MOVE
BEYOND

THERE IS NO FRAUD RISK MANAGEMENT PROGRAM WITHOUT A DATA ANALYTICS PROGRAM ANYMORE

TK Elevator – Internal Audit

July 25, 2024

AGENDA

01

Background:
KNIME @ TK Elevator

02

Fraud Risk
Management Program

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KNIME examples

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01 Background: KNIME @ TK Elevator

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03 KNIME examples

BACKGROUND: KNIME @ TKE INTERNAL AUDIT

Overview of the TKE Internal Audit department

Structure

- Included in the Group Function “Internal Controls & Audit”
- 19 FTEs located in seven different countries and four continents
- KNIME rolled-out by Internal Audit department

Current usage

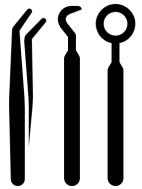
- KNIME used for both process automation and data analytics
- Data Analytics responsibilities within IT, Financial & Operational audit team
- Follow-up reporting as well as selected audit & advisory activities

Future usage

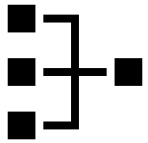
- Implementation of fraud risk management program which also requires a dedicated data analytics program
- Routines for fraud prevention and detection
- Working with extractors or clearly defined and customized data tables

BACKGROUND: KNIME @ TKE INTERNAL AUDIT

Pain points in the audit world



- A lot of manual work
  - The same checks done in Excel repeatedly
  - Human eyes can only cover a snapshot of data manually
  - **Requirement:** Automation of repetitive tasks

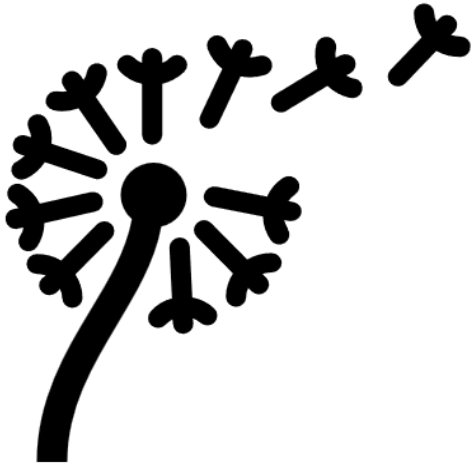


- Many data sources
  - Source of truth is not only in one system
  - Many different systems: Operational, financial, HR, etc.
  - **Requirement:** Consolidating data into one repetitive structure

- No tolerance for errors
  - Errors can lead to legal implications or wrong business decisions
  - A small human error in a spreadsheet can lead to completely different statements
  - **Requirement:** Workflows which apply the same logic to entire populations and samples

BACKGROUND: KNIME @ TKE INTERNAL AUDIT

Statements based on entire populations and not samples



Sample view

- “We selected a sample of ten projects closed within this fiscal year and compared it to the closing information of the pre-system. One out of the projects with a value of $2m was closed too early resulting in cut-off issues.”

Risk

- “They only look at the big projects.”
- Sampling focuses on a small selection of bigger projects which anyway are in focus of corporate stakeholders.

Population view

- “We reviewed all 100 projects totaling $20m and noted that 32 projects with a total value of $5m were closed too early resulting in cut-off issues.”

Remaining risk

- Data in pre-system is wrong.
- Thus, sampling is usually always required in the audit world – but based on concrete findings instead of random sampling.

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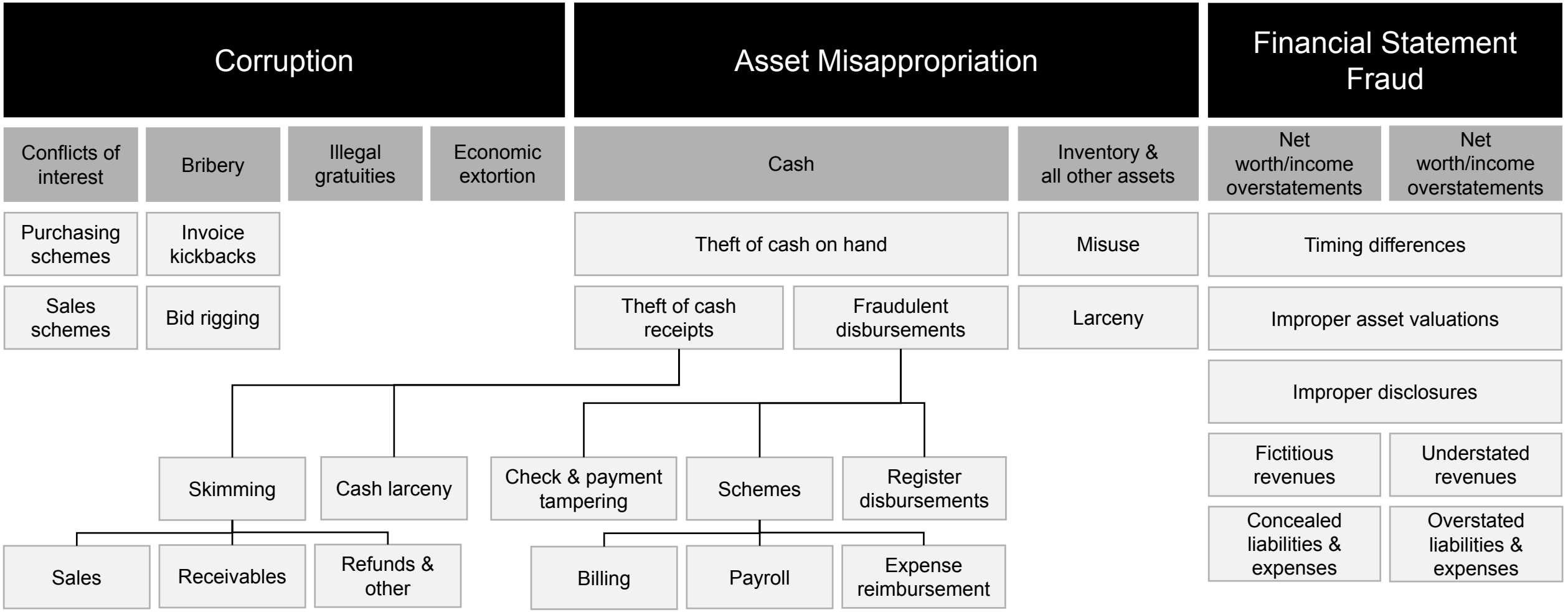
THE FRAUD TREE

What is fraud?



