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Data KPI – According to some theories KPIs should meet “SMART-criteria” (Specific, Measurable, Attainable, Realistic, Timely). As analysts are often part of bigger projects, their contribution is less measurable; how to set motivating KPIs for analysts?

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We have written this Master Thesis independently. Any ideas or data taken from other authors or sources have been fully referenced.

Value of Publishing

The publication of the thesis on "Data Key Performance Indicators (KPIs)" has a major impact since it improves the field of data analytics by examining the motivating qualities of KPIs. In order to create KPIs that are in line with company objectives, this research examines elements including performance, growth, and satisfaction. Employees as well as organizations may benefit from the findings by recognizing the role that KPIs play in enhancing job happiness and performance. In addition, publishing the thesis topic allows the dissemination of knowledge to a larger audience, including organizations working in the field of data analytics, practitioners, and fellow scholars, and it increases academic influence by providing evidence-based suggestions for future research. Publishing the thesis on "Data Key Performance Indicators (KPIs)" improves the worth of relevant literature overall. by suggesting psychological factors behind the measurement of performance indicators.

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Abstract

Title

Data Key Performance Indicators (KPI): Analyzing Factors Affecting Employee Motivation in the Field of Data Analysis and Data Engineering.

The goal of this research investigation is to identify the key performance indicators (KPIs) that impact the motivation of data engineers and analysts. The study aims to measure employees' performance and assess their impact on work, personal growth, and job satisfaction to determine their motivation levels.

Structure:

1. Introduction: The introduction presents the research's purpose and highlights the importance of identifying KPIs that affect employee motivation in the field of data analysis and engineering.
2. Methodology: This section describes the research methodology used to achieve the research objectives. It includes information about the data collection methods, the sample size, and the data analysis tools.
3. Results: The results section presents the key findings of the study and identifies the KPIs that have the greatest impact on employee motivation in the field of data analysis and engineering.
4. Discussion: This section interprets the findings and discusses their implications for organizations looking to improve employee motivation and performance in the field of data analysis and engineering.
5. Conclusion: The conclusion summarizes the study's findings and discusses the importance of identifying and addressing the KPIs that impact employee motivation in the field of data analysis and engineering. It also suggests areas for future research to build on the study's findings.

Overall, the study seeks to contribute to our understanding of the key performance indicators that impact employee motivation in the field of data analysis and engineering. By identifying these KPIs, the research aims to provide practical information to organizations looking to maximize their workforce's performance and productivity.

Keywords: [Data Key Performance Indicators (KPI), employee motivation, data, performance analysis, growth analysis, satisfaction rate, Theory of Planned Behaviour, (S180) Economics, econometrics, economic theory, economic systems, economic policy; (S190) Management of enterprises; (S212) Sociology of labour, sociology of enterprise]

I. Introduction

The acronym “SMART” (e.g., Specific, Measurable, Achievable, Realistic, Timebound, or Timely) is a highly prominent strategy for setting goals in business practice (C. Swann et al., 2022). Although authors have long been cautious of overreliance on one strategy which has not been consistently supported either by scientific literature nor empirical evidence (C. Swann et al., 2022), its simplicity, intuitiveness, and practicality should not be ignored. (Doran, G. T., 1981)

This research is generally about finding the Key Performance Indicators (KPIs) that affect the motivation of employees in the field of data analysis or engineering. By understanding these KPIs, the efficiency of employees can be calculated and future improvements for both the company and the employee can be made. The research will focus on analyzing employee performance, growth, and satisfaction rates to identify the main factors that contribute to their motivation. The goal is to provide practical insights that can help improve employee motivation and ultimately benefit both the company and the employees.

Background and Context of Study

The importance of data analysts has grown as firms continue to rely on data-driven insights to make wise decisions. In the field of data analytics, key performance indicators (KPIs) are crucial because they track advancement toward particular objectives. Setting analysts' motivational KPIs can be difficult, though, as their contributions are sometimes made as part of larger initiatives and may be harder to measure.

Some ideas contend that KPIs must adhere to the "SMART criteria," which stands for Specific, Measurable, Attainable, Realistic, and Timely. This makes it possible to guarantee that KPIs are in line with the goals of the organization and can be measured properly. Setting inspiring KPIs for analysts, however, necessitates a thorough comprehension of their position in the organization and the particular goals they are charged with achieving.

With an emphasis on the "SMART-criteria" framework, the objective of this thesis is to investigate efficient ways for designing KPIs that will motivate data analysts. This thesis attempts to offer useful advice for firms wishing to define KPIs that drive success in the field of data analytics by looking at case studies and conducting interviews with data analysts and industry professionals.

Research Question and Objectives

Research Questions:

1. How can KPIs be created with the help of the SMART criteria to effectively motivate analysts to reach their goals?
2. What developments and patterns can be observed in the growth rates of analysts, and how could growth be utilized as a motivating factor to enhance performance?
3. How can these insights contribute to developing inspiring KPIs for analysts? What are the benefits, disadvantages, and impact of utilizing KPIs in real-world management of data scenarios?

Objectives:**1. To develop a set of KPIs that are specific, measurable, attainable, realistic, and timely, and that can be used to motivate analysts to achieve their goals.**

The objective of this research is to develop a set of Key Performance Indicators (KPIs) that meet the SMART criteria (Specific, Measurable, Attainable, Realistic, Timely) and can be used to effectively motivate analysts to achieve their goals. KPIs are widely used in organizations as a means to measure performance set targets and align employee efforts with strategic objectives. However, not all KPIs are effective in motivating employees, especially in the case of analysts who may be part of bigger projects where their contributions are less measurable.

The research will start by conducting a thorough review of existing literature and best practices related to KPIs, motivation, and goal-setting. This will involve studying various frameworks and models that have been proposed in the literature for developing effective KPIs, such as the Balanced Scorecard, OKRs (Objectives and Key Results), and other relevant theories and approaches. The research will also examine the characteristics of effective KPIs, including their specificity, measurability, attainability, realism, and timeliness, and how these attributes can impact motivation and performance.

The research will also involve conducting interviews, surveys, or focus group discussions with analysts and managers in organizations to gather their perspectives on the effectiveness of KPIs in motivating analysts, their preferences for specific types of KPIs, and any challenges or barriers they face in setting and achieving KPIs. This qualitative data will provide insights into the practical implementation of the developed framework and help refine the recommendations for developing motivating KPIs for analysts.

The outcome of this research will be a set of practical recommendations and guidelines for organizations to develop KPIs that are specific, measurable, attainable, realistic, and timely, and that can effectively motivate analysts to achieve their goals.

2. To ascertain the rate of analyst growth and create plans for using growth as a motivating element to enhance performance.

Analyzing analysts' growth rates and creating plans to use them as motivational factors to improve performance are the goals of this purpose. To find patterns and trends in growth, the study will examine historical data on analyst promotions, pay raises, skill development, and career achievements. The establishment of strategies to foster growth and foster an environment of incentive for analysts, including career development plans, training programs, and performance goals, will then take place. To strengthen the suggestions for applying growth as a motivational tool to enhance performance, qualitative data will also be obtained through surveys and interviews with analysts.

3. Conduct empirical research, such as case studies, surveys, or experiments, to examine how KPIs are used in real-world data management scenarios, and assess their strengths, limitations, and impacts.

Generally, the objective involves conducting real-world research, which includes things such as case studies, surveys, several research papers, videos, or experiments, to investigate how KPIs are utilized in actual data management scenarios. The research would assess the strengths, limitations, and impacts of using KPIs in these scenarios, providing insights into their effectiveness and practical applications.

Importance of Relevance of Study

The importance and relevance of this study on Data KPIs (Focus on Goal) are significant for several reasons:

1. ***Bridging the gap in KPI theory***: This study examines the challenge of creating Key Performance Indicators (KPIs) which are motivating for the analysts, whose contributions can often be less quantifiable due to their involvement in larger projects. This study fills a

gap in the existing KPI theory by investigating how KPIs might satisfy the "SMART-criteria" (Specific, Measurable, Attainable, Realistic, Timely) in the context of analysts' jobs and offers useful insights for organizations to create effective KPIs for analysts.

