2019/20*</i>	0,013111531	-0,110423117	-0,038416955
<i>2018/19</i>	-0,113705517	-0,316821465	-0,166033716
<i>2017/18</i>	-0,187772268	-0,333333333	-0,283585767
<i>2016/17</i>	-0,331679387	-0,471620227	-0,396356646
<i>Average(after Fisher z)</i>	-0,157631629	-0,313504959	-0,225296912

Table 18 Correlation-values Players percentage

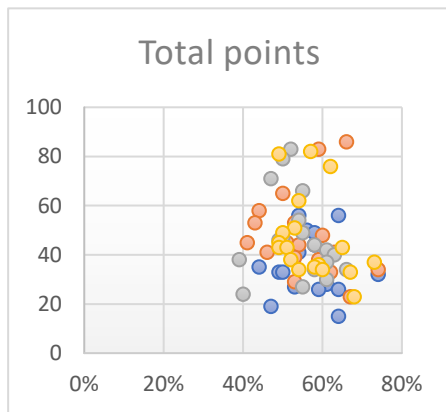


Figure 18 Total points against Players percentage

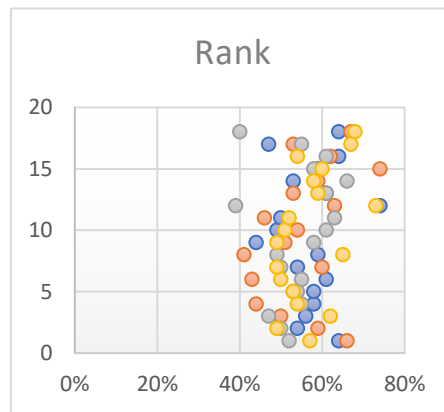


Figure 17 Rank against Players percentage

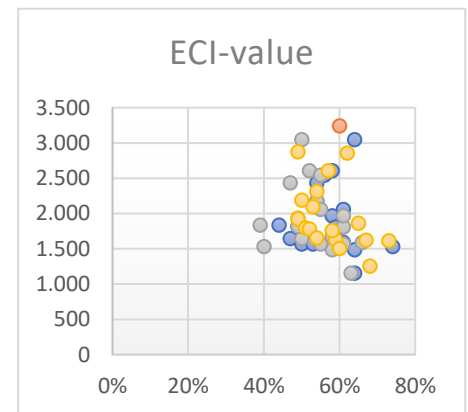


Figure 16 ECI-value against Players percentage

5.3.3 Players budget

The third financial indicator that will be worked out is the players budget, this indicator is expected to have a big impact on the sportive results because the player budgets increases year by year. The values indicate a strong positive correlation between the indicators, also the graphs show a positive correlation. Figure 21 can be interpreted wrong, but this graph also indicates a positive correlation. The better you perform the 'lower' the rank, for example finishing 3rd is better than finishing 15th. In all the tables the values in the column of 'Rank' are inverted to get the right results. The values in the columns of 'ECI' and 'Points total' are very high, it is good that three different sportive indicators are used, because only using the rank to determine the sportive performance is not sufficient.

	<i>Points total</i>	<i>Rank</i>	<i>ECI</i>
2019/20*	0,670464222	0,659442724	0,846522608
2018/19	0,838787945	0,812177503	0,866314149
2017/18	0,828840364	0,69246646	0,881838349
2016/17	0,90654946	0,839009288	0,910841706
<i>Average(after Fisher z)</i>	0,827521439	0,761144129	0,878594468

Table 19 Correlation-values Players budget

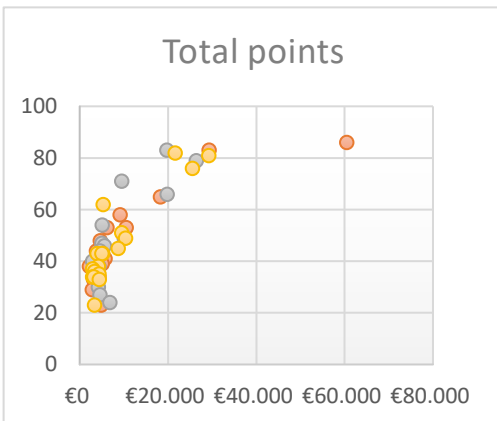


Figure 20 Total points against Players budget

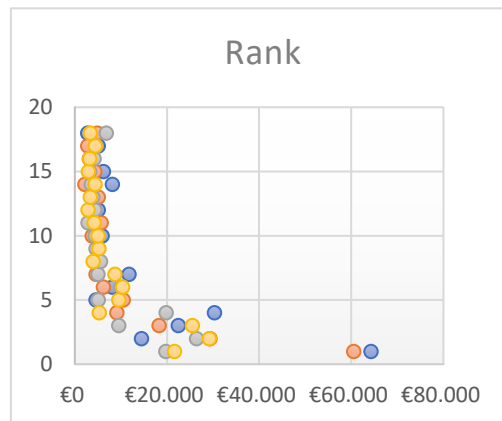


Figure 21 Rank against Players budget

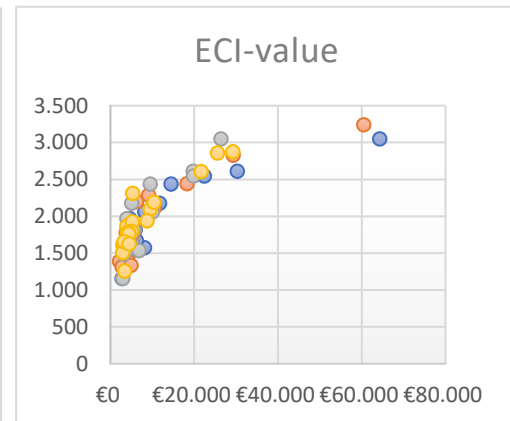


Figure 19 ECI-value against Players budget

5.3.4 Staff budget

The last financial indicator that will be worked out is the staff budget. The staff are the people who train the players and tell the players how to work. The staff should be responsible for the actions of their players, they should thus also be responsible for the on-field performance. This part will cover the correlation between the staff budget and the sportive performance, so can a good and expensive staff improve the sportive performance significantly? A strong positive correlation can be seen in the results. Again, the column of 'Rank' is lower than the other columns even though all the columns indicate a positive correlation. The graphs also back the values that indicate the positive correlation, only *Figure 25* shows a negative correlation, but this is already explained in Chapter 5.3.3.

	<i>Points total</i>	<i>Rank</i>	<i>ECI</i>
<i>2019/20*</i>	0,699567165	0,576883385	0,873315979
<i>2018/19</i>	0,804354315	0,820433437	0,837421789
<i>2017/18</i>	0,654416558	0,591331269	0,756129103
<i>2016/17</i>	0,668277782	0,684210526	0,690457832
<i>Average(after Fisher z)</i>	0,712366387	0,682166424	0,800077354

Table 20 Correlation-values Staff budget

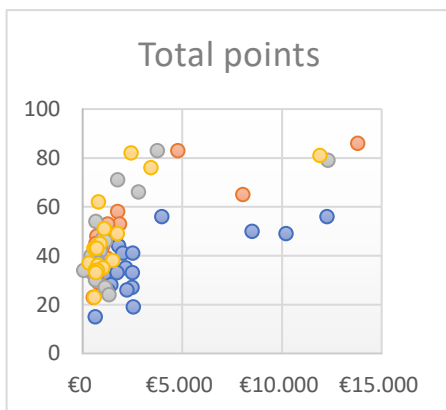


Figure 24 Total points against Staff budget

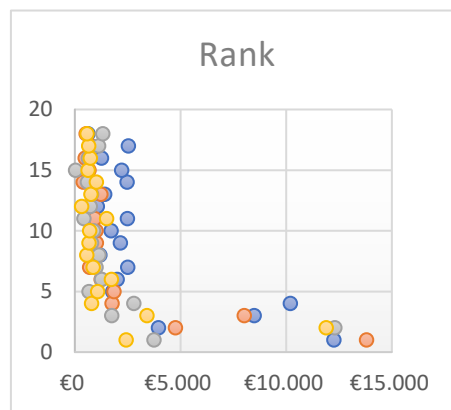


Figure 23 Rank against Staff budget

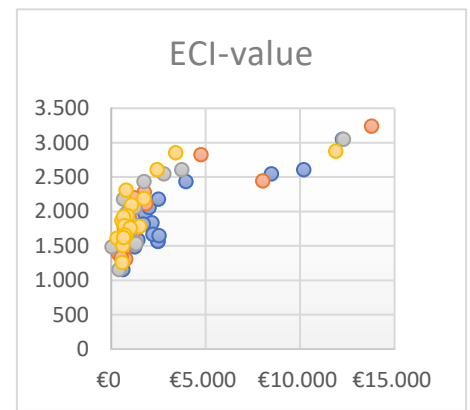


Figure 22 ECI-value against Staff budget

5.3.5 Financial KPI

The next step is to work with hypothesis testing to test whether a real correlation can be found at significance level of $\alpha = 0,05$. Below the hypothesis test for the relation between the financial indicators and the total points is shown. The other two tests (for the Rank & ECI) can be found in Appendix J. The average correlation for the different indicators are calculated following the principles of the Fisher z-transformation, see Chapter 2.5. The results of all tests will be discussed in this section.

Hypothesis test for the relation between the financial indicators and the total points.

1 Define Null and Alternative Hypotheses

H_0 ; $\rho = 0$ There is no correlation between the samples

H_1 ; $\rho \neq 0$ There is a correlation between samples

2 State Alpha

$\alpha = 0,05$

3 Calculate Degrees of Freedom

$df = n-2 \rightarrow 18 - 2 = 16$

4 State Decision Rule

With $df = 16$ and $\alpha = 0,05$, in the Pearson *Correlation-Table* we find the critical value $\rightarrow r = 0,468$. This means that H_0 will be rejected if the calculated Correlation Coefficient (r) $> 0,468$ or the calculated Correlation Coefficient (r) $< -0,468$ because this is a two-tailed test.

5 Calculate Test Statistic

The test statistic is Pearson Correlation coefficient or the Spearman correlation coefficient: r . The formula:

$$r = \frac{\sum_i(x_i - M_x)(y_i - M_y)}{\sqrt{\sum_i(x_i - M_x)^2} \sqrt{\sum_i(y_i - M_y)^2}}$$

The four different average correlation coefficients will be used.

Avg r_p for total points = **-0,192**

Avg r_s for total points = **-0,158**

Avg r_b for total points = **0,828**

Avg r_t for total points = **0,712**

6 State Results

If r is greater than 0,468 we reject the null hypothesis,

-0,192 $< 0,468$ so we do not reject the null hypothesis.

-0,158 $< 0,468$ so we do not reject the null hypothesis.