INTERNAL CONTROL FRAMEWORK & FRAUD RISK MANAGEMENT

COSO 2013 IC Framework & reference to fraud risk assessments

COSO		Fraud Risk Reference
Control Environment	1. The organization demonstrates a commitment to integrity and ethical values.	▪ COSO requires each of the 17 principles is present, functioning, and operating in an integrated manner to for an internal control system to be effective. ▪ COSO's principle 8 provides a reference to fraud risk assessments resulting in the fact that without a proper fraud risk assessment, an internal control system is not considered as effective. ▪ To establish a more comprehensive approach to manage fraud risk, the 2nd edition of the Fraud Risk Management Guide was published by COSO and ACFE comprising five Fraud Risk Management principles.
	2. The board of directors demonstrates independence from management and exercises oversight of the development and performance of internal control.	
	3. Management establishes, with board oversight, structures, reporting lines, and appropriate authorities and responsibilities in the pursuit of objectives.	
	4. The organization demonstrates a commitment to attract, develop & retain competent individuals in alignment with objectives.	
	5. The organization holds individuals accountable for their internal control responsibilities in the pursuit of objectives.	
Risk Assessment	6. The organization specifies objectives with sufficient clarity to enable the identification and assessment of risks relating to objectives.	
	7. The organization identifies risks to the achievement of its objectives across the entity and analyzes risks as a basis for determining how the risks should be managed.	
	8. The organization considers the potential for fraud in assessing risks to the achievement of objectives.	
	9. The organization identifies and assesses changes that could significantly impact the system of internal control.	
Control Activities	10. The organization selects and develops control activities that contribute to the mitigation of risks to the achievement of objectives to acceptable levels.	
	11. The organization selects and develops general control activities over technology to support the achievement of objectives.	
	12. The organization deploys control activities through policies that establish what is expected and procedures that put policies into action.	
Information & Communication	13. The organization obtains or generates and uses relevant, quality information to support the functioning of other components of internal control.	
	14. The organization internally communicates information, including objectives and responsibilities for internal control, necessary to support the functioning of internal control.	
	15. The organization communicates with external parties regarding matters affecting the functioning of other components of internal control.	
Monitoring Activities	16. The organization selects, develops, and performs ongoing and/or separate evaluations to ascertain whether the components of internal control are present and functioning.	
	17. The organization evaluates and communicates internal control deficiencies in a timely manner to those parties responsible for taking corrective action, including senior management and the board of directors, as appropriate.	

INTERNAL CONTROL FRAMEWORK & FRAUD RISK MANAGEMENT

Mapping of COSO 2013 IC Framework & Fraud Risk Management Principles

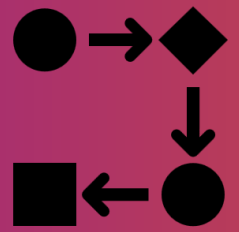
COSO	Fraud Risk Management Principles
Control Environment	1. The organization establishes and communicates a Fraud Risk Management Program that demonstrates the expectations of the board of directors and senior management and their commitment to high integrity and ethical values regarding managing fraud risk.
Risk Assessment	2. The organization performs comprehensive fraud risk assessments to identify specific fraud schemes and risks, assess their likelihood and significance, evaluate existing fraud control activities, and implement actions to mitigate residual fraud risks.
Control Activities	3. The organization selects, develops, and deploys preventive and detective fraud control activities to mitigate the risk of fraud events occurring or not being detected in a timely manner.
Information & Communication	4. The organization establishes a communication process to obtain information about potential fraud and deploys a coordinated approach to investigation and corrective action to address fraud appropriately and in a timely manner.
Monitoring Activities	5. The organization selects, develops, and performs ongoing evaluations to ascertain whether each of the five principles of fraud risk management is present and functioning and communicates Fraud Risk Management Program deficiencies in a timely manner to parties responsible for taking corrective action, including senior management and the board of directors.

Implementation approaches	
1	▪ The organization can use the Guide's second principle on a stand-alone basis to be compliant with the COSO IC Framework. ▪ Fraud risk assessment process would be overlaid on existing ICS by periodically assessing fraud vulnerabilities in internal control system.
2	▪ The organization also manages fraud risks as part of a broader Fraud Risk Management Program considering all principles. ▪ Implementation of all principles will ensure consistency and compliance with the overall COSO 2013 IC Framework.

DATA ANALYTICS & FRAUD RISK MANAGEMENT

Increasing power of data analytics in managing fraud risks

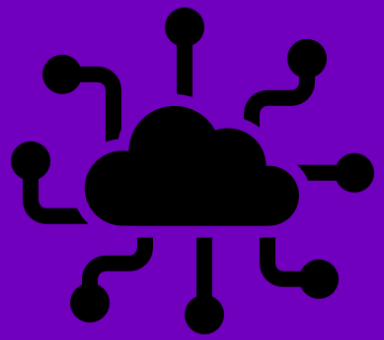
DATA ANALYTICS CAPABILITIES



SUPPORT OF FRAUD RISK MANAGEMENT

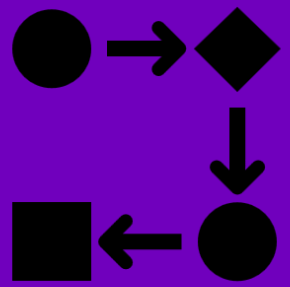
DATA ANALYTICS TECHNIQUES

BUILDING A SUSTAINABLE DATA ANALYTICS CAPABILITY



1. Commitment to the integration of data analytics
2. Consideration of need for staffing (e.g. skills, number)
3. Assignment of roles & responsibilities with objectives
4. Specified technology (software & hardware)
5. Direct link to fraud management
6. Sponsorship & oversight from management
7. Objectives, goals, strategies & measures (OGSM)

DATA ANALYTICS TO SUPPORT FRAUD RISK MANAGEMENT



Analytics Design

- Identify risks based on industry & company knowledge
- Map risks to appropriate data sources and assess availability
- Develop work plan and define analytics & procedures
- Define engagement timeline and deliverables

Data Collection

- Work with IT personnel to map identified tests to relevant data sources
- Assess data integrity and completeness
- Extract, transform, normalize, and load data into the analytics platform
- Validate that data has been loaded completely and accurately

Data Organization & Calculations

- Execute on the analytics work plan and conduct necessary mathematical procedures
- Modify analytics as appropriate based on data received, data quality, and user feedback
- Consider integrating advanced analytics procedures such as text mining or pattern analysis

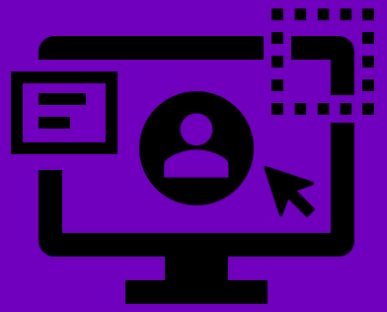
Data Analysis

- Evaluate initial analytics results
- If possible, develop scoring model and prioritize transactions or entities based on multiple risk attributes
- Tune the model as needed to refine results for relevancy

Findings, Observations & Remediation

- Request supporting documents and/or validate as available
- Determine sample selections or triage or escalation procedures
- Develop remediation and/or investigative plan
- Escalate findings as appropriate and track dispositions