2. ***Increasing motivation and performance:*** Motivating analysts is important for their performance since it has a direct impact on the quality and effectiveness of their work. This study intends to provide ideas on how organizations may create KPIs that will successfully motivate analysts to reach their goals, resulting in improved performance and productivity. This is done by developing KPIs that are in line with the unique characteristics of analysts' work and projects.
3. ***Overcoming practical KPI setting challenges:*** The contributions of analysts to larger projects are frequently multifaceted and complicated, making it difficult to evaluate their achievement using conventional KPIs. It responds to this real-world problem by investigating ways to establish KPIs that are precise, measurable, attainable, realistic, and timely while taking into account the particular circumstances of analysts' jobs. The results of this study might offer organizations useful advice on how to overcome the difficulties of developing analyst-motivating KPIs.
4. ***Increase in Performance:*** Organizations depend on the performance and contributions of their analysts to meet their strategic goals. Organizations can enhance their overall performance, accomplish their goals more quickly, and get a competitive edge in the market by creating efficient KPIs that can inspire analysts to work at their best. The results of this study can be valuable to companies by offering advice on how to develop KPIs that will inspire analysts, resulting in improved results and the achievement of corporate goals.

In conclusion for the relevance of the study, this study on data KPIs (Focus on Goal) and analyst motivation is significant and important because it closes a theoretical gap in KPI theory, improves performance and motivation, addresses real-world KPI setting challenges, and adds value to organizations by offering real-world suggestions for effective KPI setting for analysts.

II. Literature Review

Key performance indicators (KPIs) are being used by organizations more and more often, especially in the fields of data engineering and data analytics. KPIs are performance indicators that gauge how well an organization is accomplishing its main goals. They are frequently applied to boost worker motivation and productivity.

The usage of KPIs is discussed on several topics connected to work performance, motivation, and performance monitoring. The review discusses statistical techniques like structural equation modeling and partial least squares path modeling for analyzing the connections between different variables and emphasizes the significance of motivation, measurement quality, and efficient performance measurement tools in improving job performance.

Our thesis looks into the variables that influence data analysts' and data engineers' motivation about the application of KPIs. In the context of data engineering and data analytics, this research will contribute to our comprehension of the connection between motivation, performance measurement, and job performance.

1. Definition of work performance and employee work motivation.

Joseph Ato Forson, Eric Ofosu-Dwamena, Rosemary Afrakomah Opoku & Samuel Evergreen Adjavon (2021)

In order to evaluate the current state of the field, here the analysis should be done to the previous research on the impact of data KPIs on employee motivation within the framework of data analytics. After analyzing the findings to identify patterns, trends, and gaps in the literature. Recognizing the range of viewpoints on the subject, Similar highlights of the opposing methods and conclusions have also been shown. The early theories that formed the foundation for our knowledge of job performance and employee motivation, as well as more recent studies that

have enhanced our understanding in the context of data analytics, have been reviewed as well as the distinctive features of the discipline.

In putting the research within the existing discussion on the subject, Overall, by generating important insights, combining research, discovering gaps, and situating our research within the current discussion, our literature evaluation offers a strong foundation for our thesis. It sets the foundation for future contributions to the field and emphasizes the value of our research when viewed in the context of data analytics and its effects on employee motivation and productivity.

2. Motivation and Analytics: Comparing Business and Engineering Students:

Natalie M. Scala, Stella Tomasi, Andrea Goncher, Karen M. Bursic (2017)

In the fields of data engineering and analytics, this overview of the literature examines the connection between key performance indicators, or KPIs, and employee motivation. While concise and comprehensive KPIs can help further motivate employees, autonomy and growth possibilities are two of the most significant motivating aspects for workers. However, creating KPIs itself is insufficient since employees must also believe they have the chance for career progression, meaningful work, and recognition. The thesis contends that firms seeking to increase employee engagement and general performance have to understand the connection between KPIs and employee motivation.

3. Structural equation modeling and partial least squares path modeling method:

Marko Sarstedt, Christian M. Ringle & Joseph F. Hair (2021)

The methods for examining intricate interactions between variables, structural equation modeling (SEM) and partial least squares path modeling (PLS-PM), are both quite popular. Here the examination of several techniques will be conducted in the context of the general thesis topic

in this literature review, which is the investigation of the connection between data analysts' and data engineers' employee motivation and key performance indicators (KPIs) for data.

SEM can be used to look into the relationship between data KPIs and the motivation of employees in the context of our thesis topic. We can use the approach to figure out which KPIs have the strongest correlations with employee motivation and whether there are any mediating or moderating factors that affect this relationship.

Powerful methods for examining intricate relationships between variables include SEM and PLS-PM. These techniques are especially helpful in the fields of data analytics and data engineering, where non-linear and complex relationships between variables are typical. SEM and PLS-PM can be utilized to examine the connection between data KPIs with employee motivation among data analysts and data engineers in the context of our thesis topic. By employing these methods, we may identify the most crucial KPIs that are linked to employee motivation and get insightful knowledge about the factors contributing to success in this industry.

4. Extending Theory of Planned Behavior to Understand Service-Oriented Organizational Citizen Behavior:

Kuang-Chung Tsai, Tung-Hsiang Chou, Santhaya Kittikowit, Tanaporn Hongsuchon, Yu-Chun Lin and Shih-Chih Chen (2022)

The effectiveness of measurement is important to the use of KPIs. As per TPB, the quality of KPI measures is influenced by attitudes toward KPIs, subjective norms (i.e., the felt social pressure to use KPIs), and perceived control over behavior (i.e., the perceived ease or difficulty of using KPIs).

According to TPB, views of the benefits and drawbacks of adopting KPIs influence attitudes toward them. Employees are more inclined to use KPIs and ensure that their evaluations are of

good quality when they believe that doing so will have favorable results, such as enhanced performance.

The quality of KPI measurements is also influenced by subjective criteria. Employees are more likely to use KPIs and ensure that their measurements are of high quality if they believe that their coworkers and supervisors respect their use.

The accuracy of KPI measures is also influenced by a sense of behavioral control. Employees are more likely to use KPIs effectively if they believe doing so is simple and they have the skills and resources necessary to do so.

Employees are more likely to use KPIs and ensure that their measures are of high quality if they believe they have any control over their usage of them. As a consequence, employee performance may increase as KPIs give employees clear goals and objectives as well as a framework for evaluating their own performance.

TPB can be used to comprehend how the use of KPIs and the accuracy of measurement affect employee motivation. TPB claims that the intention to apply KPIs is influenced by attitudes toward KPIs, subjective norms, and perceived behavioral control.

Employees are more likely to intend to use KPIs if they have a good opinion toward using them, believe that their coworkers and superiors value using them, and believe they have the skills and resources required to do so. As a consequence, employee motivation may increase because KPIs offer staffers specific goals and objectives to work towards as well as a framework for assessing their own performance.

5. High Job Performance Through Co-Developing Performance Measures With Employees:

Bianca A. C Groen, Celeste PM Wilderom, Marc Wouters (2015)

Application to data engineers and analysts: Involving employees in the co-development of KPIs can be highly helpful in the context of data analysts and data engineers. To effectively build and implement KPIs, data analysts, and data engineers must have specialized knowledge and skills.

Companies may profit from their experience and guarantee that the KPIs developed are relevant, correct, and by company, objectives to include these individuals in the co-development of KPIs. As a result, there may be a better fit between employee performance and corporate objectives as well as an increase in measurement quality.

The motivation and commitment of data analysts and data engineers to accomplish the desired results may also be enhanced by involving them in the co-development of KPIs. This strategy enables staff participants to have more ownership and control over their performance measurements, which may increase their drive and commitment to reaching the intended outcomes.

This study offers insightful information on the benefits of involving employees in the co-development of performance measures to enhance job performance. In addition to enhancing alignment between employee achievement and business goals, this approach also can raise motivation and commitment to obtaining the desired results. This study highlights the importance of involving employees in the co-development of KPIs to ensure their relevance, accuracy, and alignment with organizational objectives. This research contributes to our thesis topic, which is to study the relationship between measurement quality, employee performance, and motivation among data analysts and data engineers. Firms may accomplish this to raise measurement quality, employee productivity, and data and data engineers' motivation.

6. Perceived Task Characteristics and Employee Performance:

Ricky W Griffin, M. Ann Welsh, Gregory Moorhead (1981)

It's important to consider how perceived measurement quality may affect work performance. Employees are more likely to be motivated to perform well if they think the performance metrics used to assess their work are accurate, pertinent, and in line with corporate goals. This review will look at the research on perceived measurement quality and its correlation with job performance in the context of our thesis topic, which is to investigate the relationship among

information key metrics (KPIs), measurement quality, employee performance, and motivation among data analysts and data engineers.

Relationship to Job Performance: In numerous studies, it has been discovered that perceived measurement quality is positively related to job performance. For instance, a study by Mone and London (2010) indicated that employees were more likely to perform well when participants felt the performance indicators used to evaluate their work was accurate and relevant. Similarly, Chen and Chen (2013) showed that employees were more likely to perform well when they believed the performance measures used to assess their job were fair and accurate.