0,828 $> 0,468$ so we reject the null hypothesis.

0,712 $> 0,468$ so we reject the null hypothesis.

7 State Conclusion

We have shown that with a significance level of 0,05 there exists a clear positive relation between Players budget (b) and the total points, there also exist a clear positive relation between Staff budget and total points. So, this implies that if the player budget or staff budget increases, the total points will improve. The Personnel percentage and the Players percentage do not have a clear relation with the total points as we failed to reject the null hypothesis.

To see the full worked out hypothesis test for the relation between the financial indicators and the ranking, see Appendix J. The conclusion of this test is stated below:

We have shown that with a significance level of 0,05 there exists a clear positive relation between Players budget (b) and the Rank, there also exist a clear positive relation between Staff budget and Rank. So, this implies that if the player budget or staff budget increases, the rank will improve. The Personnel percentage and the Players percentage do not have a clear relation with the Rank as we failed to reject the null hypothesis.

To see the full worked out hypothesis test for the relation between the financial indicators and ECI, see Appendix J. The conclusion of this test is stated below:

We have shown that with a significance level of 0,05 there exists a clear positive relation between Players budget (b) and the ECI-value, there also exist a clear positive relation between Staff budget and the ECI-value. So, this implies that if the player budget or staff budget increases, the ECI-value will improve. The Personnel percentage and the Players percentage do not have a clear relation with the ECI-value as we failed to reject the null hypothesis.

Players budget and Staff budget are both financial indicators that do have a clear positive relation with all three sportive indicators. This implies that the Players budget and Staff budget both have a big impact on the sportive performance. Personnel percentage and Players percentage do not have a relation with any of the sportive indicators, so the influence of these financial indicators on the sportive performance is not that big.

To choose the financial KPI several factors are involved. Of course, the higher the r-values, the stronger the relation. But also, the opinion of the people at GAE is important in the decision to choose the Financial KPI. Everyone at the club made very clear that a good players selection is essential for the staff to get results they want. Of course, a solid staff can take the team to a higher level, but these players will not play week in week out like the top players who earn higher wages. With the opinion of GAE taken into account and also comparing the r-values (See table below), it is clear that the Players budget is the financial KPI of this research. In the next part of this chapter the correlation will be elaborated more, and real values will be used to describe the correlation.

Variable	Total points	Rank	ECI-value
Personnel percentage	There exists no relation between these indicators, the average correlation (r) is -0,192	There exists no relation between these indicators, the average correlation (r) is -0,135	There exists no relation between these indicators, the average correlation (r) is -0,253
Players percentage	There exists no relation between these indicators, the average correlation (r) is -0,158	There exists no relation between these indicators, the average correlation (r) is -0,314	There exists no relation between these indicators, the average correlation (r) is -0,225
Players budget	There exists a positive relation between these indicators, the average correlation (r) is 0,828	There exists a positive relation between these indicators, the average correlation (r) is 0,761	There exists a positive relation between these indicators, the average correlation (r) is 0,879
Staff budget	There exists a positive relation between these indicators, the average correlation (r) is 0,712	There exists a positive relation between these indicators, the average correlation (r) is 0,682	There exists a positive relation between these indicators, the average correlation (r) is 0,800

Table 21 Overview of results of the calculations

5.4 Describing the correlation

In this part the correlation will be described with real values, the expected values will be worked out. Scenarios can be tested to obtain the right information for GAE to determine their optimal strategy. The correlation that will be described is between the Players budget and the Rank, this is because with the model it must be clear what the expected place will be.

Forecasting with the help of Excel is not feasible in this case, this is because there is a big 'grey area' on the left side of *Figure 25*. The differences between the sportive performance with a relative low players budget is not very evident. The clubs who are working with these low players budgets finish almost all the time between place 18 and 10, with some outliers excepted.

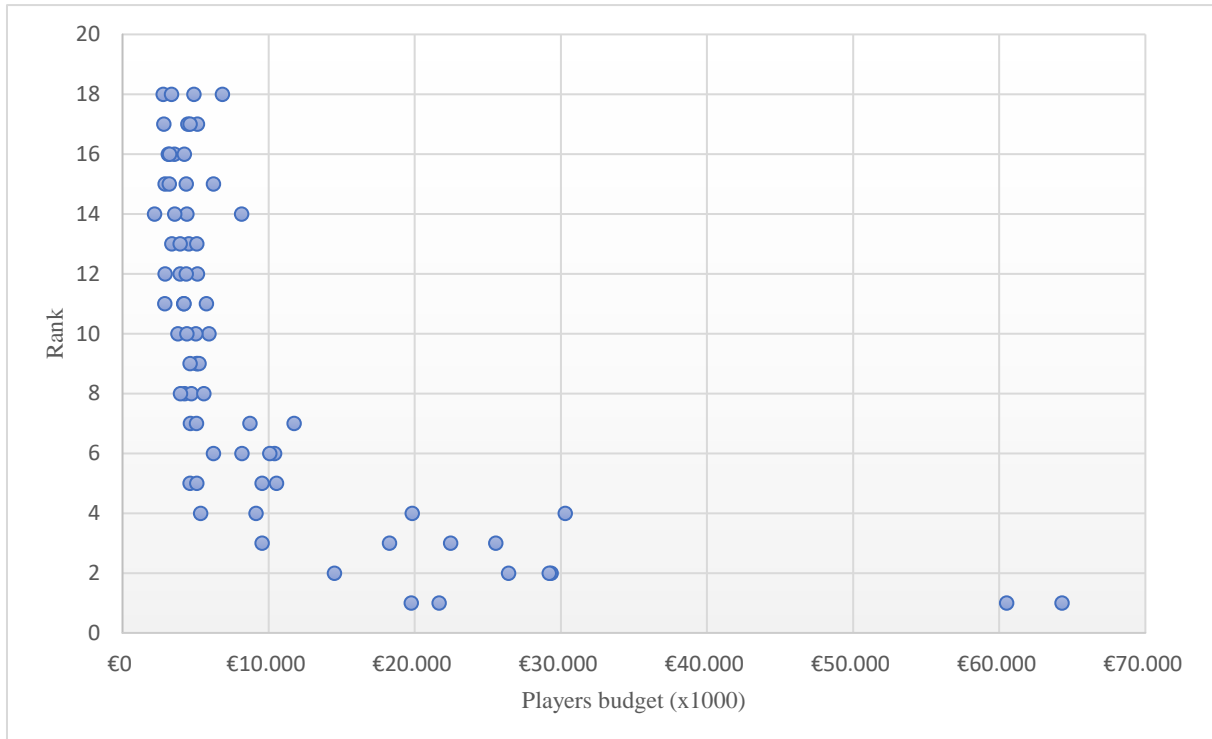


Figure 25 Rank against players budget season 2016/17 - 2019/20

For the model it is important to have expectations of where GAE is expected to finish, otherwise it is not possible to give advice to GAE. The averages of the positions over the last few seasons will help with making expectations for the future. Table 22 shows the average player budget the clubs in different rank zones are using. There is a clear distinction between the relegation zone (Rank 18-16) and the rank zones above, the distinction between rank zone 15-13 and 12-10 is less clear. This is the 'grey area' which is explained earlier, there is a difference, but it is a relatively small difference. The rank zones above the grey area do show clear distinctions and it shows the importance of the players budget once again.

Rank zone	Players budget * 10 ³
2-1	€ 33.200
4-3	€ 17.544
6-5	€ 8.077
9-7	€ 5.716
12-10	€ 4.367
15-13	€ 4.316
18-16	€ 3.813

Table 22 Rank zones with average Players budget

5.5 Forecasting the points needed for rank 15

To be able to give the best possible advice to GAE, it is useful to understand the goals and the targets for upcoming season. The main target is of course to get the most possible points in the competition, but for GAE it is important to know how much they should focus on. In this section a detailed forecast is made to calculate the (expected) amount of points GAE should obtain to finish at least 15th, which means they avoid relegation to the second division.

The method that will be used is the same as how future stock prices are being forecasted. *Table 9* shows how many points all the clubs ranked 15th managed to obtain in a competition with 34 games. With historical data, it is possible to let excel determine the formula that can be used to further describe the future. This formula needs to be updated after each year, because new data will influence the formula. It is also possible to only use the data of the last 10 seasons to get a more ‘up-to-date’ formula, for the formula worked out below all the historical data available (up to 1956/57) is used.

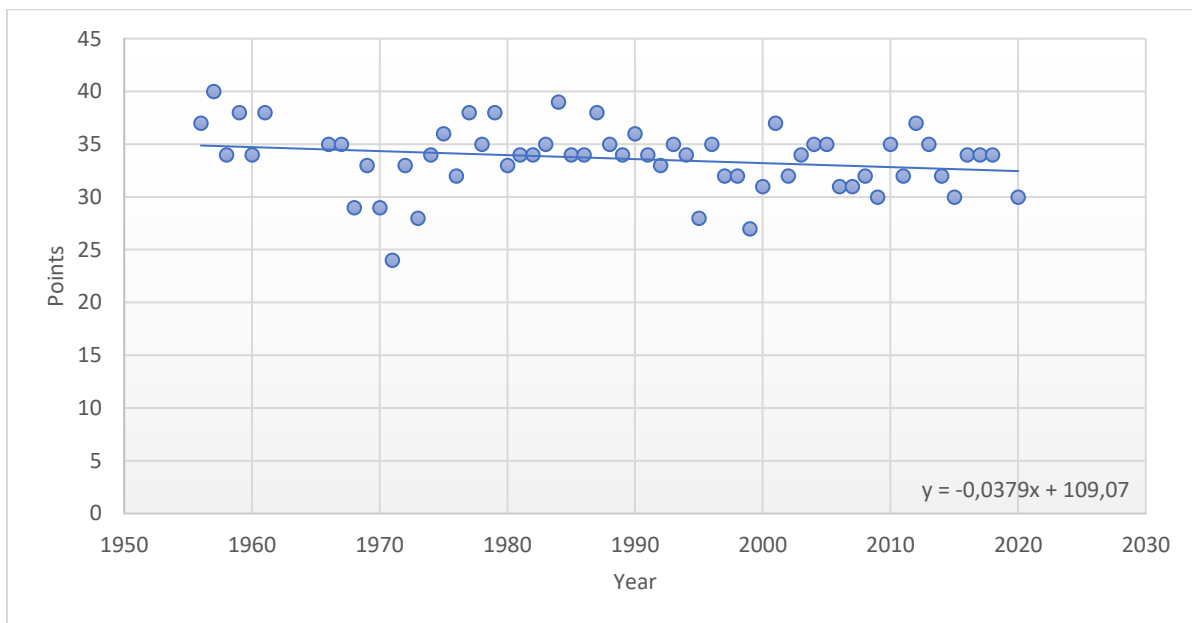


Figure 26 Points rank 15

With excel it is possible to show the formula of the data that is used, but only using this formula is not sufficient as there is no statement about possible error. In *Table 23* the forecast formula is used for the last 20 seasons ($y = -0,0379x + 109,07$). This is done to compare the forecasted amount of points and the actual amount of points that place number 15 collected in that season. With this information the errors can be calculated.