DATA ANALYTICS TECHNIQUES



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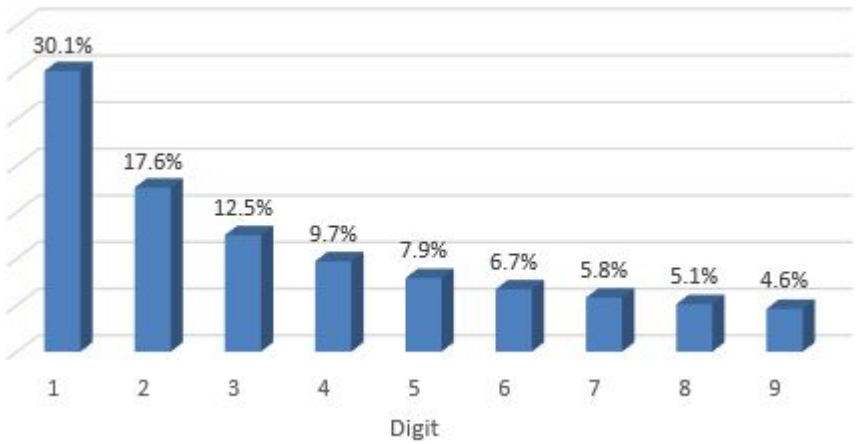
FRAUD PREVENTION & DETECTION USE CASE

BENFORD'S LAW

- Benford's Law, also known as the First-Digit Law, is a statistical phenomenon that not only governs the distribution of leading digits but extends its influence on the distribution of first two digits in many real-world datasets
- Named after physicist Frank Benford, who observed it in 1881, the law states that in naturally occurring datasets, the probability of the first digit and first two digits is not uniformly distributed.
- Instead of an equal distribution, the law dictates that smaller digits are more likely to appear as the leading digit. Specifically, the probability P(d) is given by the logarithmic formula:

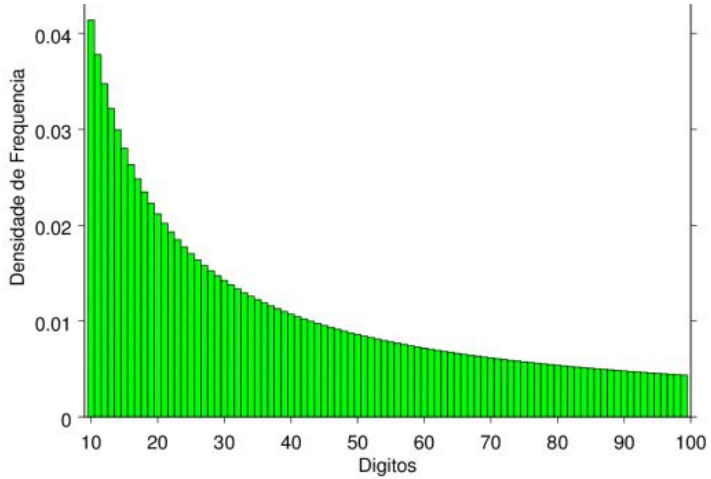
First Digit

$$P(D = d) = \log\left(1 + \frac{1}{d}\right), d = \{1,2,3,\dots,9\}$$



First 2 Digits

$$P(D_1D_2 = d_1d_2) = log\left(1 + \frac{1}{d_1d_2}\right), d_1d_2 \in \{10,11,12,\dots 99\}$$



BENFORD'S LAW – STATISTICAL TESTS APPLIED

Objective: measure whether the deviation represents a statistical nonconformity with this law or not. Followed by a financial relevance.

- Z Test: aims to identify whether the difference between the actual proportion of a digit concerning the expected distribution of Benford's Law is statistically significant, given a specific level of significance. A significance level of 5% was adopted, which corresponds to a Z-score limit of 1.96

$$Z = \frac{|PR\text{-}PE| - \left(\frac{1}{2n}\right)}{\sqrt{\frac{PE\ (1\text{-}PE)}{n}}}$$

SIGNIFICÂNCIA ESTATÍSTICA	LIMIAR DO TESTE Z
0,01	2,57
0,05	1,96
0,10	1,64

- Qui-Square Test: aims to verify whether the digits of a distribution as a whole conform to Benford's Law.

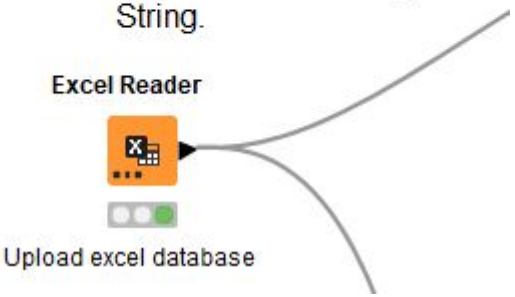
$$QQ = \sum_{i=1}^{K} \frac{(CR\text{-}CE)^2}{CE}$$

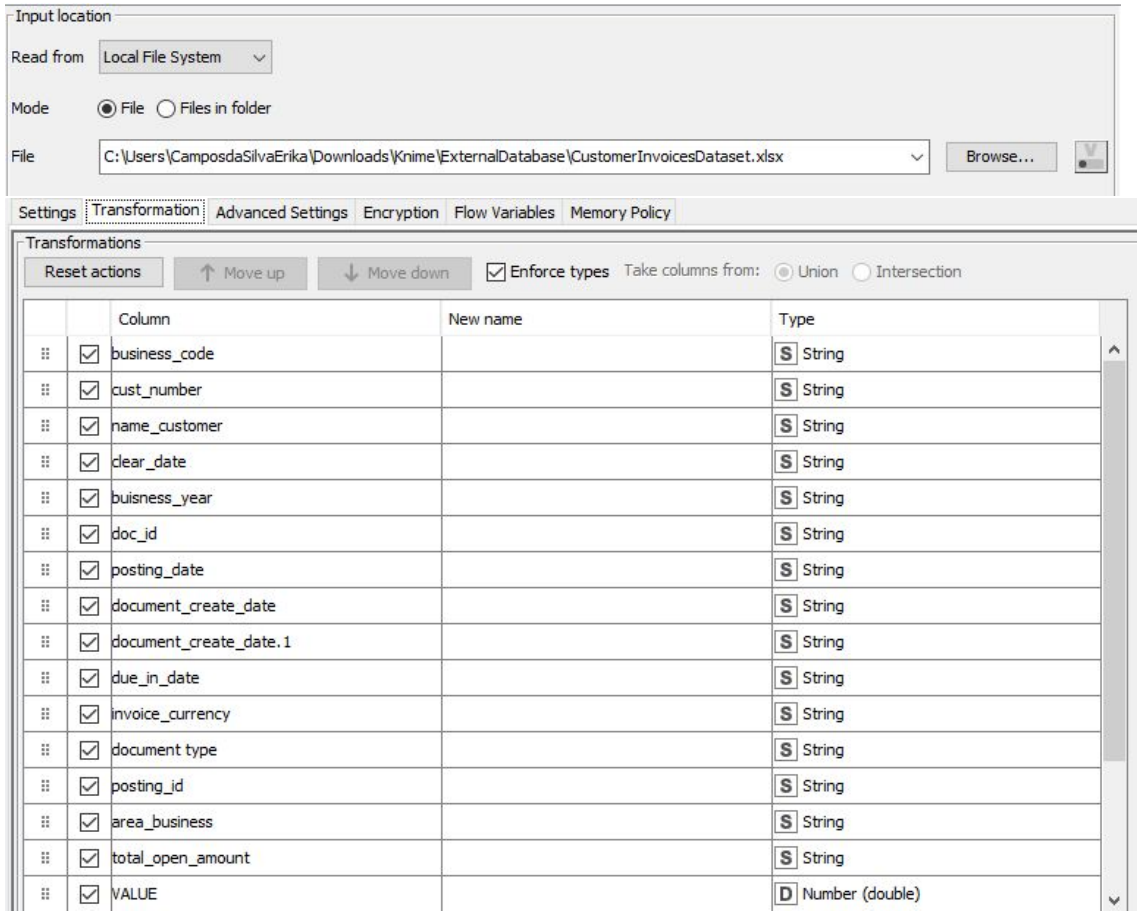
SIGNIFICÂNCIA ESTATÍSTICA	LIMIARES - TESTE DO PRIMEIRO DÍGITO	LIMIARES - TESTE DOS DOIS PRIMEIROS DÍGITOS
0,01	20,090	122,942
0,05	15,507	112,022
0,10	13,362	106,469