Perceived measurement accuracy is essential, especially for data analysts and data engineers. To aid in group decisions, these employees are responsible of evaluating and interpreting data. They are more likely to be motivated to perform well and guarantee the accuracy and relevance of their analysis if they believe that the performance measures used to assess their work are accurate, relevant, and by business goals.

It's essential to think about how perceived measurement quality may affect work performance. Employees are more likely to be inspired to do their job well if they think the performance metrics used to assess their work are accurate, pertinent, and in line with corporate goals. Perceived measurement quality is crucial in the context of data analysts and data engineers since they are in charge of assessing and interpreting information for use in the centralized decision. By ensuring the accuracy, relevance, and alignment of performance measures, companies may enhance the measurement quality, employee performance, and motivation of data analysts and data engineers, which can lead to improved overall performance and business outcomes.

Overall, the literature review highlights the importance of performance measurement tools that are accurate, reliable, and motivational in enhancing work performance. These findings have practical ramifications for enterprises, particularly those in the data engineering and data analytics field, to develop effective performance measurement systems that can inspire workers and be extremely motivated.

7. Making performance measurement systems more effective in public sector organizations:

Swee C. Goh (2012)

The topic of data analysis and data engineering is no exemption to the compelling need for enhancing the effectiveness of evaluation systems for performance in public sector companies. The writers of this research emphasize how crucial it is to comprehend the elements that drive employees in this situation. They point out that this crucial issue hasn't been thoroughly covered in the literature yet, opening the door for more investigation into the real efficacy of employees' daily jobs.

In the literature review, the target is to go beyond mere description and engage in critical discussion by showcasing our insights and connections between different theories and our chosen topic of Data Key Performance Indicators (KPIs) in the field of data analysis and data engineering.

8. A qualitative analysis of statements on the motivation of applicants for medical school:

Anouk Wouters, Anneke H Bakker, Inge J van Wijk, Gerda Croiset & Rashmi A Kusurkar (2014):

KPIs affect motivation, research on performance evaluation, growth analysis, and employee satisfaction rate are reviewed. Different viewpoints on incentives and KPIs could end up in conflicting approaches. Understanding how motivation affects KPIs is a vital characteristic.

In the workplace, as it can result in better performance and business success. In order to improve our understanding of motivation and its connection to KPIs in the field of data analysis and data engineering, we are doing a qualitative analysis as researchers. To completely fill the knowledge empty space and offer recommendations for improving employee performance and motivation in this industry, more study is required. The results of this study may have been employed for

businesses that seek to improve employee engagement and better overall performance in relation to data analysis and data engineering.

9. Motivating Personal Growth by Seeking Discomfort:

Kaitlin Woolley and Ayelet Fishback (2022)

KPIs are often used as an evaluation tool, and it is shown that discomfort-seeking behaviors are linked to improved outcomes for performance as measured by KPI scores. Incorporating growth analysis as a KPI can also shed a spotlight on the link between discomfort-seeking behaviors and employee motivation, as people who actively seek discomfort are more likely to grow both personally and professionally and be driven to do their best work. In addition, employee happiness is an important source of motivation, and discomfort-seeking behaviors could have an impact on levels of fulfillment as employees who engage in personal activities. This will directly and positively make an impact on their overall motivation levels and reflect in higher satisfaction rates as measured by relevant KPIs, such as employee satisfaction surveys or feedback metrics.

10. Motivation in Learning and Happiness among the Low Science Achievers of a Polytechnic Institution:

Safiah Omar, Jasmine Jain, and Fauziah Noordin (2013)

Studies that have examined various motivational tactics, such as goal setting, feedback, and rewards, and their effects on student motivation and happiness are categorized and the results are summarized in the field of study. the balance between extrinsic and intrinsic motivation, which are two ways that can be in conflict.

Recognition of the relationship between happiness and motivation is a defining feature of the profession, with studies demonstrating the beneficial association between motivation and subjective well-being. In this discussion, we take the stance that improving the motivation and happiness of poor science achievers can significantly improve their academic performance and

general well-being. Understanding the variables that affect motivation and happiness allows us to create treatments that are specifically designed to boost student motivation and raise their academic achievement, adding to the body of knowledge on the subject of the thesis.

11. Does Money Motivate Employees? Empirical Study of Private and Public Financial Sector:

Arman Kulchmanov and Maniam Kaliannan (2018)

Studies on the subject have looked at how financial incentives influence employee performance and motivation. While a number of studies show that financial incentives can have a positive impact on motivation, other research shows limitations in the long-term use of such incentives. To fully understand the various effects of money on employee motivation in both contexts, empirical data from the private and public financial sectors has been examined.

The role of money as the only incentive for employees is a contentious topic in the literature, with some authors stating that other non-monetary elements, such as job happiness, career advancement, and work-life balance, also play a significant part in motivating employees. The literature also discusses how company culture, principles of leadership, and job duties influence employee motivation and productivity.

Understanding the need for an extensive approach to motivation that take into account both financial and non-financial aspects that affect employee engagement and performance is a defining feature of the field. While money can be a significant motivation for data analysts and workers in the financial sector, we believe that other elements, such as job satisfaction and possibilities for career progression, are as essential.

12. Big data analytics and firm performance: Findings from a mixed-method approach:

Patrick Mikalef, Maria Boura, George Lekakos, John Krogstie (2019)

Recent years have witnessed a considerable increase in interest in the literature on big data analytics and business performance. Massive databases must be processed and analyzed using cutting-edge techniques in big data analytics, and their impact on business performance has been investigated using a mixed-method approach. Data key performance indicators (KPIs) are quantifiable measurements that companies use to gauge their progress toward strategic goals. They are also extremely important for assessing the success of big data analytics projects. The use of data KPIs in assessing the effects of big data analytics on business performance is crucial, according to existing studies. According to studies, businesses that define and track appropriate key performance indicators for big data analytics are more likely to see success.

Organizations may evaluate their success in utilizing big data to improve business outcomes by matching KPIs with the objectives of big data analytics. The connections between big data analytics, data KPIs, and company performance in many contexts, industries, and organizational settings require further study.

13. Assessing business value of Big Data Analytics in European firm:

Nadine Côte-Real, Tiago Oliveira, Pedro Ruivo (2017)

The literature on evaluating the commercial value of big data analytics in European businesses emphasizes the growing interest in and investment in using big data analytics for enhancing business performance. Studies have used a variety of methods, such as quantitative evaluations and case studies, to figure out how big data analytics affect business performance. The use of data key performance indicators (KPIs) to track advancement toward strategic goals is an essential component of this assessment. Existing research highlights the importance of clearly defined data KPIs that are in line with business objectives because they allow firms to efficiently

gauge and show the financial benefits of big data analytics tasks.

But determining the commercial value of big data analytics is difficult and necessitates taking into account elements like data quality, privacy, culture, and compliance. To examine these connections in the context of European businesses and create best practices for maximizing the commercial potential of big data analytics, more research is required.

14. Model of work motivation based on happiness:

Joanna Nieżurawska, Radosław A. Kycia, Iveta Ludviga, Agnieszka Niemczynowicz (2022)

By analyzing at how KPIs may be used to track, evaluate, and inform the effect of work motivation on organizational performance, the literature review on the model of work motivation based on happiness can be connected to our thesis on data KPIs. The effectiveness of happiness-based motivational tactics is assessed by recording and analyzing data on employee engagement, retention, performance, and organizational KPIs. Data KPIs can also be used to monitor and measure employee happiness and job satisfaction, giving information on the connection between work motivation and happiness at work. Overall, data KPIs can be quite useful in assessing the impact of joy-based job motivation and directing organizational decision-making processes.

15. Business value of big data analytics:

A systems-theoretic approach and empirical test: John Qi Dong, Chia-Han Yang (2020)

The article "The company value of big data analytics: A systems-theoretic Approach and empirical test" offers a thorough analysis of the existing research on this topic. To comprehend the intricate connections between variables like data quality, analytics skills, and business performance in the context of big data analytics, the authors take a systems-theoretical approach. The evaluation underlines the significance of utilizing big data analytics to create commercial value and the requirement for businesses to have the capacity to generate insightful conclusions and make defensible decisions based on the analysis of data.

The findings from this literature research are very relevant to the data KPIs and smart analysis issue of the thesis. They show the significance of data quality and analytics capabilities in creating business value from big data initiatives. Organizations may precisely assess the effect of their data analytics efforts on performance outcomes by utilizing smart analysis techniques along with appropriate KPIs.