Season	year	Actual points	Forecast	ABS Error	Error²	% Error
2000/01	2000	31	33,27	2,27	5,15	7,32%
2001/02	2001	37	33,23	3,77	14,20	10,18%
2002/03	2002	32	33,19	1,19	1,43	3,73%
2003/04	2003	34	33,16	0,84	0,71	2,48%
2004/05	2004	35	33,12	1,88	3,54	5,38%
2005/06	2005	35	33,08	1,92	3,68	5,48%
2006/07	2006	31	33,04	2,04	4,17	6,59%
2007/08	2007	31	33,00	2,00	4,02	6,47%
2008/09	2008	32	32,97	0,97	0,93	3,02%
2009/10	2009	30	32,93	2,93	8,58	9,76%
2010/11	2010	35	32,89	2,11	4,45	6,03%
2011/12	2011	32	32,85	0,85	0,73	2,67%
2012/13	2012	37	32,82	4,18	17,51	11,31%
2013/14	2013	35	32,78	2,22	4,94	6,35%
2014/15	2014	32	32,74	0,74	0,55	2,31%
2015/16	2015	30	32,70	2,70	7,30	9,00%

2016/17	2016	34	32,66	1,34	1,79	3,93%
2017/18	2017	34	32,63	1,37	1,89	4,04%
2018/19	2018	34	32,59	1,41	1,99	4,15%
2020/21	2020	30	32,51	2,51	6,31	8,37%

Table 23 Forecasting points rank 15

This data gives us the following values:

Mean Absolute Deviation = 1,96

Mean Squared Deviation = 4,69

Mean Absolute Percentage Deviation = 6%

This means that using all the historical data available and working with a regression model, gives us a forecasting model with a percentage error of 6%.

*Points needed = $-0,0379 * 2021 + 109,07 = 32,4741$*

So, the minimum points GAE should obtain to avoid relegation is 33.

Chapter 6 Model

In this part the (Excel) model will be described, this will be done in different sections. The model is made based on the same data that is used in this research, also more recent data can be used to update the model yearly. All the different components will be explained in detail. The model works as a 'calculation tool', which means that the model will be used to calculate several values. It is made so that GAE can fill in the input data to get the results they are looking for. The model is made in Dutch, because the people that will use this model are also Dutch. The first part of this section will elaborate on the requirements for the model, after the requirements are clear the model will be explained step by step.

6.1 Requirements

The model has several requirements that need to be met in order to fulfil all the wishes of GAE. The requirements are stated below with a short explanation.

- The model needs to give a clear overview of all the annual costs and incomes.
- The model needs to show the progress of each variable over time.
- There needs to be a calculation for the financial KPI (players budget).
- The model needs to work with probabilities, to determine how high the chances are of reaching a certain goal.
- The model needs to have quick visual overviews so the progress can be visually interpreted.
- The model needs to be easy to use for everyone.

6.2 Model description

The model starts with general information, the yellow boxes need to be filled in and the red boxes indicate important information. The result of the previous season and the goal for upcoming season is also needed, this will help with understanding the situation and what financial steps need to be made to achieve the goal. The box which indicates the goal of the upcoming season will trigger several boxes within the model so that the model is focused on the right target (in this situation rank 15).

6.2.1 Annual overview of costs and incomes

invulinstructie: vul alle gele cellen in en lees alle instructies in de rode vakjes			
Naam Club	Go Ahead Eagles		
Divisie	Eredivisie		
Resultaat afgelopen seizoen	20	Gebruik resultaat in de voetbalpyramide	
Doel dit seizoen	15	Gebruik resultaat in de voetbalpyramide	
Om het verschil van	5 plaatsen te overbruggen, moeten de volgende financiële stappen worden gemaakt		

Figure 27 Begin of the model

Below is shown how the main part of the model looks like, this part gives an overview of all the annual costs and incomes. All the section have their own variables which need to be filled in.

Baten	2021/22			2020/2021		
	waarde (x1000)	Voortgang	Toelichting	waarde (x1000)	Voortgang	Toelichting
Wedstrijdbaten						
Totaal	1.542,00	88%		820,00	-44%	
Jeugdopleiding						
Totaal	-	#DIV/0!		-	#DIV/0!	
Sponsor inkomsten						
Totaal	3.550,00	81%		1.957,00	-17%	
Media gerelateerde baten						
Totaal	2.258,00	172%		830,00	1%	
Subsidies & Giften						
Totaal	250,00	-62%		653,00	#DIV/0!	
Merchandising & B-to-C Activiteiten						
Totaal	250,00	150%		100,00	-43%	
Food & Beverage						
Totaal	395,00	122%		178,00	-28%	
Overige baten						
Totaal	119,00	70%		70,00	-70%	
Totale baten	€ 8.364,00	82%		€ 4.608,00	-13%	

Figure 28 Annual overview incomes

Kosten	2021/22			2020/21		
	waarde (x1000)	Voortgang	Toelichting	waarde (x1000)	Voortgang	Toelichting
Technische Staf						
Totaal	-	#DIV/0!		-	#DIV/0!	
Medische Staf						
Totaal	-	#DIV/0!		-	#DIV/0!	
Scouting						
Totaal	-	#DIV/0!		-	#DIV/0!	
Jeugdopleiding						
Totaal	-	#DIV/0!		-	#DIV/0!	
Personeelskosten						
Totaal	2.064,80	63%		1.264,00	-16%	
Verkoopkosten						
Totaal	1.019,00	130%		444,00	-28%	
Huisvestingskosten						
Totaal	478,00	45%		330,00	-11%	
Wedstrijd- en trainingskosten						
Totaal	735,00	78%		412,00	-15%	
Algemene kosten						
Totaal	395,00	8%		365,00	65%	
Afschrijvingslasten						
Totaal	470,00	0%		470,00	-1%	
Overige bedrijfskosten						
Totaal	-	#DIV/0!		-	#DIV/0!	
Rentebaten en lasten						
totaal	-	#DIV/0!		-	#DIV/0!	
Totale kosten*	€ 5.161,80	57%		€ 3.285,00	-10%	

Figure 29 Annual overview costs

The overviews for both the costs as the incomes can be expended with one click on the left side of a variable, all the sorts of incomes/ costs for that particular domain can then be filled in (e.g., the different sorts of sponsor incomes come up if there is clicked on the left side of ‘Sponsor inkomsten’)

6.2.2 Quick overviews

For both the costs and the incomes a quick overview is made, this overview is supported by an interactive graph which changes by selecting the different sorts of incomes/ costs. Only the quick overview of the incomes is shown below, because the quick overview of the costs is worked out in the same way.

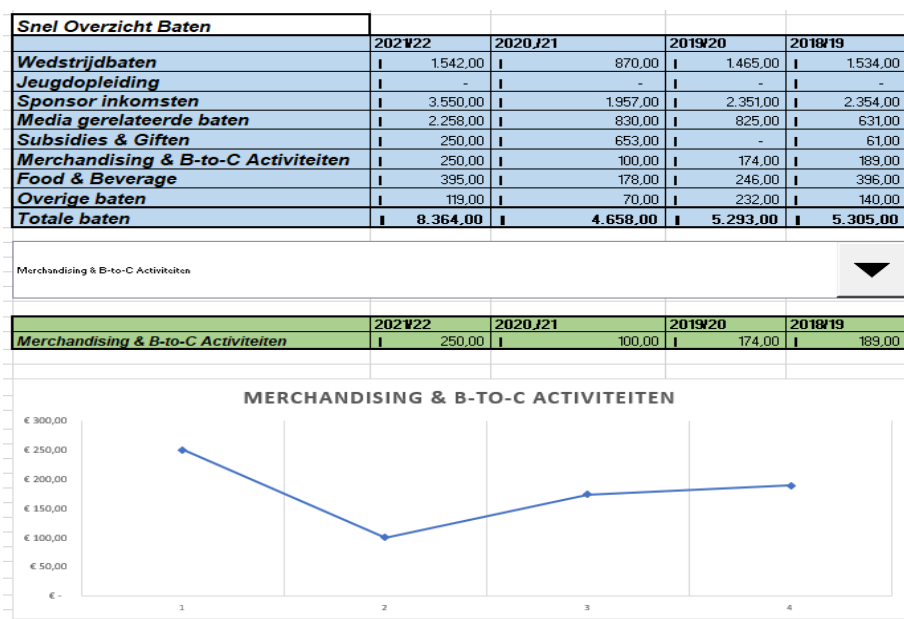


Figure 30 Quick overview

6.2.3 Players budget calculation & probabilities

The total annual costs are calculated without the players budget, in this way an x amount remains which can be invested in the players budget. Below is shown how the players budget is determined, it starts with the amount that remains when the costs are subtracted of the incomes. Then there is a possibility to invest extra in the players budget, or if the club does not want all the remaining money to be invested in the players budget, then a margin of profit can be used. For example, if GAE wants to have an operating result of +100.000, then the margin of profit will be 100.000 and this amount will be subtracted from the players budget. The final players budget is calculated after the margin of profit and the possible investments are written down. Below an extra investment of 400.000 is used, this will also influence the operating result of that year which can be seen in the yellow part.

Beschikbaar spelersbudget	€ 3.202,20	142%	€ 1.323,00	-19%
Eventuele extra investeringen	€ 400,00			
Winstmarge				
Spelersbudget	€ 3.602,20	172%	€ 1.323,00	-19%
Bedrijfsresultaat	€ -400,00		€ -	

Figure 31 Annual calculations

The calculation for the financial KPI (players budget) is now done and the model needs to work with this value. To help GAE show how much the change of this financial indicator will influence the sportive results, probabilities need to be worked out. The probabilities are divided in two parts, one part focusses on the chances to finish in a rank zone. The other percentage focusses on the chance to finish a certain position or higher. So, with the used players budget (as shown above), GAE has 17 percent to finish 18th – 16th etc. And the other probabilities are used that with the already known player budget of GAE, they have 83 percent to finish 15th or higher for example. These percentages are calculated based on the historical data available, so it is not possible to say that GAE has a 100% chance to finish 16th or higher, but the percentages need to be interpreted as that in the past no other club with that players budget finished below rank 16. Thus, the expected rank of GAE will be 16th or higher.