CONFIGURING KNIME FOR BENFORD'S LAW ANALYSIS

1. Data Import: import relevant datasets.

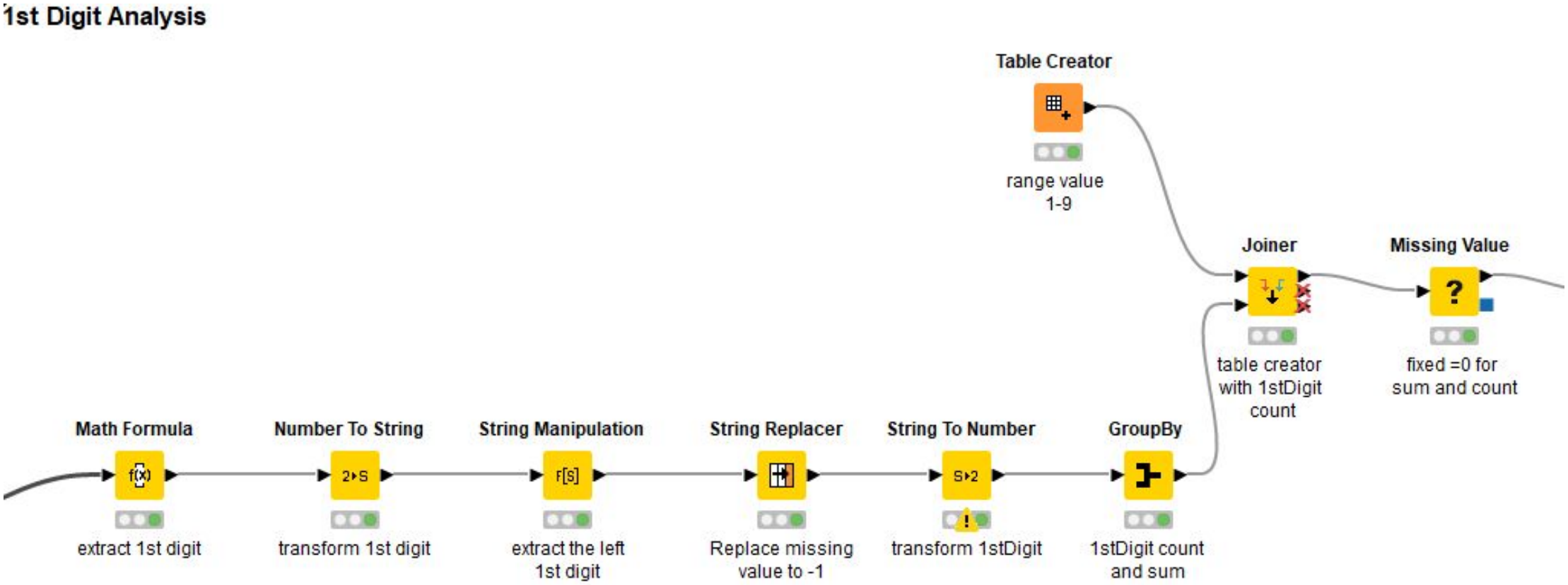
1- Before upload the database rename the column of amounts to be tested to "VALUE", check if the whole column is only numbers.
2- After upload to Knime, open the node and in the tab "Transformation", select the columns needed and check if the column "VALUE" is with type Double and all other columns with type String.