The literature research entitled "Business value of big data analytics: A systems-theoretic approach and empirical test" argues that data KPIs and clever analysis are crucial for generating business value from big data analytics efforts. It offers a thorough grasp of the complex nature of big data analytics and emphasizes the requirement for businesses to have the capacity to efficiently analyze and draw conclusions from massive amounts of data. The conclusions from this literature review emphasize the significance of using data KPIs and smart analysis in assessing the efficacy of data-driven projects in companies, which is especially relevant to your thesis research.

16. A Correlational Study of Creativity, Happiness, Motivation, and Stress from Creative Pursuits:

Michael W. Ceci and V. K. Kumar (2016)

The literature research on "A Correlational Study of Creativity, Happiness, Motivation, and Stress from Creative Pursuits" highlights how important these elements are to our thesis topic on data KPIs and employee motivation. Designing successful data KPIs that meet employee requirements, boost motivation, and enhance performance on data-related tasks requires an understanding of the interactions between creativity, happiness, motivation, and stress. It may establish a supportive workplace that encourages creativity, minimizes stress, and increases employee motivation by incorporating the lessons from this research analysis, which will boost performance in tasks involving data. This comprehensive strategy may have important ramifications for our thesis study and help create more useful data KPIs that promote business performance.

III. Methodology

The methodology section outlines the research design, data collection, and analysis methods used to answer the research questions. They are as follows:

Research design and methodology

The research design and methodology for the thesis on Data Key Performance Indicators (KPIs) will involve a systematic approach to investigate the factors that directly affect the motivation level of employees in the field of data analysis or data engineering. The following outline presents the main components of the research design and methodology:

1. **Research Approach:** The research will adopt a quantitative research approach, utilizing numerical data to analyze and measure the performance, growth, and satisfaction rate of employees in relation to KPIs. The research will take a quantitative approach, analyzing and measuring staff performance, growth, and satisfaction in relation to key performance indicators (KPIs). This methodology was selected for a variety of reasons.

For example, a quantitative approach allows for the collection of empirical data that can be statistically examined. It is now possible to quantify and compare numerous elements related to employee motivation and performance by using standardized surveys and numerical data. This approach provides for a careful and objective analysis of the relationship between KPIs and employee results, laying the foundations for drawing conclusions and making reasonable recommendations. Second, the use of quantitative data makes it simpler to recognize patterns, trends, and correlations. It may be accomplished by employing statistical analysis techniques such as regression evaluation or correlation analysis.

2. **Data Collection:** Data for this study will be collected through a structured survey that is distributed to analysts, team leaders, and employees from various companies. The

questionnaire consists of 17 carefully developed questions that align with the research objectives. The technique was adopted for a variety of reasons.

Starting with, a questionnaire survey provides for the efficient collection of data from a large number of participants in a short period of time. The study can collect an array of responses and views by distributing the questionnaire to many analysts and employees. Second, the survey is a uniform tool that ensures information consistency. Personal interviews or open-ended answers will be avoided since each participant will answer the same set of questions. This unifying method improves comparability and allows statistical analysis of the collected data.

- 3. Data Analysis:** The collected data will be analyzed using appropriate statistical techniques, such as descriptive statistics, correlation analysis, and regression analysis, to identify the key factors that affect employee motivation and their relationship with KPIs. The methods used allow an in-depth and robust examination of the data, enabling the researchers to draw relevant inferences from the information collected. The study may identify the vital factors that significantly affect employee motivation and their link with KPIs by combining descriptive data, correlation analysis, and regression analysis.

Furthermore, the statistical analysis provides an objective and evidence-based approach to data interpretation, reducing subjective biases and increasing the reliability of the outcomes. The use of known statistical techniques also enables comparisons with previously published literature or industry benchmarks, allowing for a greater understanding of the research issue.

- 4. Ethical Considerations:** Ethical considerations, including informed consent, confidentiality, and data protection, will be strictly adhered to throughout the research process to ensure the ethical integrity of the study. Another important ethical component that will be strictly adhered to is confidentiality. Any data gathered from participants will be kept strictly confidential and securely maintained. The data will be accessed only to authorized researchers, and it is used strictly for the purpose of the research study.

5. **Limitations:** Potential limitations of the research, such as sample size, data availability, and generalizability of findings, will be acknowledged and discussed in the research report.

Another limitation may be data availability. The research relies on data collected through surveys, which are dependent to the respondents' willingness to participate and provide correct information. Incomplete or biased responses could compromise the integrity of the data, affecting the analysis and conclusions taken from it. While efforts were taken to ensure the clarity and validity of the questionnaire, some level of response variability is typical of self-reported data.

In conclusion, the research report will address and discuss the potential limitations of the study, including sample size, data availability, and generalizability. By acknowledging these limitations, the report ensures transparency and provides a more nuanced interpretation of the findings, while also identifying avenues for further research.

6. **Significance of Findings:** The findings of the research will be interpreted and discussed in the context of existing literature on KPIs, employee motivation, and performance management. Practical implications and recommendations for organizations to improve employee motivation through effective KPIs will be provided based on the research findings.

Data collection methods and instruments

Personal and professional satisfaction, questionnaires, interview, existing data, and validated tools were all used in the data gathering for the thesis on Key Performance Indicators (KPIs). Data on employee performance, perceptions, attitudes, and views regarding KPIs and their effects on motivation will be gathered using these techniques. The research objectives and the data availability will determine the choice of data collection techniques and ethical concerns will be followed at every step of the way.

Data collecting methods and instruments were essential for gathering broad and meaningful data

for the Key Performance Indicators (KPIs) investigation. The techniques and instruments used were carefully chosen based on their connection with the research objectives and data availability, assuring the collection of relevant and valuable information. To respect the participants' rights and confidentiality, ethical considerations were essential throughout the data collection process.

Questionnaires were used as the primary instrument for collecting information on personal and professional satisfaction, perceptions, attitudes, and views on KPIs and their impact on motivation. This approach guarantees uniformity and comparability across respondents by enabling standardized data collection. For greater reliability and validity, the questionnaire design incorporated established instruments and scales.

Sample selection and size

A number of factors impacted the choice of the Key Performance Indicators (KPIs) for this thesis. Firstly, the growing importance of data analysis and data engineering in numerous companies, particularly in the financial and banking industries, has highlighted the significance of knowing the factors affecting employee motivation and performance in these disciplines. KPIs are essential indicators for measuring and tracking progress toward defined objectives, making them a significant area of study.

A distributed questionnaire survey targeting analysts working in banks, small- to medium-sized financial institutions, and team leaders in the fields of data analysis or data engineering was utilized to select the sample size and composition for this thesis on data Key Performance Indicators (KPIs). Purposive sampling was used to find volunteers who met the requirements for being part of the study, including relevant competence in the respective domains.

Considering factors such as the methodology of the study, the power of statistical analysis, and the resources at hand, the sample size was set with the objective of obtaining a representative

sample that might provide useful data. The objective of determining a suitable sample size was to ensure that the findings of the research had sufficient validity and generality.

Data analysis techniques

The R programming language was chosen as the primary data analysis tool in this study due to its versatility and a wide variety of statistical capabilities. R is a popular programming language and open-source software environment for statistical computing and graphics. It provides a wide set of statistical techniques and packages, making it suited for advanced data analysis such as descriptive statistics, correlation analysis, and regression analysis. R's adaptability and resilience make it a perfect choice for data analysis, allowing the research team to glean relevant insights and form statistically valid conclusions. In addition, the open-source nature of R promotes transparency and reproducibility by allowing others to check and go over the study, hence increasing the confidence and reliability of the research findings.

In order to gain insight into the relationships between various Key Performance Indicators (KPIs) and employee motivation in the field of data analysis or analyst in the industry, the results of the data analysis will be interpreted and discussed in the context of the research questions and objectives. The research findings will add to the body of information and offer companies useful advice on how to create compelling KPIs for analysts using an analysis of the data collected.

Ethical considerations

It is widely acknowledged that while developing Key Performance Indicators (KPIs) to inspire other analysts, ethical dilemmas can occur. Instead of merely checking boxes on a checklist, the approach entails developing KPIs that are meaningful, support beliefs, and foster professional development. Although the "SMART-criteria" for KPIs—Specific, Measurable, Attainable, Realistic, and Timely—are widely acknowledged as acceptable practices, it can be challenging to

determine an analyst's effectiveness when they contribute to complex projects with a range of outcomes.