Kans om te eindigen op plek interval	18 tot 16	15 tot 13	12 tot 10	9 tot 7	6 tot 5	4 tot 3	2 tot 1
	17%	33%	33%	17%	0%	0%	0%

Kans om minimaal te eindigen	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	100%	100%	100%	83%	83%	67%	50%	33%	33%	17%	17%	0%	0%	0%	0%	0%	0%	0%

Figure 32 Probabilities of achieving ranks

6.2.4 Monte Carlo simulation

In Table 22 in Chapter 5.4 the average players budget for the different rank zones are shown, these averages are from the seasons 2019/20 up to season 2016/17. This table gives an insight of how much the clubs should invest in the players budget, but these values do not have a solid backbone as these values are averages of the last few seasons. It is important to have this backbone for such a decision, to get a more precise prediction of the expected players budget needed, a simulation is performed. The first step is to define which sort of simulation is needed. Some inputs are known and a output needs to be generated, in simple terms. Although the data ranges over multiple years, it is not necessarily progression through time. This is because all the data is used in the same way and not differently year by year. Figure 33 indicates what type of a simulation is needed, this shows a Monte-Carlo simulation. The most important part of simulation is defining the model, in this case both dependent and independent variables are used for the Monte-Carlo simulation. The independent variables are the input variables, the dependent variable is the average needed players budget for a certain goal (in this case rank 15).

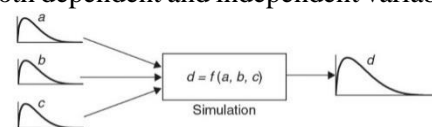


Figure 33 Simulation

With this *Monte Carlo* simulation, the expected players budget needed for the goal, which is determined in the beginning of the model (in this case 15th), can be calculated. With this simulation and the needed input data it is possible to work with randomness. The simulation will run 500 trials, each trial represents a player budget that is needed to finish in rank 15th.

Excel is useful to run the Monte Carlo simulation, but also useful to get all the input data for this simulation. For the simulation the probability, the mean and the Standard deviation of the player budgets are the input value. The mean and the standard deviation of the player budgets are calculated on all the data available (season 2016/17 – 2019/20). The mean represents the average, or the expected value. In this case the mean is the expected needed players budget for the different rank zones as shown in Table 22 in Chapter 5.4. In the scenario where the goal is to finish 15th (top of 6.2.1), then the expected players budget is 4.316 million euros. The Standard deviation is a measure of the amount of variation or dispersion of a set of values, this value is calculated by excel. The last variable of the input data is the probability, for this variable excel will generate a random number between 0 and 1 to be able to work with the randomness.

Below is shown how the Monte Carlo simulation is worked out, and also the frequency of the different intervals are determined. On the left side all the trials with their corresponding players budget are shown. In the simulation 500 trials are done, but in the picture only 25 are visible. Next to the trials the input/output data is shown. The input data will change if the goal in the beginning of the model is different than rank 15, the output data is based on the 500 trials.

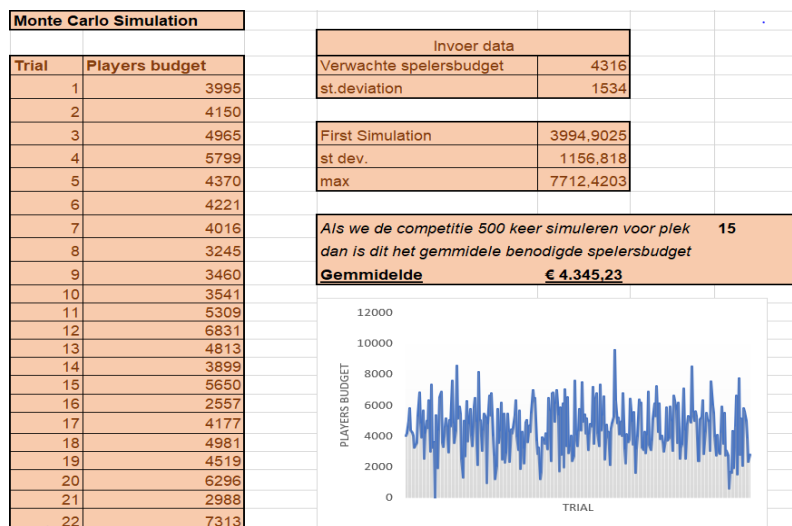


Figure 34 Monte Carlo simulation

Below the input and the output data in Figure 34, the result of the simulation is written down. The result is the average player budget if the competition is simulated 500 times for rank number 15. The frequency table shown in Figure 35 counts how many times the result of a trial is in the intervals. For both the simulation and the frequency table, a visual representation is made.

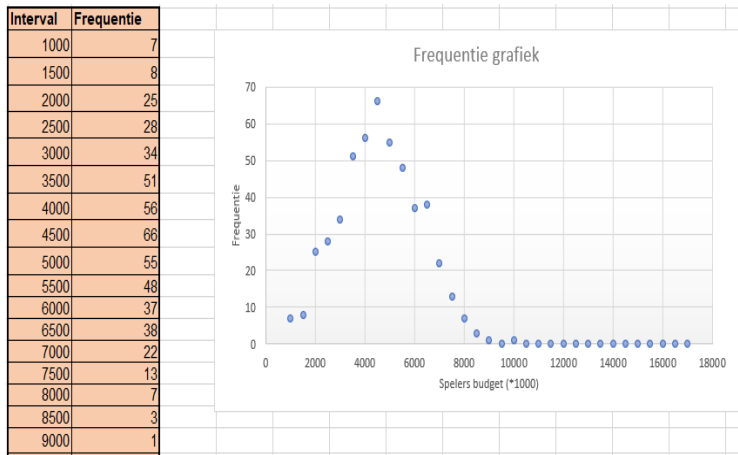


Figure 35 Frequency table and graph

The general outlines of the model are now described, small features that make several calculations in the model possible are not described in this chapter because this is not important to understand the model. All the requirements, stated in section 6.1 are met and described in this chapter. This model stands out for its usefulness, the layout and its user-friendly interface.

Chapter 7 Conclusion

After working out the correlations between the indicators, it became clear that the influence of the Personnel percentage and the Players percentage on the sportive performance were not statistically significant, this is supported by the hypothesis tests. Although the Personnel percentage and the Players percentage do not have a direct relation with the sportive performance, this does not take away the fact that a good plan must be made for determining these percentages. For example, it is very risky to maintain a high personnel percentage because, if the results are not sufficient and a possible relegation happens, all the money spent on salaries will be lost. More importantly, the expensive players/ staff members still need to be paid regardless the division the club is playing in and paying them is harder in the second division as the revenue reduces extremely.

The financial KPI of this research is the Players budget, a strong correlation between the Players budget and the sportive performance indicators is found, the hypothesis tests supports this. To optimize this relation, the model is worked out. Within this model GAE needs to fill in their goals and ambitions, as well as their current financial data. The model will work out what the expected Players budget must be in order to achieve the goals. The expected rank is displayed in percentages based on historical data. GAE now has a model where they can gain insights on the impact of the on-field sportive performance by changing the Players budget. With this information, GAE can optimize the relation by determining their optimal Players budget to achieve their sportive goals, while also being financially 'healthy'.

The model is implemented easily at GAE, because of its easy to use interface and the quick calculations that can be made in the model. Also, GAE is satisfied to see how they perform over the years, both in numbers as well as visual representations. Advice to GAE is to use the model to find the optimal value for the players budget, when the club knows how much to invest in the players budget, then room for other possible investments can be found. Also keeping an eye out for the Personnel and Players percentage is essential for upcoming seasons. If GAE can stay up for multiple seasons in the Eredivisie, then they can potentially lower the percentages and thus allocate more money to other departments in the club.

The norm of this research, creating *a model which can help GAE to optimize their financial investments so that the best on-field performance can be guaranteed*, is fulfilled. The relation between financial and sportive performance is theoretically explained and GAE now has a model to create the best possible environment to achieve place number 14 in the Dutch football pyramid.

Chapter 8 Discussion

In every research there are discussion points, in this section these points will be brought up. The meaning, importance and relevance of the results will be elaborated. In the discussion the issues of the research will be critically evaluated to develop creative solutions to problems based on the findings. All the issues and their solutions will be discussed below.

In this research it was not possible to work with the most recent data, and for an assignment that focuses on the development of the economic side in sports this is a real problem. The most recent available data is from the season 2019/2020. To try and reduce the possible biases, data from multiple seasons are used. This was a hard decision, because how far in the past is the data still relatable for the situation right now. In the end, all the available data is used up until season 2016/2017. Data older than the season 2016/2017 is not representative anymore for the current situation, as the differences are too big. To keep the model and the results relevant, GAE needs to update the model each year. This needs to be done because each year the financial situation develops rapidly in the sport.

To get the optimal result a few parts need to be re-calculated each year and this needs to be implemented in the model: Average players budget for the different rank zones, percentages of finishing in rank zones and the standard deviation of the players budgets. Also, the forecast of the expected needed points needs to be updated each year. Another restriction of the model is the possibility of inflation. The value of money is and will change continuously, the model does not take possible inflation in account.

All the data used in this research can be retrieved from the KNVB, all the data of the professional football clubs is available from season 2016/17 onwards.

Another topic which the results may reflect is the recent spreading COVID-19 virus, supporters were locked up inside, players had to quarantine and the whole competition even stopped after 26 games. So, the competition table gave an unfair reflection of the results, as not all the games were played and teams had to deal with a lot of cancellations of the players because of sickness. However, this research looked at the competition relative in that year, so the correlations are not useless for that year. The only point to keep in mind is that these scores were not the end scored of that year, teams that had a good form could have scored more points in the later games than their competitors.

For a Monte Carlo simulation a lot of data needs to be available and also the data needs to be accurate, but a lot of outliers are in the data and the size of the data range gave a relatively high standard deviation, high standard deviation results in a less accurate simulation. An example of an outlier is FC Twente that relegated in season 2017 / 2018 with a players budget of over 6 million, this was the 6th highest players budget in that season. GAE needs to add new data each year to the table to reduce the biases of this simulation.

For further research on this subject several things seem reasonable to do. Firstly, reducing the significance (from 0,05 to 0,01 for example) in the hypothesis tests can make the results of this research more valid. Also determining how the club makes financial decisions about the financial KPI before a solution is implemented can be useful. Then a good comparison can be made and the influence of the solution can be better exposed.

Appendix A: Stakeholder analysis

Company supervisor (Micro)

At Go Ahead Eagles my supervisor is Alex Kroes, he is the major shareholder of Go Ahead Eagles. I will work together with Alex towards a good financial plan. Alex has high power in my assignment, as I try to help the club as good as possible. Also, Alex can answer all the questions regarding the club, which is useful for me. The interest of Alex will be high, he was looking for someone to help him with the financial structure at GAE as this structure could be improved.