CONFIGURING KNIME FOR BENFORD'S LAW ANALYSIS

2. Data Preprocessing: Perform the necessary cleaning and preparation to ensure analysis quality.



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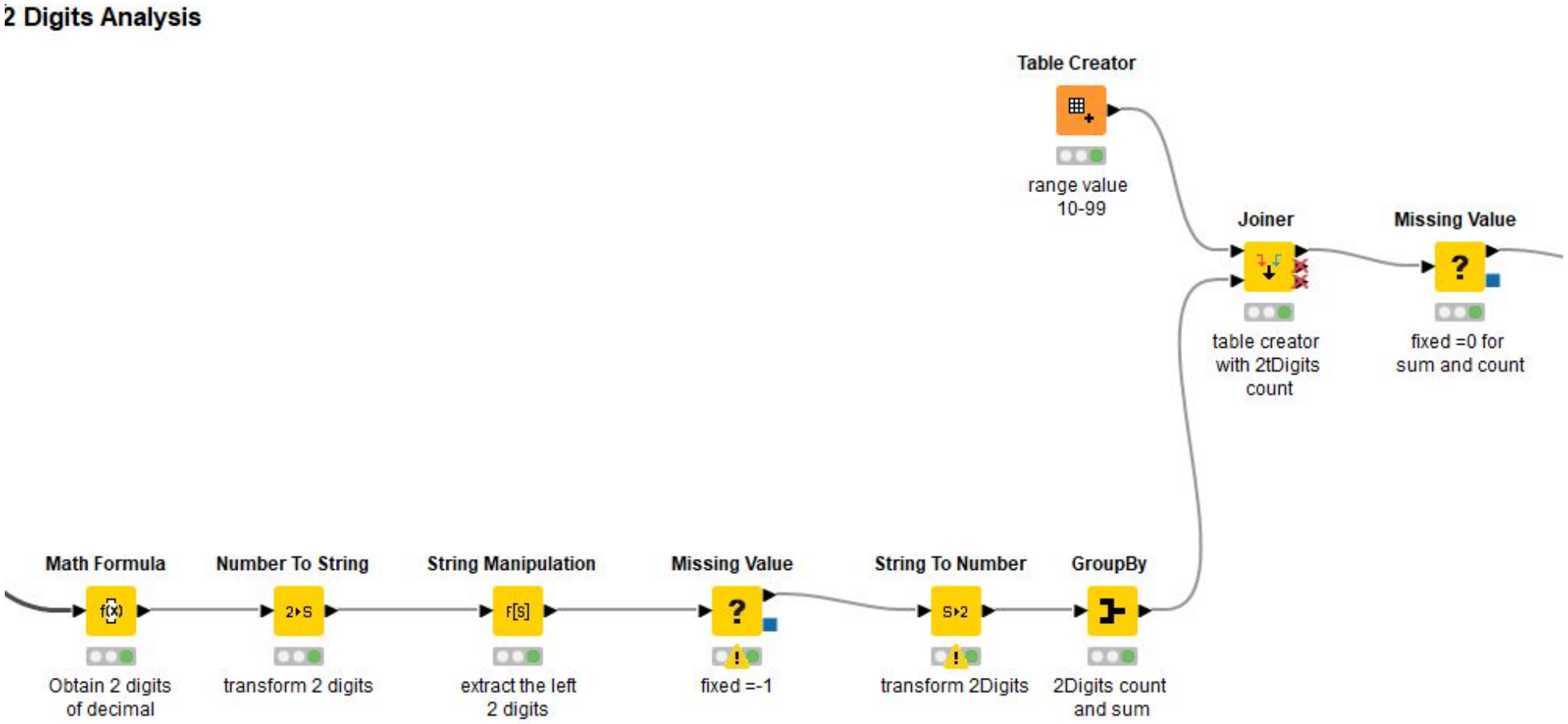
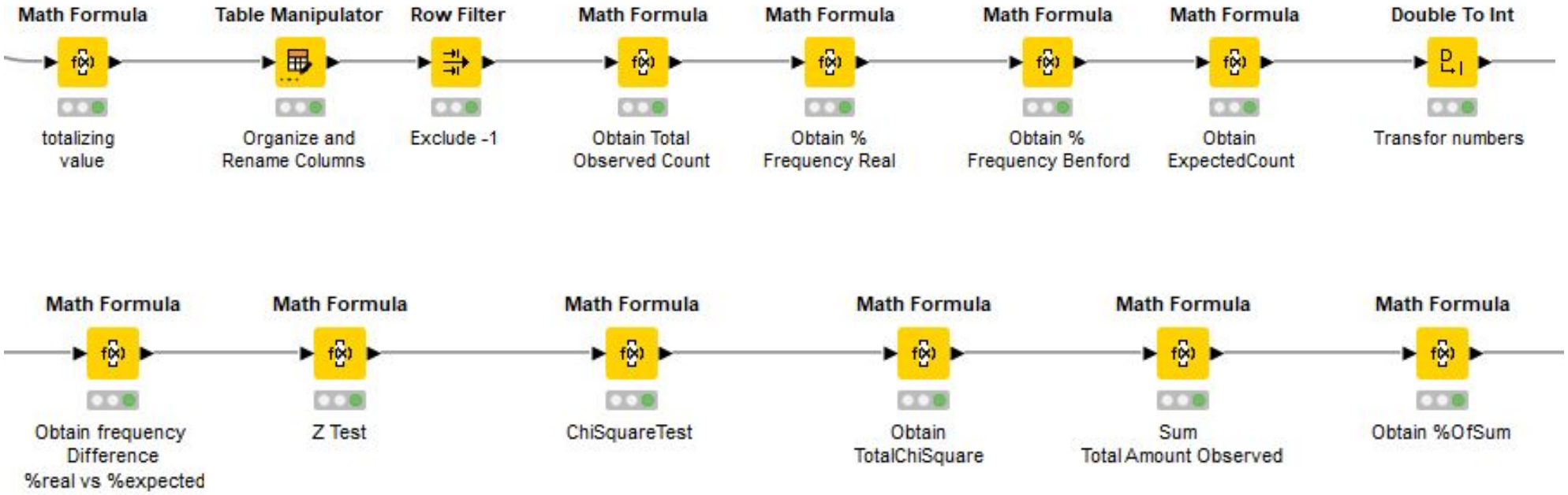