The aim is to develop KPIs that are not only successful in enhancing performance but also heartfelt in their effects on the personal and professional lives of those who make up the team. This is accomplished by having a clear knowledge of the "SMART criteria" and a dedication to ethical considerations, which can have an enormous impact on the team's lives and jobs.

IV. Results

The major goal of this research was to investigate ways of creating motivating key performance indicators (KPIs) for data analysts using the SMART criteria framework. By analyzing the growth rates of analysts, this research aimed to identify patterns and developments that could be used to enhance performance. Insights from this research can contribute to the development of inspiring KPIs for analysts and help companies in real-world data management scenarios. The benefits and disadvantages of utilizing KPIs were also explored in this study. Ultimately, the goal was to provide practical advice for companies to define effective KPIs that lead to success in data analytics and improve the motivation and performance of their data analysts.

Presentation and analysis of data

As it was mentioned, a sample of 116 responses has been collected to our thesis questionnaire, with the target group of the questionnaire being employees (mostly in data analyst, data engineering, and data steward positions) working in data-intensive job functions and their team leads in Estonia. After filtering out 27 responses that stated their role as neither team lead nor data-related, our data frame ended up having a relatively smaller but reasonable sample size (N = 89) that allows us to perform our exploration. (de Winter et al., 2009) Each question item in the survey is *scaled* with choices numbered as Likert scale [from 1 to 5] meaning that towards the right end of the scale, respondents provided answers agreeing more with the mentioned statement or expressing a more confirmational attitude towards the statement intended to measure our latent variables.

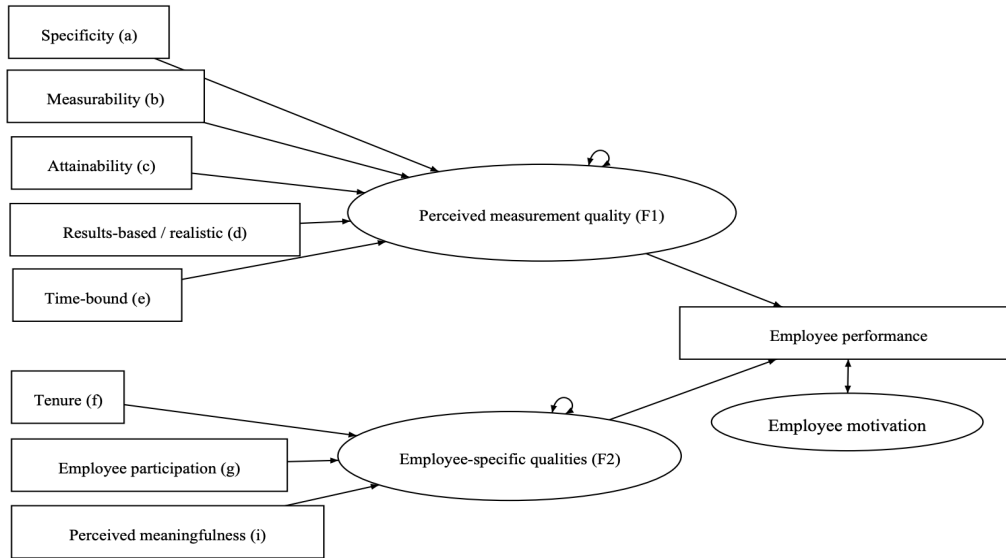
For the sake of saving space in our dataset considering the number of variables involved, response items are named according to their position in the survey with an assumed construct following the question number. For example, variable *q3i1* is a categorical variable that reflects the answer for question 3, and belongs to *i* (*perceived meaningfulness*) variable.

Every item (question) in the survey corresponds to certain variables that have to be analyzed in order to understand whether it can reliably claim that the model is explaining the underlying relationship structure between *employee motivation* in data-intensive roles and two factors: *the measurement quality of key performance indicators* as well as other *employee-specific qualities*. Though not all questions have the same function. For example, the first question in our survey was intended to measure organizational tenure as one of the variables to test if there is any statistically significant correlation between experience and employee performance, hence motivation. Previous research in the field suggests that there exists a multilayered relationship between organizational tenure and performance (Steffens et al., 2014).

Additionally, question 11 differs in terms of its structure as it gives a weighted result based on how many features of key performance measures (level of influence) that an employee had control over are selected. The more influence over different aspects of performance indicators, the stronger variable is. Question 2 was also discarded since it was meant to be a filtering variable to determine whether responses are suitable for our analysis or not.

The objective of this study was to investigate whether there is a linear dependency or mutual relationship between performance and motivation. Although the limitations can be acknowledged between the sample size and potential Heywood cases with commonality indicators greater than one, the aim is to refine the model and adjust variables to improve the accuracy of the estimators.

According to the main topic of our paper and the availability of data, a model with 8 *independent variables* and 2 *factors* ultimately explaining the variability in 2 *dependent variables* namely *performance and motivation* was presented:

**Table 1**

Questionnaire items (Question numbers)	Independent variables	Factors
q17	Specificity (a)	F1
q13	Measurability (b)	F1
q14	Attainability/achievability (c)	F1
q15	Results-based/ realistic (d)	F1
q16	Time-bound (e)	F1
q1	Organizational Tenure (f)	F2
q9, q10, q11	Employee participation (g)	F2
q3, q4, q5, q6, q7	Perceived meaningfulness/recognition (i)	F2

Findings related to the research questions and hypotheses

After conducting the Keiser-Meyer-Olkin test to see whether our dataset observes this criterion. This measurement helps us to see the degree to which each observed variable is predicted by the other variable in our survey data. According to KMO (Keiser-Meyer-Olkin) test result, which is used to measure sampling adequacy to better understand if our dataset is suitable for factor analysis, it can be said that the overall Measure of Sampling Adequacy (MSA) is **0.8** which is acceptable. (*Kaiser 1970, Dodge, Y. 2008, Gonick, L. 1993, Klein, G. 2013, Vogt, W. P. 2005*)

Table 2

Kaiser-Meyer Olkin factor adequacy

Overall MSA = 0.8

MSA for each item:

Variable	Value	Variable	Value
Tenure.f.	0.89	q8.e.	0.77
q3i1	0.76	q9g1	0.88
q4i2	0.82	q10g2	0.87
q5i3.a.	0.76	q11g3*	0.87
q5i3.b.	0.87	q12j1c	0.86
q5i3.c.	0.71	q13j2b	0.72
q6i4	0.76	q14j3c	0.72
q7i5	0.66	q15j4d	0.84
q8.d.	0.88	q16j5e	0.82

Note: The Kaiser-Meyer-Olkin test is a measure in multivariate statistics to determine whether our sample is adequate and suitable for factor analysis (Kaiser 1970, Dziuban & Shirkey, 1974, Cerny and Kaiser 1977). KMO values greater than 0.8 is generally considered good enough, meaning that the usefulness of factor analysis can be granted. This is the case when the majority of zero-order correlations are positive (Kaiser 1970).

Individual Keiser-Meyer-Olkin test results of questionnaire items were also promising, considering that test output didn't indicate any item that scored less than 0.60 which according to [Shirkey E.C et al., 1974](#), might be a cut-off threshold below which would not be counted as adequate.

Bartlett's test needs to be performed (a so-called *measure of sphericity*) in order to determine whether or not variances between groups (in our case assumed factors) are equal. (Bartlett 1951). What Bartlett's test of sphericity does essentially is that it tests a hypothesis that if a correlation matrix differs significantly from an identity matrix (no correlation coefficients, all zeros).

Table 3

χ^2	p-value	<i>df</i>
763.5105	7.791653e-82	153

The Bartlett test of homogeneity of variances indicates that the p-value is less than 0.05 significance level, therefore it can be stated that the dataset is suitable for exploratory factor analysis.

Therefore, the null hypothesis can be rejected and can be stated that there is a significant probability that the correlation matrix has some relationships among at least two variables in our dataset.