Team leaders (Meso)

The team leaders will monitor all the employees at the office, they try to keep the workflow going and the environment as friendly as possible. The team leaders have mediocre interest in my assignment. There is indeed an interest, but it is relatively small. Also, their power is low, because they do not influence how I will be performing the assignment.

Technical director (Meso)

The interest of the technical director is high, the financial plan is something he is reliable of. The budget that he works with can be worked out with this research. He will have a financial backbone to work with, which is extremely useful for a technical director. His power is mediocre, he is important at GAE, but for my assignment not so much. However, he will be giving some input for my assignment, which I, of course, have to take into account.

Financial employees (Micro)

It is clear that the interest for the financial employees is high, they experience how the financial structure is holding on every day. Their power is also considerably high, this is because they know precisely how GAE is currently working and what could be improved.

Other employees (Meso)

The power and interest of the remaining employees are mediocre to low. They do want to keep an eye on the assignment, but are not that invested as other people will be.

Supporters (Macro)

Supporters of the football club are the customers of the business. They are extremely important for a club, because with the support of the fans a lot of changes are possible to make. The power of the supporters is thus relatively high. The interest, however, is mediocre. This is because the supporters do not understand how the financial structure is made and also do not care about this part, the supporters are (only) interested if the club does well.

University supervisor (Macro)

Rogier Harmelink is my supervisor from the UT. He is the person I can always ask my questions to regarding the outlines of the assignment. He has high power, because he will help me to meet the requirements of the University of Twente and he helped me with finishing the project plan. His interest will be mediocre, he will not be influenced by the outcome of the assignment, but I believe he will be interested in the phase of performing the assignment.

Appendix B: Systematic literature review

The relation between financial performance and on-field performance is a topic which is talked about a lot, also for this assignment, this relation plays a big role. For the systematic literature review it is good to dive deeper into this subject. A lot of information is available regarding this topic, but clear and understandable knowledge is harder to find. In this review I will ensure objectively and without any form of bias the relation between the financial performance and the on-field performance in the football world and which financial indicators play a role within this relation.

How do the most important financial indicators influence the sportive performance in the football world?

The selection criteria are important within a Systematic literature review, these criteria set the boundaries. An important criteria to be included are the research groups of the studies, the studies must target football clubs and not clubs of different sports. My assignment is about a Dutch professional football club, and I will also benchmark other Dutch competing football clubs of Go Ahead Eagles, but for the systematic literature review the studies may target football clubs of competitions in other countries to get the best understanding of the relation between financial performance and on-field performance.

Standard inclusion criteria are language (English) and availability. All the articles which are not in English have to be translated and this will be at the expense of the quality most of the times. Open access is not needed for all documents as the UT provides us with thousands of “closed” papers, but for the papers which are not provided by the UT, availability is more difficult. Study design is also an inclusion criterion, the inclusion of only selected study designs is a way to make the review much more manageable and applicable to the research question.

The databases used are Find UT, Web of Science and Google scholar. For exploratory research Find UT is used, Web of Science and Google Scholar are used because they possess a user-friendly search engine. This helped me with narrowing my research so that I did not get to many hits.

To find the right articles, the search terms and strategy must be determined. The right search terms became clear while searching for articles. I started with searching on FindUT for articles about the relation between financial performance and sportive performance. With the search term *Relation football results and financial performance*, I got a lot of results, but it was easy to distract the articles that were not sufficient of relevant. Two articles were sufficient and relevant, but these articles are pretty identical, so I chose one of these articles. I changed the previous search term a bit to *Relation Financial performance and sportive performance*, this gave me only 34 results of which only 1 is applicable for research. Also, articles about financial analysis and the most important financial indicators are important for the review. With the search term *financial performance Analysis football clubs* 372 results came up, I chose 2 of these results to include in my review. Also, the how to perform a data analysis in the football world is important, so I used the search term *Data analysis at a football club*.

At Web of Science not many documents are available of the relation between financial performance and sportive performance. 134 documents came as result of *financial performance football club* as search term, only one of these documents is applicable for research. I narrowed these 134 for down to 1 with the function “search within results for...”. I also looked for financial indicators in the football sector, as the finance side is clear in most sectors, but in the sports sector not so much. There exist a lot of hidden rules and outlines where the clubs need to watch out for.

With Google Scholar I started off with the search term *relation financial performance and sportive performance*. This gave me to many results so I narrowed it down to football and this was the search term I used *financial performance and sportive performance at a football club*, this search term gave me 5.120 results on Google Scholar. I chose the second article to include in my literature research as

this fits the review perfectly. This article is about the relation and focusses on four football clubs in Turkey.

Database	Search term	results	Duplicates	Content is not sufficient or relevant	Applicable for research
FindUT	Relation football results and financial performance	690	0	688	2
FindUT	Relation Financial performance and sportive performance	34	26	33	1
Web of Science	Financial performance football club	134	0	133	1
FindUT	Financial performance Analysis football clubs	372	-	-	2
FindUT	Financial performance Analysis football clubs	372	372	-	--
Web of Science	Financial indicators football	30	18	29	1
Google Scholar	Financial performance and sportive performance at a football club	5.120	0	-	-

Used articles:

Mijatovic,P. Pavlovic, V. Milacic, L. (2015) *Effect of investment on financial and sports results*. *Industrija* v43 n2 (2015): 145-163.

Alvaro da Silva Macedo, M. Lucindo Ferreira, H. (2018) *Economic-fiancial performance and sportive performance: an analysis with football clubs in Brazil*. Publisher Universidade Federal do Ceará

Di Simone, L. Zanardi, D. (2020) *On the relationship between sport and financial performances: an empirical investigation*. *Managerial Finance*.

Alaminos, D. Esteban, I. Fernández-Gámez, M,A. (2020) *Financial Performance Analysis in European Football Clubs*. Department of Financial Management, Calle de Alberto Aguilera 23, Universidad Pontificia Comillas, 28015 Madrid, Spain

Hamil, S. Walters G. (2010) *Financial performance in English professional football: 'an inconvenient truth'* *Soccer & Society* 11, no. 4 (2010): 354-372

Maglio, R. Rey, A. (2017) *The impairment test for football players: the missing link between sports and financial performance*

Göllü, E. (2012) *Impact of the financial performances of incorporations of football clubs in the domenestic league on their sportive performances: a study covering four major football clubs in Turkey*. *Okan University* p20-29

Article	Year	Relation Financial and sportive	Financial analysis	Data analysis	Investment test	Financial regulations	Average attendance	Available players budget

		performanc e						
Mijatovic,P . Pavlovic, V. Milacic, L. (2015)	201 5	x	x	x	x		x	x
Alvaro da Silva Macedo, M. Lucindo Ferreira, H.	201 8	x	x				x	x
Di Simone, L. Zanardi, D.	202 0	x	x	x				
Alaminos, D. Esteban, I. Fernández- Gámez, M,A.	202 0		x			x	x	x
Hamil, S. Walters G.	201 0		x			x	x	
Maglio, R. Rey, A.	201 7	x	x	x	x	x		x
Göllü, E.	201 2	x	x		x		x	x

This concept matrix gives us good insights for which concepts play a big role within the literature review. All the articles work with a financial analysis, but only a few have a well-worked out data analysis. Available players budget is a concept that is used in almost all articles, this indicates the importance of this concept. Available players budget will thus play a big role within my assignment.

All the articles had different ways of explaining their research and had different results, examples of financial indicators that play a role in performance are Average attendance, the bonus strategy and of course the available players budget. The average attendance makes the relation between the sportive and the financial performance very clear, because if the on-field performance of the club gets better, then more people want to buy a ticket and watch the games, which of course improves the financial performance. The bonus strategy can be a way to improve the sportive performance, if the team players receive a bonus for reaching a pre-determined goal, this can motivate the players a lot during the games. This indicator also makes the relation between sportive performance and financial performance clear, but in a different way than the average attendance. With the average attendance the financial performance will grow if the on-field performance gets better, with the bonus strategy the on-field performance will grow if you use your financial situation. Another big indicator is the available players budget, if this is high then there exists an opportunity to sign good players. Of course, it is still doubtful if the players will reach their level, but the chances are greater with a higher available players budget. The articles made clear that there exists a clear correlation between the available players budget, and the on-field performance. This is exactly what I tried to find in this literature review, the most important (financial) indicators and how they influence the on-field performance of a football club. The articles all have a different research group in different countries, this makes the literature review more reliable and applicable, because the articles had matching results on different research groups.

Appendix C: Interview script

I will start off with explaining why the interview takes place, and how the person being interviewed can help me with my research. The setting must be friendly and professional so that the answers will be as valid as possible. Below are the questions stated:

- What is your position within Go Ahead Eagles?
- How did you end up at Go Ahead Eagles and this position?
- How long have you been working at Go Ahead Eagles?
- What are the goals / ambitions you are trying to achieve at Go Ahead Eagles?
- Which area do you think there is still much to be gained within the club?
- How do you try to take steps in the area where there is much to be gained?
- How do you see the upcoming season coming up?
- The interests are of course great at a football club, how could you compare your tasks and the interests involved with a "normal" company?
- Where do you think Go Ahead Eagles leads and falls short compared to direct opponents (right table Eredivisie)?
- What are the most important decisions and processes you encounter during a year?
- How do these decisions come about?
- Who are involved in these decisions?
- What characterizes this company from an organizational point of view?
- How do you think Go Ahead Eagles is currently performing from a financial point of view?*
- How do you think Go Ahead Eagles is currently performing from a sportive point of view?*
- What do you think are the most important financial indicators that influence the sporting results?*

Appendix D: Interview Description Jan-Willem van Dop

Managing director, June 2, 2021

What is your position within Go Ahead Eagles?

“My position has become increasingly clear over the years. As general manager I am ultimately responsible for all matters that play a role inside our company. My interests lie in commerce, supporter policy and safety. I also try to provide support to the technical manager when it comes to contract negotiations. I have enough colleagues here that I can focus on this and that I don't have to pay much attention to other matters. I also focus on the external relations of the club.”

How did you end up at Go Ahead Eagles and this position?

“In 2011, I left Fc Utrecht, my previous club. I then took a break in club form, I tackled other projects both at home and abroad. Through a former colleague at Feyenoord, Paul Bosvelt, I came into contact with the chairman at the time, and that's how the ball started rolling. I've been hired for 20 hours a week, but in these 20 hours I can't give enough attention to all subjects. I had to make choices where to focus on.”

What are the goals / ambitions you are trying to achieve at Go Ahead Eagles?