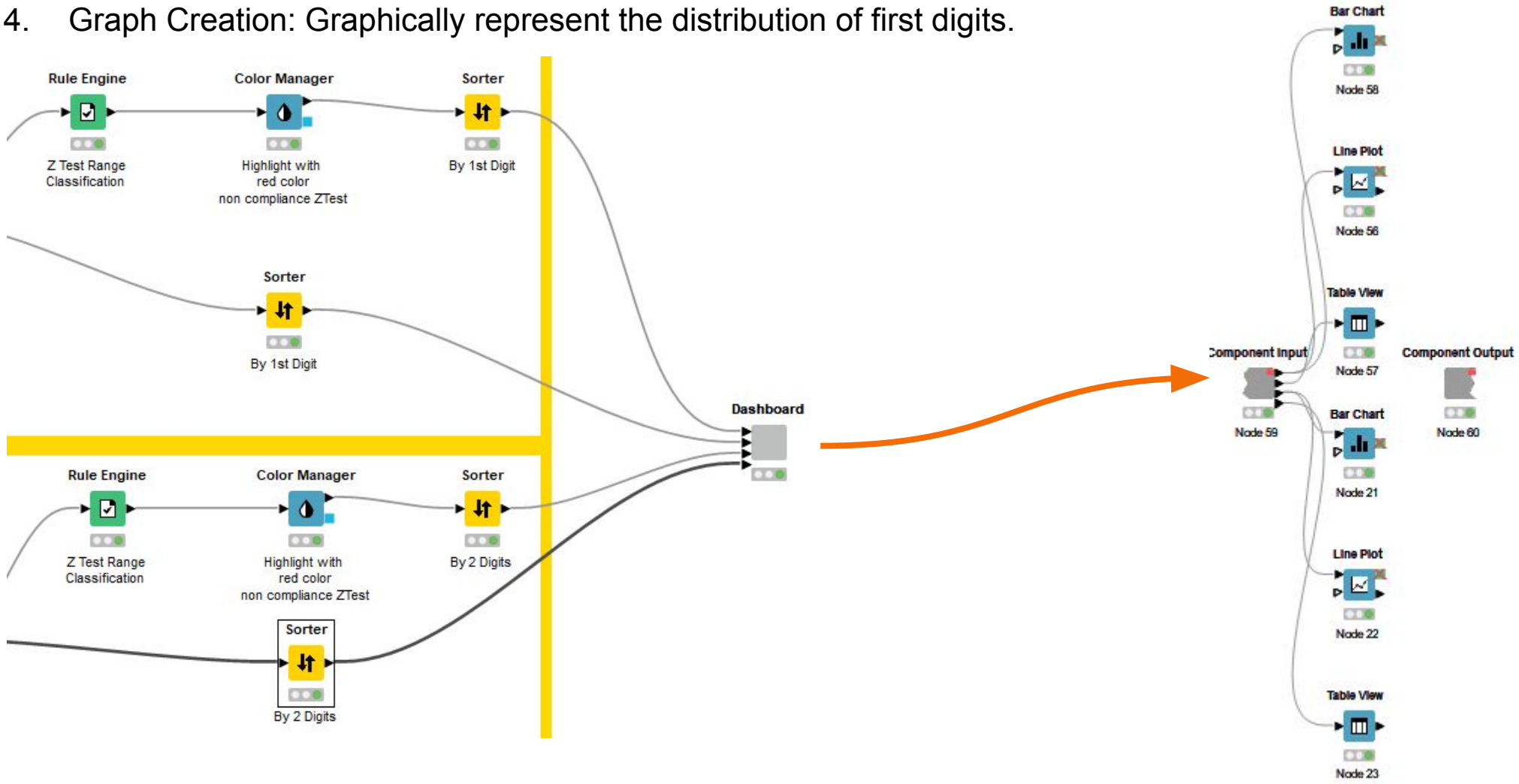
CONFIGURING KNIME FOR BENFORD'S LAW ANALYSIS

3. Math calculation: Perform math and statistical calculation



CONFIGURING KNIME FOR BENFORD'S LAW ANALYSIS

4. Graph Creation: Graphically represent the distribution of first digits.



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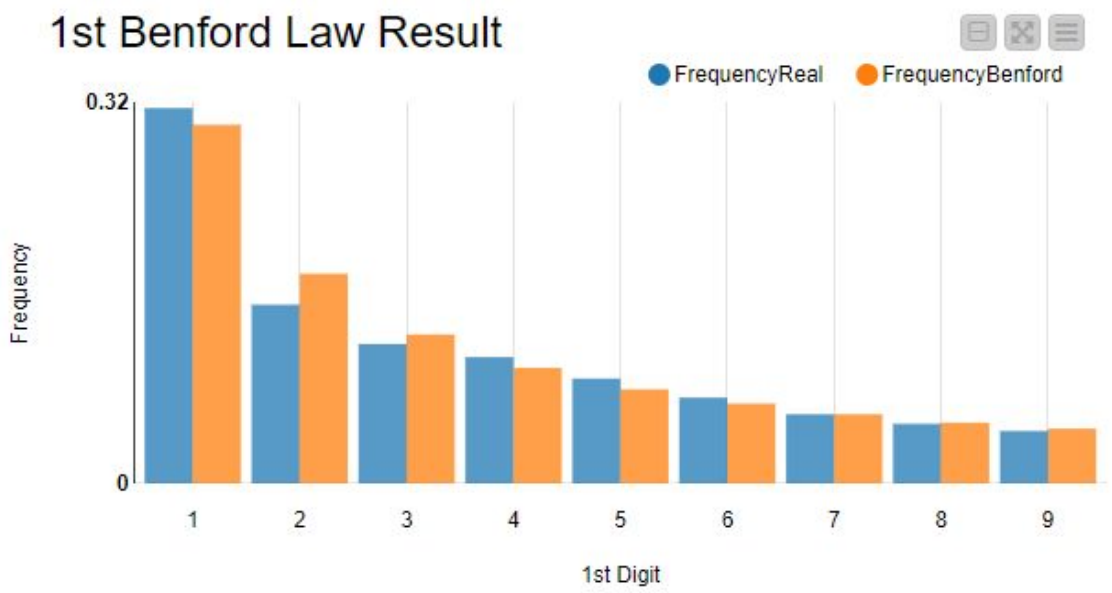

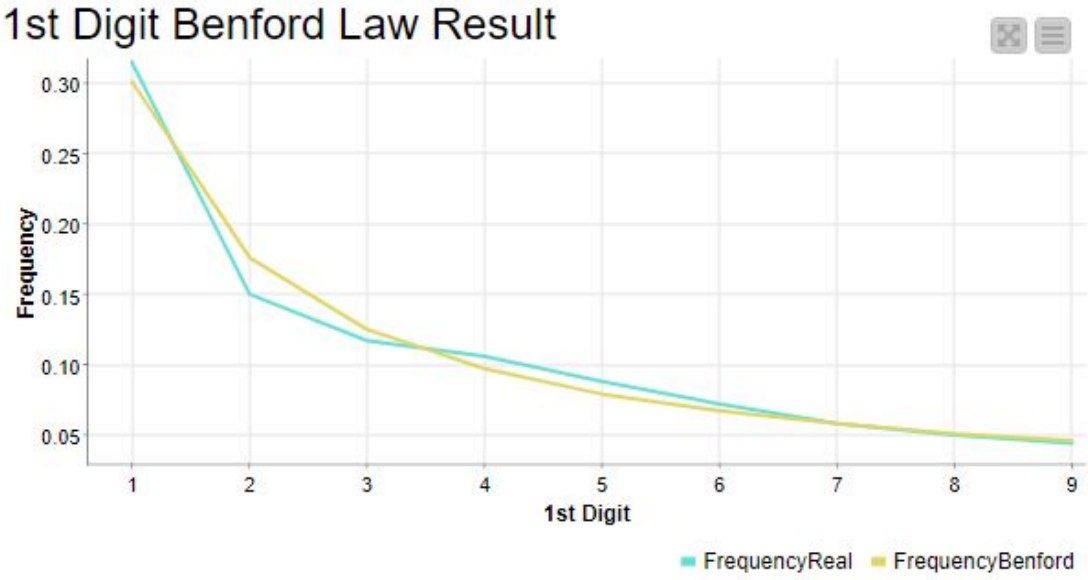

1st Digit Summary Table

RowID	1stDigit	ObservedCount	ExpectedCount	FrequencyReal	FrequencyBenford	Diferrence	ZTest	ChiSquareTest	%OfSum
Row0	1	15728	15049	0.315	0.301	0.014	6.82	30.636	32.652
Row1	2	7489	8800	0.15	0.176	-0.026	15.26	195.309	10.417