- *H₀: Variances among factors are equal.,*
- *H_a: At least two of them differ*

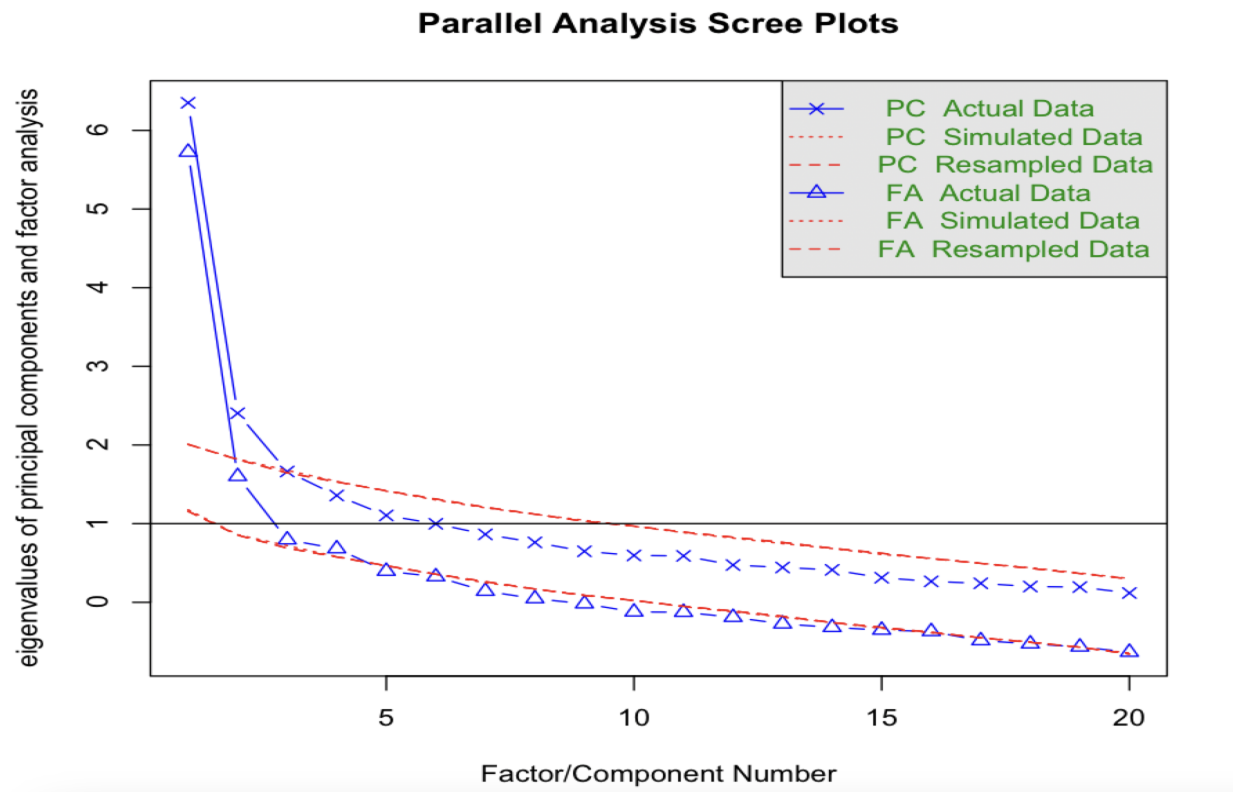
The Bartlett test of homogeneity of variances indicates that the p-value is less than 0.05 significance level, therefore it can be stated that the dataset is suitable for exploratory factor analysis. Later on, factor analysis was conducted using the maximum likelihood method.

Initially, the aim is to use the function of *'factanal'* to make sure that the number of variables that are selected captures most of the variance. Therefore, “factor” is used in place of “variable” in this particular test result.

Here factor loadings are selected which is greater than $|0.5|$ (current threshold) to determine which items have more contribution to variables. At the final step of the analysis, a test will be conducted in order to make reliable conclusions about our model.

Results of parallel analysis where it is indicated that greater than 1 eigenvalue of factor analysis should be taken as determining value, therefore, help us to add some certainty that 2 factors will be utilized. (Table 4)

Table 4



[Source: Screenshot by author]

TABLE 5

Uniquenesses:

Tenure.f.	q3i1	q4i2	q5i3.a.	q5i3.b.	q5i3.c.	q6i4	q7i5	q8.d.
0.726	0.005	0.223	0.066	0.452	0.283	0.218	0.005	0.581

q8.e.	q9g1	q10g2	q11g3*	q12j1c	q13j2b	q14j3c	q15j4d	q16j5e	q17j6a
0.757	0.302	0.355	0.565	0.369	0.046	0.321	0.282	0.005	0.138

LOADINGS :									
	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9
Tenure.f.	0.360		0.210	0.111		0.160		0.133	0.198
q3i1	0.812	0.231		0.150	0.294	0.228		0.191	-0.258
q4i2	0.731	0.130				0.318	0.301		0.117
q5i3.a.	0.238		0.331		0.139	0.197	0.214	0.808	
q5i3.b.	0.176		0.618	0.121		0.195		0.249	
q5i3.c.			0.809		0.102		0.151		0.123
q6i4	0.108	0.129	0.162		0.645	0.432		0.333	
q7i5	0.187		0.160		0.930	0.195	0.127		
q8.d.	0.167					0.257	0.518	0.205	
q8.e.		0.289	0.376						
q9g1	0.303		0.118		0.194	0.713	0.138	0.130	
q10g2	0.234	0.111		0.174	0.239	0.661	0.149		0.114
q11g3*	0.285		0.433		0.160	0.212		0.283	-0.112
q12j1c	0.349	0.529	0.147	0.374	0.135	0.124	0.139	0.123	
q13j2b	0.116	0.199		0.926		0.115	0.152		
q14j3c	0.149	0.208		0.428	0.188		0.553		0.285
q15j4d	0.192	0.465	0.199	0.337			0.534		-0.123
q16j5e	0.114	0.925	0.131	0.172		0.113	0.221		
q17j6a		0.378	0.187	0.511	0.199		0.578		-0.206

TABLE 6

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9
SS Loadings	1.923	1.801	1.737	1.691	1.639	1.599	1.526	1.056	0.327
Proportion Var	0.101	0.095	0.091	0.089	0.086	0.084	0.080	0.056	0.017
Cumulative Var	0.101	0.196	0.287	0.376	0.463	0.547	0.627	0.683	0.700

[Source: Screenshot by author]

Before getting into the explanation of our test results, let us review the idea of using this specific function in the research: Factor analysis essentially generates linear combinations of factors to abstract the variable's underlying commonality. As much as the variables have commonalities, fewer factors would capture a large proportion of the variance in the survey data. This fact will let us aggregate many variables in a model to represent an underlying construct.

The output of the model initially starts with the function call that gives the general specifications. Then the information regarding the *uniqueness* ranges from 0 to 1. Sometimes also can be referred to as *noise*, which explains the variability proportion which can not be explained by a linear combination of the factors.

Apart from *Tenure.f.*, *q8*, and *q11*, other questionnaire items received lower *uniqueness* of less than 0.5, which could be interpreted as factors (in our example variables explaining survey items) accounting for significant variability of responses. Factor loadings indicate what is the contribution of each response vector to the variable considered, with some negatively correlated variables seen as well.

At the last part of the output window, information is received on the *sum of squared loadings (SS loadings)*, the proportion of variance explained by each variable (*Proportion Var*), and the cumulative proportion of variables explained (*Cumulative Var*); In general, there is a threshold for keeping a factor (or in this particular output, variable) when its SS loading is greater than 1, therefore the assumption is supported that there are 8 variables worth keeping. (Kaiser, H.F., 1960)

Finally, the hypothesis test result output expresses the null (number of variables = 9) hypothesis H_0 that was correctly determined and a sufficient amount of variables to capture the full dimensionality of the data frame. Given $p\text{-value} = 0.995$ ($\chi^2=18.03$, $df=36$) therefore H_0 is rejected.

What that means is, it is likely that there are at least 9 or more than enough variables to explain the underlying linear correlation. The hypothesis test was based on the estimation method called maximum likelihood (ML).

V. Discussion

Interpretation of the findings

1. How to interpret correlations and test results in exploratory factor analysis: Interpreting correlations and test results in exploratory factor analysis (EFA) is a crucial step in understanding the underlying structure of data and extracting meaningful factors. EFA is a statistical technique used in psychology, social sciences, and other fields to uncover latent variables or factors that explain the variance in observed variables. When interpreting correlations and test results in EFA, several key considerations should be taken into account.
 - a. **Correlations:** Correlations represent the strength and direction of the linear relationship between pairs of variables. In EFA, correlations are examined to assess the strength of association among observed variables and identify patterns of covariance. High positive correlations between pairs of variables suggest that they tend to increase or decrease together, while negative correlations indicate an inverse relationship. However, it's important to note that correlations do not necessarily imply causality and spurious correlations may occur due to chance or other confounding factors.