“My dream from last season was promotion, and we fulfilled my dream last season. My more realistic goal last year was to become a period champion and we have achieved that. My ambition for this season is to do everything I can to create the environment to stay up in the highest division. We have to take steps commercially to lay down a financial basis so that we can put together a team which is capable to secure place number 14.”

Which area do you think there is still much to be gained within the club?

“Administration and finance are departments which can be evolved a lot. We need to make sure we can easily keep control with good systems. This will give our club a huge boost in the right direction.”

How do you try to take steps in the area where there is much to be gained?

“We try to prepare the path for further development for our employees, that also characterizes our club. We try to let people grow and develop further at our club. An example of this is that we have someone who has not yet graduated, but who is already working with a trainer to take over his role when he leaves.”

How do you see the upcoming season coming up?

“Positive, I am already looking forward to it. I have full faith, and we are going to make sure we push ourselves to the limit in order to stay up in the Eredivisie.”

The interests are of course great at a football club, how could you compare your tasks and the interests involved with a ‘normal’ company?

“There are indeed overlaps, I still have to deal with personnel policy. Ultimately, it is about putting the right people in the right position. Football makes my work very interesting, with all kinds of side effects. The moment we fire someone, it immediately appears in the newspaper, the moment an ‘normal’ company fires someone, it does not even make the local newspaper.”

Where do you think Go Ahead Eagles leads and falls short compared to direct opponents (right table Eredivisie)?

“We are still lagging behind in the fact that our stadium is not finished. We also need to make ourselves even more visible in the city triangle, so that we become more regional. Then we have a larger target group, and this can give us many advantages. We are also lagging behind on merchandising, so we need to be able to generate more turnover.”

What are the most important decisions and processes you encounter during a year?*

“I start by getting the right people in the right place, we have come a long way with this. My most

important projects are different each year, for example there is now an expansion of the stadium coming up. I'm very busy developing the people and employees right now, creating the support, so that we agree that enlargement should happen and how it should take place and when it should take place.”

Who are involved in these decisions?

“There are many stakeholders involved in my decisions, every decision involves other stakeholders. In the stadium expansion, the municipality is a key stakeholder that we need to complete this project. GAE's management is also always involved in these decisions.”

What characterizes this company from an organizational point of view?

“Everyone is approachable, we are not hidden. Anyone can ask us questions and we try to help everyone. We no longer work with an official supervisory board, which means that I work very closely with all employees.”

Appendix E: Interview Description Paul Bosvelt

Technical manager, June 1, 2021

What is your position within Go Ahead Eagles?

“My position is technical manager, at first, I worked more as a consultant for the director, but because I wanted to apply my own vision to Go Ahead, I ended up in the role of technical manager. When I got in, I wanted to do the right things straight away, so I quickly found myself in that role. I talked a lot to technical managers at other clubs, in this way I got an idea of how they are working. At Go Ahead I tried to put a bit of ‘GAE sauce’ over it, so that the status of the club would not be adjusted. I played football here for 6 years and was an assistant-trainer for 3.5 years her, so I have the knowledge to know what the supporters expect, but also how it should be from history.”

How did you end up at Go Ahead Eagles and this position?

“In 2017 I was asked by the previous owner Hans de Vroome to advise him. He had fired the technical manager and the trainer at almost the same time, it was a bit of a chaos over here. And then he called me, basically out of nowhere. At that time, I was still an assistant trainer at the Dutch national team U21. I had a season ticket for GAE, and this is my club, my first reaction was that I wanted to help. In the beginning I rather stayed in the background, but after time this was not possible anymore. I thought that the office organization had to be adjusted. All focus was on the technical side and on the first selection, and little on the office organization, this was not taken seriously enough in my opinion. It was quite strange for me in the beginning, because at first I was always in the stands as a supporter watching the match and now, I have to let go of that, that was a switch.”

What are the goals / ambitions you are trying to achieve at Go Ahead Eagles?

“Our goals change step by step, our first goal is staying up in the Eredivisie, and then perhaps to be able to take further steps. Also improving the youth academy, we have to compete with other clubs so that talented young players prefer our academy above others. Basically, I want to make the best of everything that I focus on, so this also includes improving the scouting process. There will always be room for improvement, because it can never be perfect, but that's the challenge that makes this work so much fun.”

Which area do you think there is still much to be gained within the club?

“Marketing and finance are points where there is still a lot to be gained, it is unfortunate that there are few large companies in Deventer that are associated with us. There is still a lot to be done here, the main stand is often not full at a home game, while this stand must be the first stand to be filled with sponsors and companies.”

How do you see the upcoming season coming up?

“We are aware of the fact that we need to bring in new players who will form the basis of our first selection, they need to have experience and know how to handle with the pressure of the Eredivisie. But I certainly have faith in staying up in the Eredivisie. We act with a solid policy and do not just blindly invest money in players in the hope that they will do well.”

Where do you think Go Ahead Eagles leads and falls short compared to direct opponents (right table Eredivisie)?

“We are lacking behind the competition with the resources we have available, other clubs can afford much more and take more action while we always have to be careful and take it easy.”

“The advantage is that we do not do crazy things and have a well-considered policy, we don't let ourselves be fooled easily. The trick is to ensure that the players on the field are as functional as possible and to ensure that the largest part of the budget is being spent to the selection. Our staff has remained for 90% the same in comparison with last year, this characterizes us as a club.”

What are the most important decisions and processes you encounter during a year?*

“Getting the right people in the right place were definitely the hardest decisions. When I came to Go Ahead, things were not organized well, and the wrong people were in the wrong position. These were the first decisions I had to make, I wanted to let new people first join in for a few days to get better orientated.”

“The most important processes that I have to arrange throughout the year is the scouting process, it is very important that the best players are on the field so that we can expect the best sportive performance. We will never be able to get complete players with our resources, so we have to be creative and give the players the opportunity to grow at our club.”

How do these decisions come about?

“Normally in the final phase of the scout process I will look at the player in topic, now with COVID-19 we are limited to data and video scouting and that is far too little for us. A scout of GAE targets a player until he can judge him well, in this way we see not only the good matches, but maybe also the matches where the player maybe plays a less good. The scout gives the player a grade(A,B,C,D), these grades are relative, so last year's A was less high than this year's A. This is because we are going to play on a higher level and therefore need better players. We always try to have a core of players with grade A or B, but this is of course always speculating as you never know for sure how the players are going to perform. How are the talents of this year going to hold their own in the Eredivisie, that's what it's all about.”

“Our workflow is that we first get tips or players come on our radar in a different way, we forward these players to Rogier (data scout), he assesses the player on the basis of 3 different ratings: The Sci-Sports rating, the Go Ahead rating and the Go Ahead Potential rating. Rogier then indicates an action list, on this list will the players be shown that I need to keep an eye on. I will then contact the player's agent if they are feasible in terms of ambition and finances. If so, our scouts will rate the player with a grade (A, B, C, D) and I often contact the player to get to know him better. After also having conversations with the trainer, I know whether the trainer wants the player in the selection. Negotiations with the player are up to Alex.”

“There are two transfer windows, one in the winter and one in the summer until September, the moment the window closes we start looking at the next season. Of course, we still need to focus on this season because in the winter there is still a transfer window where we can make transfers happen. But our strength is not to do crazy things in the middle of the season and gamble without knowing if it will work. We also have to keep a close eye on all contracts and see which contracts expire and which positions we need to strengthen ourselves.”

Who are involved in these decisions?

“We have 3 scouts who are focusing on players for the first selection, we have 1 data scout and 6/7 scouts who are keeping an eye on the youth players in the Netherlands and also a in Germany. I have conversations with trainer Kees van Wonderen about whether certain players fit in with our selection. The player with his player agent then negotiates the contract with Alex.”

What characterizes this company from an organizational point of view?

“We used to work with a ‘trouble manager’, so if there was a problem, he tried to solve it, but not much else happened. This way of working does not belong to this club, and it has changed a lot over the years. Now, with Alex, we really do have someone who works in a good policy and systematic way, with responsibilities and goals. This is a much better way of working and it also suits me a lot better.”

Appendix F: Interview Description Eric Whittie

Head of the youth academy, June 3, 2021

What is your position within Go Ahead Eagles?

“I am head of youth education. In our organization, everything that has to do with youth education is my responsibility. Examples of things I have to do: Hiring players, testing players, hiring and firing trainers, organizing the scouting system, organizing the football school, keeping in touch with the 30 partner amateur clubs, commercial branch for the youth academy, I have also been a teacher at the KNVB for 40 years. In short, very diverse.”

How did you end up at Go Ahead Eagles and this position?

“That's a really strange situation actually, my wife also works here at GAE, and I've been helping her with the away games for a while to sort things out. 3 years ago, in the autumn I started to give a training where 2 people from GAE happened to be, and so I came on the radar of Paul Bosvelt. Paul brought me in for head of training after having a conversation a few times.”

What are the goals / ambitions you are trying to achieve at Go Ahead Eagles?

“Let the youth play in the highest division as possible, there are 4 divisions in which the youth can play. At the moment, the majority are in the third and fourth division and one team plays in the second division. We want to ensure that the average level is at least 2.5, which means that at least half of the teams plays in the 2nd division and the other half plays not lower than the 3rd division.

We also want to deliver at least 2 players to the first selection every year, of which 1 is actually a starting player and the other makes the selection. Of these two, at least 1 must also become transferable.

Another striven is to keep youth players at least 5 years in GAE's youth academy, we only start with children from 13 years old, because we believe that the children should play football with their childhood friends first and be the best on the field at their amateur clubs. When the children become 13, they are ready to join our youth academy”

Which area do you think there is still much to be gained within the club?

“I think the mentality of a youth player determines whether he can make the first selection or not, everyone who plays at GAE has the talent, they have also been scouted for that. It is now very important for the youth to be mentally ready to become a professional football player, and this is often greatly underestimated.”

How do you try to take steps in the area where there is much to be gained?

“We are currently working on mindset training; I am convinced that a positive mindset will improve the results. We have also recruited a personal coach for the youth, who works with the youth twice a week. We are also going to start building the mobility skills of the youth by introducing them to other sports.”

Where do you think Go Ahead Eagles leads and falls short compared to direct opponents (right table Eredivisie)?

“We are lagging behind in terms of exposure, I think we expressed ourselves too little to the outside world. We also have to professionalize everything we do, the video analyses are sufficient, for example, but we want to professionalize this even more next year. I think in everything we do there is definitely a mindset and vision which is good, but now we have to start optimizing everything. We also need to decentralize a bit more so that the pressure is not put too much on individuals.”

What are the most important decisions and processes you encounter during a year?

“The most important thing for me is that the youth academy is as good as possible, I have to make sure

that the best trainers are appointed for the youth teams. This process runs throughout the year, I have monthly meetings and I follow training courses to assess the trainers.”