CONFIGURING KNIME FOR BENFORD'S LAW ANALYSIS

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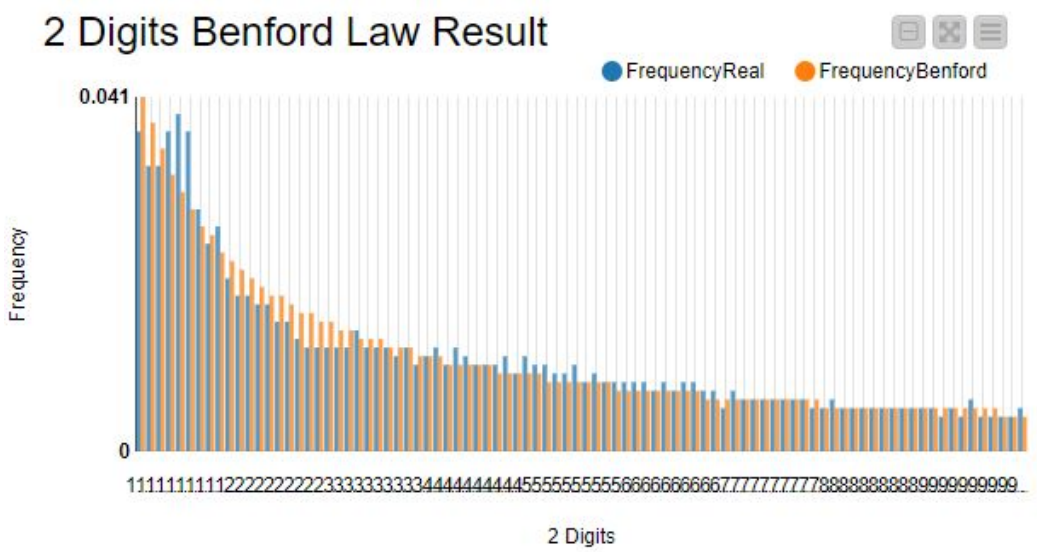
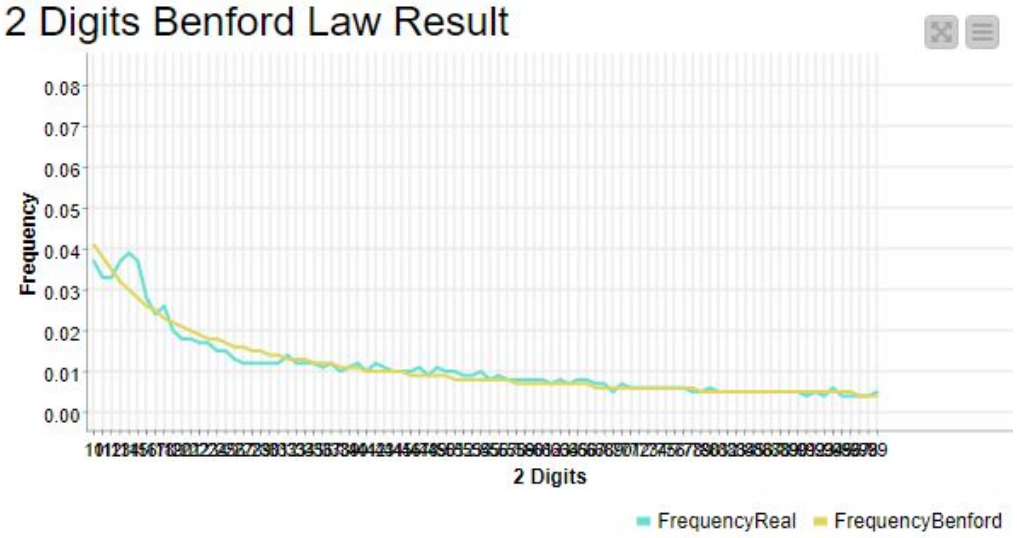




2 Digits Summary Table

Show 10 entries

RowID	2Digits	ObservedCount	ExpectedCount	FrequencyReal	FrequencyBenford	Diferrence	ZTest	ChiSquareTest	%OfSum
Row0	10	1871	2049	0.037	0.041	-0.004	4.499	15.463	0.05
Row1	11	1660	1899	0.033	0.038	-0.005	5.835	30.08	0.048
Row2	12	1651	1749	0.033	0.035	-0.002	2.421	5.491	0.043

BENEFITS AND SIGNIFICANCE FOR COMPANY

- Fraud Detection: detect anomalies and potential fraud in datasets
- Data Validation: validate the integrity of datasets. It helps identify errors, inconsistencies, or potential inaccuracies in numerical data, ensuring the overall quality and reliability of information.
- Early Warning System: analysts can establish an early warning system for potential issues in financial reporting, tax filings, or any dataset where numerical patterns are expected
- Audit Efficiency: streamline the process by highlighting areas of interest. Auditors can focus their attention on data subsets that deviate from the expected distribution, improving the efficiency of the audit process.
- Preventive Measures: can be used as a preventive measure, helping organizations and authorities take corrective actions before issues escalate.

Time savings up to 1h per use case while one audit can have several areas where this workflow can be used

SOME LIMITATIONS

- Not necessarily work for services with payer-fixed prices. E.g.: Rental expenses

- Commonly used statistical tests exhibited heightened mathematical sensitivity when applied to extensive databases (more than 25,000 records). This suggests caution in their interpretation involving large datasets. The same caution must be applied for small datasets