When interpreting correlations in EFA, it's crucial to focus on the pattern of correlations rather than individual correlations. Specifically, identifying clusters of variables with high intercorrelations may suggest the presence of underlying factors that are driving the observed relationships. Correlations can also be used to assess the suitability of data for factor analysis. Low correlations between variables may indicate that the data is not suitable for EFA, as it suggests weak covariance among the observed variables.
 - b. **Test results:** One of the main test results that have been obtained from the analysis of the collected questionnaire is that In EFA, various statistical tests are used to assess the appropriateness of the factor model and to determine the number of factors to extract. Commonly used tests include the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, Bartlett's test of sphericity, and factor eigenvalues. The KMO measure assesses the adequacy of sample size for factor analysis, with values closer to 1 indicating better suitability for EFA. Also, it is mentioned in Bartlett's test of sphericity examines whether the correlation matrix is significantly different from an identity matrix, with significant results supporting the use of

EFA. Factor eigenvalues represent the amount of variance explained by each extracted factor, with eigenvalues greater than 1 often used as a criterion for retaining factors.

While interpreting the test results after the analysis in EFA, it's important to consider the overall fit of the factor model and the appropriateness of the extracted factors. A good fit is indicated by high KMO values, significant Bartlett's test of sphericity, and factor eigenvalues greater than 1.

2. How to interpret and apply better rotation (in our case varimax rotation for example) to better capture relations between variables: Varimax rotation, a popular technique in exploratory factor analysis (EFA), can significantly improve interpretability and more accurately capture the relationships between variables. By maximizing the variance of loadings for each component, this approach produces factors with high or low loadings that help the factor structure stand out and be easier to understand. Variables with high loadings on a particular factor, for instance, are substantially related to that factor, whereas variables with loadings near zero are less strongly related to any particular factor. The factor structure is additionally made simpler by varimax rotation, resulting in separate, non-overlapping factors that make it easier to assign variables to particular factors based on their loadings. As a result, the underlying relationships between variables are shown in a simpler and more understandable way.

Varimax rotation is a valid option in EFA for capturing and analyzing relationships between our variables because of its simplicity, interpretability, and better validity and dependability of results.

Relationship of the Results to the literature review

After attempting to refine the previous model and adding one element that wasn't explored: The results of our study on data key performance indicators (KPIs) have a strong connection to the results of the literature review and trying to strengthen a model that had already been developed and added a previously unconsidered component. Our work expands on the body of knowledge on data KPIs already in existence, which includes theories, concepts, and actual data associated with monitoring and evaluating data performances.

The literature evaluation performed before our study served as the major foundation for our research. It provided us with an in-depth understanding of the current state of knowledge on data KPIs, including the advantages and disadvantages of the available models. A prior model is included by this fresh attribute after conducting a literature review that revealed a gap in the literature concerning an unidentified component. The results of our study add to the body of information on data KPIs by increasing understanding and providing fresh perspectives that what actually motivates the employees and their performance in the general workflow. The introduction of the previously undiscovered aspect broadened the model's reach and allowed us to study new dimensions or correlations while improving the efficiency in the work of employees with which the prior model measured and evaluated data performance. Solving the indicated gap and advancing general knowledge in the area of data KPIs, contributes to the body of literature already in place. As an attempt to improve the prior model by discovering the motivation which leads to efficiency and also adding a previously unknown aspect, the findings of our study on data KPIs are, in conclusion, closely related to the literature review. Addressing the identified gap which is finding out the main source of motivation and advancing general knowledge in the area of data KPIs, based on the idea of building on prior research, contributes to the body of literature already in existence. The connection between our findings and the literature evaluation is crucial for developing the field and guiding future studies and application of data KPIs.

Implications of study

1. How can companies use the element of autonomy and transparency in order to promote more involvement in data KPI analysis: The findings of our study indicate that companies could employ autonomy and transparency to encourage greater participation in data key performance indicator (KPI) analysis, improving organizational performance and decision-making. Employee empowerment to use their knowledge and insights in the analysis process can promote a culture of possession, participation, and accountability. This is because employees are given autonomy in the analysis of data KPIs. Additionally, encouraging transparency in the data KPI analysis process will build credibility and confidence, which will enhance employee engagement and

motivation. This transparency can be accomplished by disclosing pertinent information about KPI selection, data sources, and results. A more engaged and motivated workforce can be created by incorporating autonomy and transparency as essential methods for data KPI analysis processes, which will improve performance in the context. Companies can consider integrating these findings into their data KPI analysis practices to drive positive outcomes and achieve better results.

2. The motivational reward will be better monitored to retain senior and skilled employees in data-intensive job functions: The implications of our research on data key performance indicators (KPIs) emphasize the significance of keeping a watchful eye on the inspiring reward system for maintaining senior and skilled workers in jobs requiring a lot of data. Companies have to offer a stimulating atmosphere that values and honors the contributions of senior and talented employees since data-intensive tasks call for specific knowledge and abilities. Creating better and more useful performance measures, how can this paper be useful in Human Resources Management: In the field of data analysis and data engineering, the paper on "Creating better performance measures" is very relevant to human resources management. It highlights comprehensive performance measurement, defines key performance indicators (KPIs) that affect employee motivation, and recognizes the essential role that motivation has in job performance. In order to promote employee engagement and performance in these specialized roles, the research highlights the need for ongoing improvement in performance measurement procedures and offers useful implications for HR managers. Overall, the study offers useful advice for HR managers on creating effective procedures and interventions for performance evaluation in order to maximize employee motivation and performance in data analysis and data engineering.

Limitations and areas for further research

Our research of general investigation on factors that affect employee motivation in the field of data analysis and data engineering through key performance indicators (KPIs) is valuable, there are some limitations and areas for further research to consider. As the information on employees' performance and motivation may rely on self-assessment or subjective measurements, self-report bias may be a limitation of the study. The accuracy and reliability of the results may be affected

by social desirability bias or personal opinions when using self-report measures. To minimize self-report bias, future studies might take into account objective measurements of achievement and motivation, like performance indicators or physiological indicators. The findings' application to other organizational settings or cultures may also be an issue. The study's possible focus on specific data analysis and data engineering disciplines or organizations may limit how broadly the findings might be applied to other environments or industries. To provide a deeper knowledge of the subject, additional research might examine the applicability of the identified KPIs and factors affecting motivation across different scenarios, such as different sectors, nations, or organizational cultures. The study may also have only examined the immediate effect of KPIs on motivation, disregarding possible long-term consequences or interactions with additional factors. Additional investigation might look at the long-term impacts of KPIs on employee motivation as well as possible relationships with other elements like leadership.

Conclusion: While the research on evaluating factors affecting employee motivation in the field of data analysis and data engineering through KPIs is important, it's also necessary to acknowledge the limitations and areas that still require more study. The validity and significance of the findings can be improved by addressing these limitations and performing more studies. This will give HR managers and practitioners invaluable information for maximizing employee motivation and performance in these specialized roles.

VI. Conclusion

Summary of the Study and its Findings

In conclusion, it is evident that there is a significant correlation between employee motivation and assumed performance in data-centric roles, as measured by perceived measurement quality and employee-specific qualities. The results suggest that KPIs can be used to precisely measure employee performance and motivate employees in these roles. However, it is important to note that KPIs alone will not inspire workers, and organizations must create a work environment that takes into account individual intrinsic motivators.

The study highlights the importance of creating assessment techniques that consider specific characteristics of employees in data-driven occupations. The findings have significant implications for human resources management, as they underscore the need for more precise and realistic performance targets.

Moreover, the research contributes to a better understanding of the relationship between motivation, performance, and KPIs in the fields of behavioral sciences and economics. Future research can build on these findings to explore how these concepts affect human resources management in data-centric roles. In light of these outcomes, it is recommended that organizations implement KPIs that are aligned with employees' intrinsic motivators and provide growth opportunities, such as training in new technologies or methodologies, attending industry conferences or events, or taking on challenging projects. By doing so, businesses can create a more productive work environment that fosters employee motivation and engagement.

Significance and Contribution to the Field

Implications of our findings for Human Resources Management, Behavioural Sciences, and Economics fields are promising: Companies have long been using key performance indicators to track and reliably understand how their employees perform at work, though still, human factors behind those measurements were historically poorly understood.

By clarifying the complex connection between KPIs, motivation, and employee performance, our research has the potential to advance the fields of human resources management, behavioral psychology, and economics. Companies may better create KPIs that match with employees' intrinsic motivators by understanding the underlying psychological elements, which will increase assignment completion rates and overall performance. This knowledge may be useful in the development of performance management methods and standards which are ultimately beneficial to both firms and people.

Overall, the research has importance for several disciplines, including the fields of human resources management, behavioral sciences, and economics, and provides useful data about the relationship between KPIs, psychological characteristics, and employee performance. A more full understanding of how to use KPIs for controlling and inspiring staff in different organizational contexts could result from further research in this area that expands upon our findings.