How do these decisions come about?

“If we need a new trainer, we look at the file of trainers available, we also receive many applications from the trainer corps. I also work at the KNVB, so I still have a good idea of the qualities of the trainers. We also get tips from outsiders about trainer. Then we have several conversations with the trainers about his vision from a football perspective, but also about what he is like as a person. Because of these conversations we can state whether he is suitable for Go Ahead Eagles”

What characterizes this company from an organizational point of view?

“At Go Ahead we have a very clear way of training and stimulating, I think that 80% of what the trainers say to the players should be positive. We all see possibilities here and I feel very much at home in that. We have a great open and positive atmosphere here, this is very important to develop.”

Appendix G: Interview Description Wouter Rutgers

Marketing and commerce, May 27, 2021.

What is your position within Go Ahead Eagles?

“My function is broad, I am constantly working on making the story of Go Ahead Eagles the best as possible. My work ranges from social media, campaigns, but also helping the players and the staff to express themselves in the right way towards the media in the football world. At GAE we do not have clear function profiles where it states what is expected from you, we all work with passion for the club and try to help the club as much as possible.”

How did you end up at Go Ahead Eagles and this position?

“I started in 2009 as a volunteer and in 2013 I officially started working under contract at GAE. I studied Journalism and told the club that I always wanted to help if anything was needed. I started very abrupt at GAE as the previous worker came in a conflict with the club, I got one day of explaining and then I was thrown into the deep end. In 2013 GAE got (unexpectedly) promoted to the highest professional football division, the organisational structure was a chaos, and it was tough for me to start working here in this chaos. But I am still working here, so maybe it was meant to be haha”

What are the goals / ambitions you are trying to achieve at Go Ahead Eagles?

“I have always said that I did not want to work here until I am 30, in the meantime I will be 30 in September and the chances are very high that I will still be here. In the business lounge a nice quote is displayed from Bert van Marwijk: “As a child I didn't want to become a professional footballer, no I wanted to play football at GAE”. The same goes for me, I never had any ambitions to work in the football industry, but I did want to work for Go Ahead. My ambitions are not in this industry, but it is not a big difference from what I do now. We are now entering the Eredivisie and that is why I have many ambitions again. I have been saying for 6/7 years straight, that there is an incredible amount of potential in this club, in my opinion we only fill in 30 percent of this potential. That is also the reason that I stay here, because I really see the opportunity to evolve, and I would like to help GAE with this.

Which area do you think there is still much to be gained within the club?

“I think there is room for improvement in de commercial and sales departments, I think if we look at the revenue stream that there is a new world to discover. Comparing our departments to competitors, it is clear to see that we lack behind. Deventer is not a city where many big companies are located, this also plays a part. We experience a hard time connecting us with the big companies that are located in Deventer. We need to try and connect businesses that not only come over to have a fun day and watch a football match, but come over to upgrade their network and their business story.”

How do you try to take steps in the area where there is much to be gained?

“We need to try and go from a ‘City club’ to a ‘region club’, in this way we have a larger target group, and this can improve us financially as well as our club status. We need to try and connect the city Apeldoorn to GAE, but as I said before this is a hard challenge. A good example that indicates that GAE is a city club is that 5000 of the 6000 people that extended the season ticket are living in Deventer. Only 500 people of the 6000 are living in Apeldoorn and Apeldoorn is the home for over 140 thousand residents. A lot of choices need to be made because of the club we are and how we work, but we all are extremely proud of the way we work and how we promote the club to the rest of the world. An example of a dilemma regarding the evolvement from city club to region club has to do with the design of the shirt, GAE is proud of the city Deventer and on all the football shirts a big skyline of the city centre from Deventer is shown, but does this design make the residents from Apeldoorn feel left out? Or does this skyline only represents the hometown? These decisions are hard to make, but we cannot make decisions without thinking from both sides.”

How do you see the upcoming season coming up?

“Positive, I have faith that we can stay in the highest division. Our structure is key, and we need to build on this structure.”

Where do you think Go Ahead Eagles leads and falls short compared to direct opponents (right table Eredivisie)?

“You see with competitors such as Heracles that they are structurally well in control, but I also see that these clubs are reaching the ceiling of their potential and that GAE has more potential and even more flexibility to reach this potential. An example is that since the expansion of the stadium in Heracles, a 100% visitor rate is no longer achieved, not even against clubs like Ajax or Feyenoord. At GAE we are also planning an expansion of the home stadium, but I believe we will still maintain a full stadium. In fact, the queues for a season ticket are still piling up at the moment.”

“GAE must build slow and steady to achieve its potential, because in the end slow and steady will win you the race. We at GAE have so much potential, given the story of the club, the stadium, the supporters etc. Under Alex, we are finally stabilizing the organization and building steadily towards a stable club, instead of expensive investments without thinking through.”

What are the most important decisions and processes you have you encounter during a year?*

“Every year is very different, I don't have a fixed job per year. I try to get all my activities and all my ideas done with a budget as low as possible, but marketing is a feeling and you cannot guarantee anything, we have to dare to invest to bring in more.”

“Season ticket campaign is the measurement moment every year, we are actually working on this all year round. We are creating a feeling so that when the season ticket sale starts, people want to buy a ticket or extend their ticket for another year. The supporters need to feel engaged and connected by the club, that is our way of promoting the season tickets for the club.”

How do these decisions come about?

“I start with the creative process, the way I work out my ideas depends on many factors. Such as sportive results and recently the situation regarding COVID-19. What is needed and with what message? With a season ticket there are always 3 goals: thank current supporters, keep as many season ticket holders as possible and of course sell as many season tickets as possible. Then the brainstorm process starts, how can we thank the supporters? Which gift can we give current supporters such that it does not influence new supporters? How can we keep the supporters engaged? How can we reach out to people not so familiar with GAE? All these questions will be thrown into the brainstorming process off the campaign. I will then present an overview of possible ideas and I hope to get approval of Alex Kroes. If this is the case, I will get in contact with third parties whose help we need to successfully perform the campaign. Afterwards we always evaluate the campaign and try to find improvement points for next year.”

Who are involved in these decisions?

“The creative ideas are most of the times from my input, with these ideas I work with Bryan from marketing / commerce. I start with a presentation and explain what we want and then a budget is drawn up, this budget will (hopefully) be approved by Alex.”

What characterizes this company from an organizational point of view?

“The organization has completely changed over the years. We first had a chairman with a cooperating board of commissioners of 8 people, because we could use all the help at the time. This didn't work because everyone had a say and things were never clear. At this moment in time, this is much better organized and very well structured. We have a block of three (Paul, Jan Willem & Alex) that are easily approachable. Clarity is good now, we are not a big club and we do not have a hierarchical structure, which does not suit a club like GAE.”

Appendix H: Interview Description Ronnie Janssen

Head of facilities, May 31, 2021

What is your position within Go Ahead Eagles?

“Head of facilities, I'm responsible for operational matters. Jan-Willem (managing director) calls my function as ‘Operations’. I am responsible for the buildings at the club and football fields, I also try to help the stewards on match days. So, all the facilities to host a match at the Adelaarshorst are my responsibility.”

How did you end up at Go Ahead Eagles and this position?

“I was volunteer at the supporters association and at that time we were almost bankrupt. The groundskeeper needed a lot of help at the time, me and other people from the supporters association always helped when possible. We were needed, because the club could not do it themselves. A lot has changed here in the past 15 years, and at one point the director asked if I wanted to work here. This was an opportunity I could not resist. When I started working here it was important to let my feelings as supporter go, and try to help GAE as good as possible. When working here you have to think in possibilities and being a supporter of the club does not help because you are only interested in the best results.”

What are the goals / ambitions you are trying to achieve at Go Ahead Eagles?

“*The Adelaarshorst* must be finished in the near future, one stand still has to be expanded and this is certainly an ambition. The training complex must also be improved, personally I am ashamed of how our youth players should train. The football fields need to be improved, and a complete training complex of our own is also an ambition, since we need sports complexes from other associations for training. Our first team trains at a different complex than our youth, I would like to see this change. The training field is also of low quality, it is more like a sand field with a bit grass on it, there is no drainage or hybrid in it, nothing at all. So, the renovation of the training complex and the stadium are definitely my ambitions within this club.”

Which area do you think there is still much to be gained within the club?

“Of course, the facilities have to be improved, but I think there is still a lot to be gained in the field of marketing and commerce. The club can still grow a lot, especially regarding the city triangle. So engaging Apeldoorn with our club is important to keep growing. Apeldoorn has a lot of football fanatics, only they have lost the feeling for GAE over the years. Our main target is to get them back and give them the ‘Go Ahead Eagles feeling’ again.”

How do you see the upcoming season coming up?

“Difficult, it will be a hard season, but that is always the case when playing Eredivisie. We will be expected at the bottom of the table, and it is our job to show how we are going to prevent this from happening. On the other hand, I certainly have confidence to maintain ourselves and stay in the Eredivisie. We have to be fit in time and also get a lot of points in the beginning, then we can stay

Where do you think Go Ahead Eagles leads and falls short compared to direct opponents (right table Eredivisie)?

The supporters of Go Ahead Eagles are of course very exceptional, and we are certainly ahead of direct opponents on this level. Our marketing is good enough to fill the stadium with supporters well every game. Our stadium is also a point where we are ahead of opponents, it is an authentic and beautifully situated stadium that will also be expanded in the upcoming years.

Where are we lacking behind? Then I will get back at the training complex again, many direct opponents have this facilitated much better, because of this they can also get more out of their youth academy. If we look at a club like FC Groningen for example, they have their entire training complex equipped with luxurious facilities and also every field with grass heating. This attracts talented young

players to play for FC Groningen, at GAE we also need to make the trainings complex so that the talented players will not choose other clubs over us.

What are the most important decisions and processes you encounter during a year?*

“My most important decisions are regarding the football field inside the Adelaarshorst, this involves getting the best field for the first selection to play their home games on.”

How do these decisions come about?

“We first look at the condition of the field, this runs throughout the year of course, but in December we really start with the project for the field. How do we want the field next year? What could be better? What are we going to do on the field? These are questions that are always important at the beginning of the process. A budget consultation with Alex is necessary before we can get started. We always encounter unique problems that need to be solved, this is because the development of grass continues to improve over the years, examples are drainage, hybrid and field heating. External factors can cause problems, for example the weather.”

“I never try to spend a lot, in the past this was not possible because if you wanted to spend a relatively small amount like 100 euros, you already had to get three signatures. This has changed over the years, but I always try to keep the budget as low as possible. We should not be scrimping just for the sake of it, but of course I don't have to possess 20 lamps in stock either, it's not an easy consideration, but a very important one.”

Who are involved in these decisions?