SUPPLIER FRAUD RISKS / COST OPTIMIZATION

COMBINING COST OPTIMIZATION & FRAUD PREVENTION/DETECTION

Use case

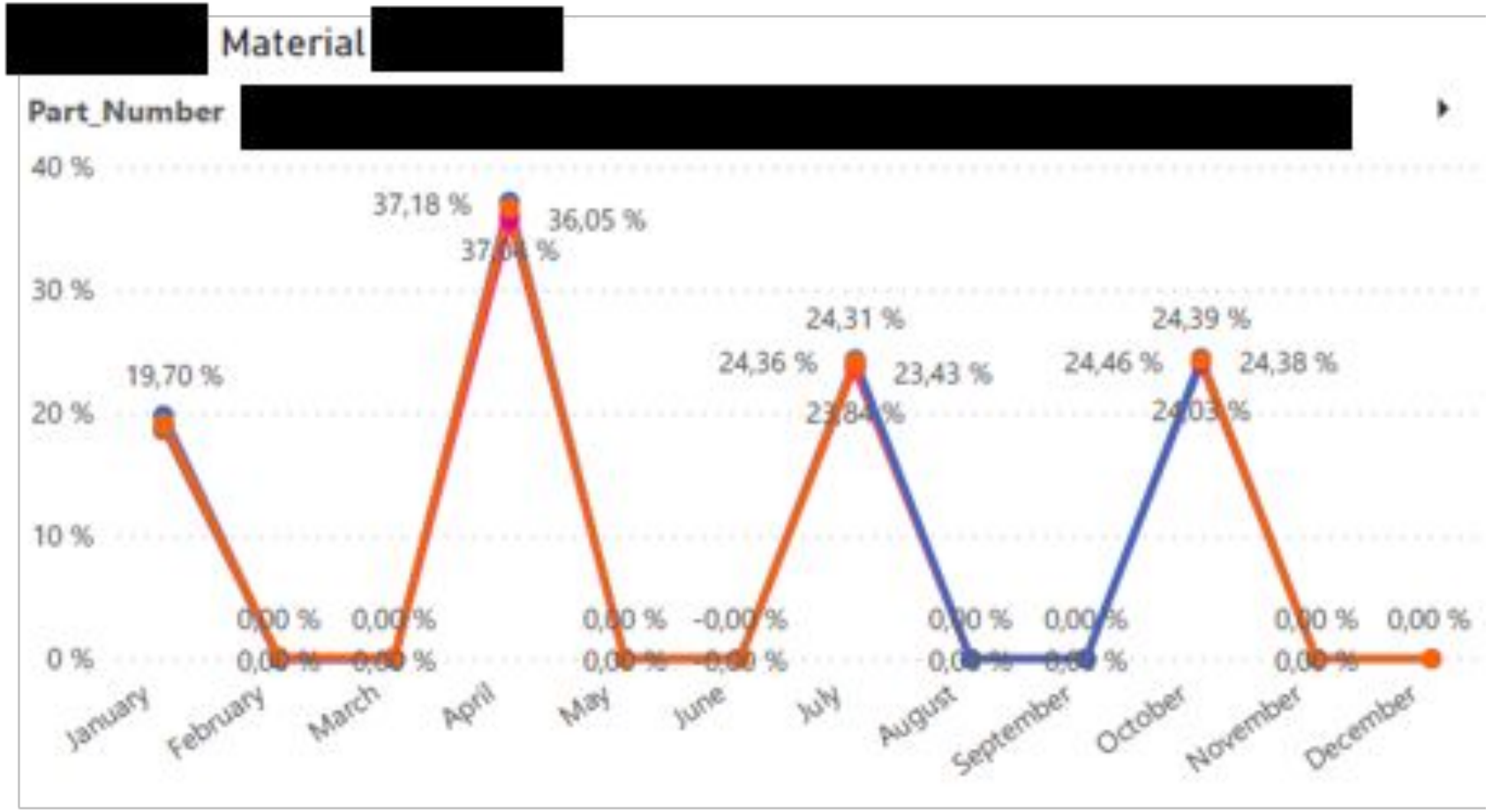
- Management requested us to review the material price development in a specific region due to high increases.
- The request aimed at improving prices with suppliers and identify potentials in terms of savings.
- Since such a price development can also be driven by fraudulent activities (e.g. conflicts of interests), we considered this use case to be both process and fraud detection driven.

Why KNIME?

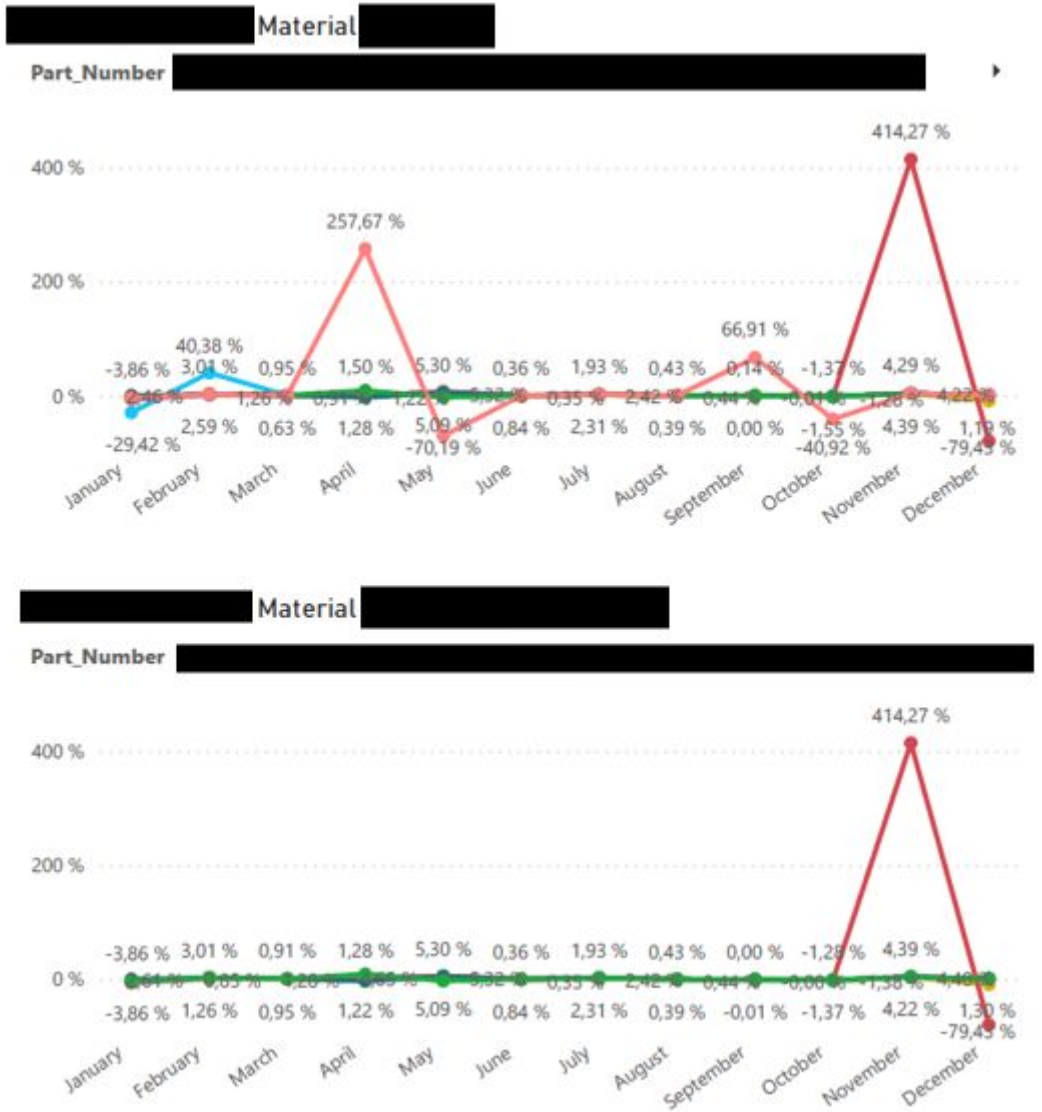
- System of the company in scope is not a standard system and does not provide the opportunity to extract customized reports.
- Extracted data is not standardized (e.g. dates are in different formats).
- Very high number of line items and different materials as well as parts.
- Room for manual errors

Overpayments of seven-digit amounts can be identified due to the high material spend

PRICE DEVELOPMENT ANALYSIS – AS EXPECTED



PRICE DEVELOPMENT ANALYSIS – RED FLAGS



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