Future Agenda

There are numerous important steps that would be included in the study agenda for the key performance indicators (KPIs) that affect employee motivation in the field of data analysis or data engineering. First, appropriate key performance indicators would be identified by conducting an extensive review of the current literature, best practices in the industry, and professional opinions. These KPIs would then be applied to a thorough examination of employee performance, monitoring and analyzing each employee's performance in their usual workday or

workflow to gauge their levels of motivation. Additionally, a growth study would be carried out to evaluate the prospects for employee advancement offered and correlate it with their levels of motivation.

To evaluate its impact on motivation, the employee satisfaction rate would also be evaluated through surveys or interviews. Advanced statistical techniques would then be used in a correlation analysis to figure out the relationships between the identified KPIs, performance data, growth analysis, and employee satisfaction rate. The company and its employees would receive implications and recommendations based on the results of the research, including ideas for enhancing the identified KPIs, placing motivational strategies into practice, and creating guidelines for improving employee motivation in the area of data analysis or data engineering. These outcomes could potentially have a big impact on the company's potential for growth and the general well-being of its employees.

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VIII. Appendices:

The objective of the study is to look into the motivations behind data analysts and engineers working in various companies. A questionnaire with 17 questions was used to collect the data, and the programming language R was used for data analysis. The questionnaire includes topics like workload, impact on the workplace, personal growth, and job satisfaction. We identified the key performance indicators (KPIs) in the banking sector that had the greatest effect on enthusiasm by analyzing the data. These factors included the volume of daily data requests processed and the possibility of career advancement. Using methods for statistical analysis, including tables and visuals, the results were presented. The study has some drawbacks, particularly the limited sample size and reliance on information provided by participants, which should be highlighted.

1. How long have you been working for your company? (*variable = Tenure.f.*)
 - a. Less than a year
 - b. 1-3 year
 - c. 3-10 year
 - d. 10 year

2. How do you define your role in the team? (*q2, filtering variable*)
 - a. Data specialist (including data analyst, data steward, data scientist, data engineer etc.)
 - b. Analysts' team lead
 - c. Neither of them

3. How much do you feel your work is meaningful? (*q3i1*)
 - a. Not meaningful
 - b. Very meaningful

4. How much impact do you think your tasks have on your company's goals? (*q4i2*)
 - a. Low impact
 - b. Highest impact

5. How much do you feel your contribution is recognized and valued: (*q5i3.a., q5i3.b., q5i3.c.*)
 - a. By manager (1-5 Likert scale; 1-Never, 2-Somewhat, 3-Sometimes, 4-Mostly, 5-Always), (*q5i3.a.*)
 - b. By team (1-5 Likert scale; 1-Never, 2-Somewhat, 3-Sometimes, 4-Mostly, 5-Always) (*q5i3.b.*)
 - c. By organisation (1-5 Likert scale; 1-Never, 2-Somewhat, 3-Sometimes, 4-Mostly, 5-Always), (*q5i3.c.*)

6. How likely are you to recommend your current employer to others? (*q6i4*)
 - a. Not likely
 - b. Extremely likely

7. What is the level of opportunities for growth and development within your organization? (*q7i5*)
 - a. Low level of opportunities of growth
 - b. High level of opportunities of growth

8. How much do you feel that your organization prioritizes data-driven decision-making and innovation? (*q8.d., q8.e.*)
 - a. Data-driven decisions (*q8.d.*)
 - b. Innovation (*q8.e.*)

(Column options were: *Never a priority, Rarely a priority, Sometimes a priority, Often a priority, and Always Priority*)

9. How much do you feel that you can collaborate efficiently with your team members?
(*q9g1*)
(1 = very poor collaboration, 5 = very efficiently)
10. How much do you feel that you can communicate clearly within your team? (*q10g2*)
(1 = very poor communication, 5 = excellent communication)
11. I have/had an influence on: (*q11g3**, *weighted variable*)
- What is being measured on key performance measures
 - How the performance measures are designed
 - The choice of which data are used as input into the performance measures
 - Ongoing modifications to the design of the performance measures
12. Providing effort in my job leads to better performance on the performance measures.
(*q12j1c*)
- Strongly agree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree
13. My performance measures measure only what I can actually influence. (*q13j2b*)
- Strongly agree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree
14. My performance measures express accurately whether I function well or not. (*q14j3c*)
- Strongly agree
 - Disagree

- c. Neutral
- d. Agree
- e. Strongly agree

15. My performance measures are clear to me. *(q15j4d)*

- a. Strongly agree
- b. Disagree
- c. Neutral
- d. Agree
- e. Strongly agree

16. My performance measures are objective and verifiable. *(q16j5e)*

- a. Strongly agree
- b. Disagree
- c. Neutral
- d. Agree
- e. Strongly agree

17. The performance measures are specific enough. *(q17j6a)*

- a. Strongly agree
- b. Disagree
- c. Neutral
- d. Agree
- e. Strongly agree

This study aimed to gain insight into the motivations of data engineers and analysts in different fields. A questionnaire consisting of 17 questions was administered to data professionals, and data analysis was conducted using the R program. The questions focused on various aspects of an employee's experience with their employer, including their role definition, perceived meaning of work, the impact of tasks on company goals, recognition and value of contribution, and opportunities for growth and development. The study identified the key performance indicators

(KPIs) in the banking industry that had the greatest impact on motivation, such as the volume of data requests handled daily and opportunities for professional advancement. The findings were presented using statistical analysis in tables and visuals, and although there were limitations such as a small sample size and reliance on self-reporting, the results could assist managers and banks in understanding the driving forces behind data professionals and improving their performance. This research contributes to the field of organizational behavior and can help organizations identify areas for improvement in employee engagement, performance assessment, and organizational culture by making data-driven decisions.

IX. Resüme

Andmete KPI – mõne teooria kohaselt peaksid KPI-d vastama SMART-kriteeriumidele (spetsiifiline, mõõdetav, saavutatav, realistlik, õigeaegne). Kuna analüütikud osalevad sageli suuremates projektides, on nende panus vähem mõõdetav; kuidas määrata analüütikutele motiveerivaid KPI-sid?

Võtmetulemusnäitajad (KPI-d) on olulised tegurid, mis mõjutavad analüütikute ja andmetöötlaste spetsialistide motivatsiooni. Käesoleva uurimistöö eesmärk on välja selgitada need KPI-d ning mõõta töötajate tulemuslikkust ning hinnata nende mõju tööle, isiklikule arengule ja töörahulolule, et kindlaks teha töötajate motivatsioonitasemed.

Magistritöö struktuur hõlmab sissejuhatust, metoodikat, tulemusi, arutelu ja järeldusi. Sissejuhatus tutvustab uurimistöö eesmärki ja rõhutab KPI-de olulisust andmeanalüüsi ja andmetöötlaste valdkonnas töötajate motivatsiooni mõjutamisel. Metoodika osas kirjeldatakse uurimistöö saavutamiseks kasutatud meetodeid, sealhulgas andmete kogumise meetodeid, valimi suurust ja analüüsi tööriistu.

Tulemuste osas esitatakse uurimuse olulisemad leiud ning tuuakse välja KPI-d, mis avaldavad suurimat mõju töötajate motivatsioonile andmeanalüüsi ja andmetöötlaste valdkonnas. Arutelu osas tõlgendatakse uurimustulemusi ja arutletakse nende organisatsioonidele pakutavate võimalike mõjude üle, kuidas need parandavad töötajate motivatsiooni ja tulemuslikkust andmeanalüüsi ja andmetöötlaste valdkonnas.

Järeldus võtab kokku töö tulemused ning arutab KPI-de tuvastamise ja nendega tegelemise tähtsust töötajate motivatsiooni mõjutamisel analüüsi valdkonnas. Samuti pakutakse välja täiendavaid uurimisteemasid, mis saaksid põhineda käesoleva uurimistöö tulemustel. Kokkuvõttes soovib käesolev uurimistöö aidata mõista, millised võtmetulemusnäitajad mõjutavad andmeanalüütikute ja andmetöötlaste spetsialistide motivatsiooni. KPI-de tuvastamisega soovitakse anda praktilist sisendit organisatsioonidele, kes soovivad maksimeerida oma töötajate tulemuslikkust ja produktiivsust.

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Data KPI – According to some theories KPIs should meet “SMART-criteria” (Specific, Measurable, Attainable, Realistic, Timely). As analysts are often part of bigger projects, their contribution is less measurable; how to set motivating KPIs for analysts?

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