Alex is always involved before we can get started. Our groundsman is involved, our main contractor is also there and someone who monitors the fertilization of the fields.

What characterizes this company from an organizational point of view?

We no longer have a supervisory board, so there is little form of hierarchy present. Peace has come to the office, this has certainly been different in the past. There are still discussions, but discussions are also necessary, otherwise we can never grow as a club.

Appendix I: Input for Correlation coefficient calculation

2019/20

Rank	Clubs	Points	ECI	personnel	players	Players budget	Staff budget
1	Ajax	56	3.048	60%	64%	€ 64.293	€ 12.257
2	AZ	56	2.437	61%	54%	€ 14.489	€ 3.963
3	Feyenoord	50	2.546	53%	56%	€ 22.451	€ 8.490
4	PSV	49	2.610	59%	58%	€ 30.291	€ 10.192
5	Willem II	44	1.970	54%	58%	€ 4.611	€ 1.792
6	Vitesse	41	2.061	66%	61%	€ 8.173	€ 2.007
7	FC Utrecht	41	2.178	54%	54%	€ 11.732	€ 2.507
8	Heracles Almelo	36	1.811	54%	59%	€ 4.244	€ 1.182
9	FC Groningen	35	1.836	50%	44%	€ 5.092	€ 2.159
10	SC Heerenveen	33	1.817	51%	49%	€ 5.908	€ 1.715
11	Sparta Rotterdam	33	1.568	57%	50%	€ 4.175	€ 2.484
12	FC Emmen	32	1.532	70%	74%	€ 5.116	€ 1.058
13	VVV-Venlo	28	1.590	68%	61%	€ 4.527	€ 1.420
14	FC Twente	27	1.571	53%	53%	€ 8.134	€ 2.478
15	PEC Zwolle	26	1.668	67%	59%	€ 6.210	€ 2.213
16	Fortuna Sittard	26	1.486	66%	64%	€ 3.543	€ 1.259
17	ADO Den Haag	19	1.648	54%	47%	€ 5.122	€ 2.535
18	RKC Waalwijk	15	1.155	62%	64%	€ 2.768	€ 623

2018/19

rank	Clubs	Points	ECI	personnel	players	Players budget	Staff budget
1	Ajax	86	3.242	59%	66%	€ 60.500	€ 13.800
2	PSV	83	2.826	59%	59%	€ 29.330	€ 4.767
3	Feyenoord	65	2.443	52%	50%	€ 18.263	€ 8.023
4	AZ	58	2.284	63%	44%	€ 9.122	€ 1.755
5	Vitesse	53	2.115	66%	53%	€ 10.532	€ 1.846
6	FC Utrecht	53	2.197	53%	43%	€ 6.216	€ 1.250
7	Heracles Almelo	48	1.776	59%	60%	€ 4.642	€ 700
8	FC Groningen	45	1.843	56%	41%	€ 4.694	€ 658
9	ADO Den Haag	45	1.883	54%	51%	€ 5.071	€ 1.018
10	Willem II	44	1.776	56%	54%	€ 3.784	€ 1.006
11	SC Heerenveen	41	1.810	55%	46%	€ 5.737	€ 944
12	VVV-Venlo	41	1.621	65%	63%	€ 3.939	€ 626
13	PEC Zwolle	39	1.708	66%	53%	€ 5.070	€ 1.225
14	FC Emmen	38	1.390	60%	59%	€ 2.173	€ 395
15	Fortuna Sittard	34	1.384	68%	74%	€ 4.343	€ 670
16	Excelsior	33	1.507	66%	62%	€ 3.119	€ 489
17	De Graafschap	29	1.311	56%	53%	€ 2.815	€ 783
18	NAC	23	1.333	56%	67%	€ 4.886	€ 535

2017/18

Rank	Clubs	Points	ECI	personnel	players	Players budget	Staff budget
1	PSV	83	2.610	55%	52%	€ 19.741	€ 3.741
2	Ajax	79	3.048	54%	50%	€ 26.400	€ 12.300
3	AZ	71	2.437	64%	47%	€ 9.538	€ 1.751

4	Feyenoord	66	2.546	49%	55%	€ 19.825	€ 2.796
5	FC Utrecht	54	2.178	46%	54%	€ 5.067	€ 666
6	Vitesse	49	2.061	63%	55%	€ 10.068	€ 1.265
7	ADO Den Haag	47	1.648	55%	50%	€ 5.048	€ 1.011
8	SC Heerenveen	46	1.817	53%	49%	€ 5.567	€ 1.138
9	PEC Zwolle	44	1.668	63%	58%	€ 4.605	€ 800
10	Heracles Almelo	42	1.811	60%	61%	€ 4.403	€ 885
11	Excelsior	40	1.155	68%	63%	€ 2.894	€ 424
12	FC Groningen	38	1.836	57%	39%	€ 4.352	€ 735
13	Willem II	37	1.970	57%	61%	€ 3.928	€ 790
14	VVV-Venlo	34	1.590	66%	66%	€ 3.565	€ 600
15	NAC	34	1.486	53%	58%	€ 3.187	€ 43
16	Roda JC	30	1.571	53%	61%	€ 4.215	€ 640
17	Sparta Rotterdam	27	1.568	64%	55%	€ 4.619	€ 1.130
18	FC Twente	24	1.532	53%	40%	€ 6.834	€ 1.326

2016/17

Rank	Clubs	Points	ECl	personnel	players	Players budget	Staff budget
1	Feyenoord	82	2.606	56%	57%	€ 21.648	€ 2.431
2	Ajax	81	2.878	55%	49%	€ 29.200	€ 11.900
3	PSV	76	2.857	55%	62%	€ 25.525	€ 3.419
4	FC Utrecht	62	2.312	50%	54%	€ 5.333	€ 793
5	Vitesse	51	2.097	65%	53%	€ 9.538	€ 1.082
6	AZ	49	2.189	63%	50%	€ 10.407	€ 1.735
7	FC Twente	45	1.938	56%	49%	€ 8.710	€ 863
8	Heracles Almelo	43	1.866	60%	65%	€ 3.960	€ 570
9	FC Groningen	43	1.925	59%	49%	€ 5.224	€ 664
10	SC Heerenveen	43	1.794	50%	51%	€ 5.008	€ 705
11	ADO Den Haag	38	1.784	50%	52%	€ 4.187	€ 1.503
12	Excelsior	37	1.614	68%	73%	€ 2.900	€ 320
13	Willem II	36	1.630	57%	59%	€ 3.361	€ 759
14	PEC Zwolle	35	1.761	63%	58%	€ 4.386	€ 1.019
15	Sparta Rotterdam	34	1.507	59%	60%	€ 2.912	€ 626
16	NEC Nijmegen	34	1.657	46%	54%	€ 3.220	€ 733
17	Roda JC	33	1.623	60%	67%	€ 4.463	€ 659
18	Go Ahead Eagles	23	1.257	65%	68%	€ 3.354	€ 582

Appendix J: Hypothesis tests

Hypothesis test for the relation between the financial indicators and the Rank.

1. Define Null and Alternative Hypotheses

H_0 ; $\rho = 0$ There is no correlation between the samples

H_1 ; $\rho \neq 0$ There is a correlation between samples

2. State Alpha

$\alpha = 0,05$

3. Calculate Degrees of Freedom

$df = n-2 \rightarrow 18 - 2 = 16$

4. State Decision Rule

With $df = 16$ and $\alpha = 0,05$, in the Spearman *Correlation-Table* we find the critical value $\rightarrow r = 0,503$. This means that H_0 will be rejected if the calculated Correlation Coefficient (r) $> 0,503$ or the calculated Correlation Coefficient (r) $< -0,503$ because this is a two-tailed test.

5. Calculate Test Statistic

The test statistic is Pearson Correlation coefficient or the Spearman correlation coefficient: r . The formula:

$$r_s = 1 - \frac{6 \sum D^2}{N^3 - N}$$

The four different average correlation coefficients will be used.

Avg r_p for Rank = **-0,135**

Avg r_s for Rank = **-0,314**

Avg r_b for Rank = **0,761**

Avg r_t for Rank = **0,682**

6. State Results

If r is greater than 0,503 we reject the null hypothesis,

-0,135 $< 0,503$ so we do not reject the null hypothesis.

-0,314 $< 0,503$ so we do not reject the null hypothesis.

0,761 $> 0,503$ so we reject the null hypothesis.

0,682 $> 0,503$ so we reject the null hypothesis.

7. State Conclusion

We have shown that with a significance level of 0,05 there exists a clear positive relation between Players budget (b) and the Rank, there also exist a clear positive relation between Staff budget and Rank. So, this implies that if the player budget or staff budget increases, the rank will improve. The Personnel percentage and the Players percentage do not have a clear relation with the Rank as we failed to reject the null hypothesis.

Hypothesis test for the relation between the financial indicators and the ECI-value.

1 Define Null and Alternative Hypotheses

$H_0; P = 0$ There is no correlation between the samples

$H_1; P \neq 0$ There is a correlation between samples

2 State Alpha

$\alpha = 0,05$

3 Calculate Degrees of Freedom

$df = n-2 \rightarrow 18 - 2 = 16$

4 State Decision Rule

With $df = 16$ and $\alpha = 0,05$, in the Pearson *Correlation-Table* we find the critical value $\rightarrow r = 0,468$. This means that H_0 will be rejected if the calculated Correlation Coefficient (r) $> 0,468$ or the calculated Correlation Coefficient (r) $< -0,468$ because this is a two-tailed test.

5 Calculate Test Statistic

The test statistic is Pearson Correlation coefficient or the Spearman correlation coefficient: r . The formula:

$$r = \frac{\sum_i(x_i - M_x)(y_i - M_y)}{\sqrt{\sum_i(x_i - M_x)^2} \sqrt{\sum_i(y_i - M_y)^2}}$$

The four different average correlation coefficients will be used.

Avg $r_p = -0,253$

Avg $r_s = -0,225$

Avg $r_b = 0,879$

Avg $r_t = 0,800$

6 State Results

If r is greater than $0,468$ we reject the null hypothesis,

-0,253 $< 0,468$ so we do not reject the null hypothesis.

-0,225 $< 0,468$ so we do not reject the null hypothesis.

0,879 $> 0,468$ so we reject the null hypothesis.

0,800 $> 0,468$ so we reject the null hypothesis.

7 State Conclusion

We have shown that with a significance level of $0,05$ there exists a clear positive relation between Players budget (b) and the ECI-value, there also exist a clear positive relation between Staff budget and the ECI-value. So, this implies that if the player budget or staff budget increases, the ECI-value will improve. The Personnel percentage and the Players percentage do not have a clear relation with the ECI-value as we failed to reject the null hypothesis.

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