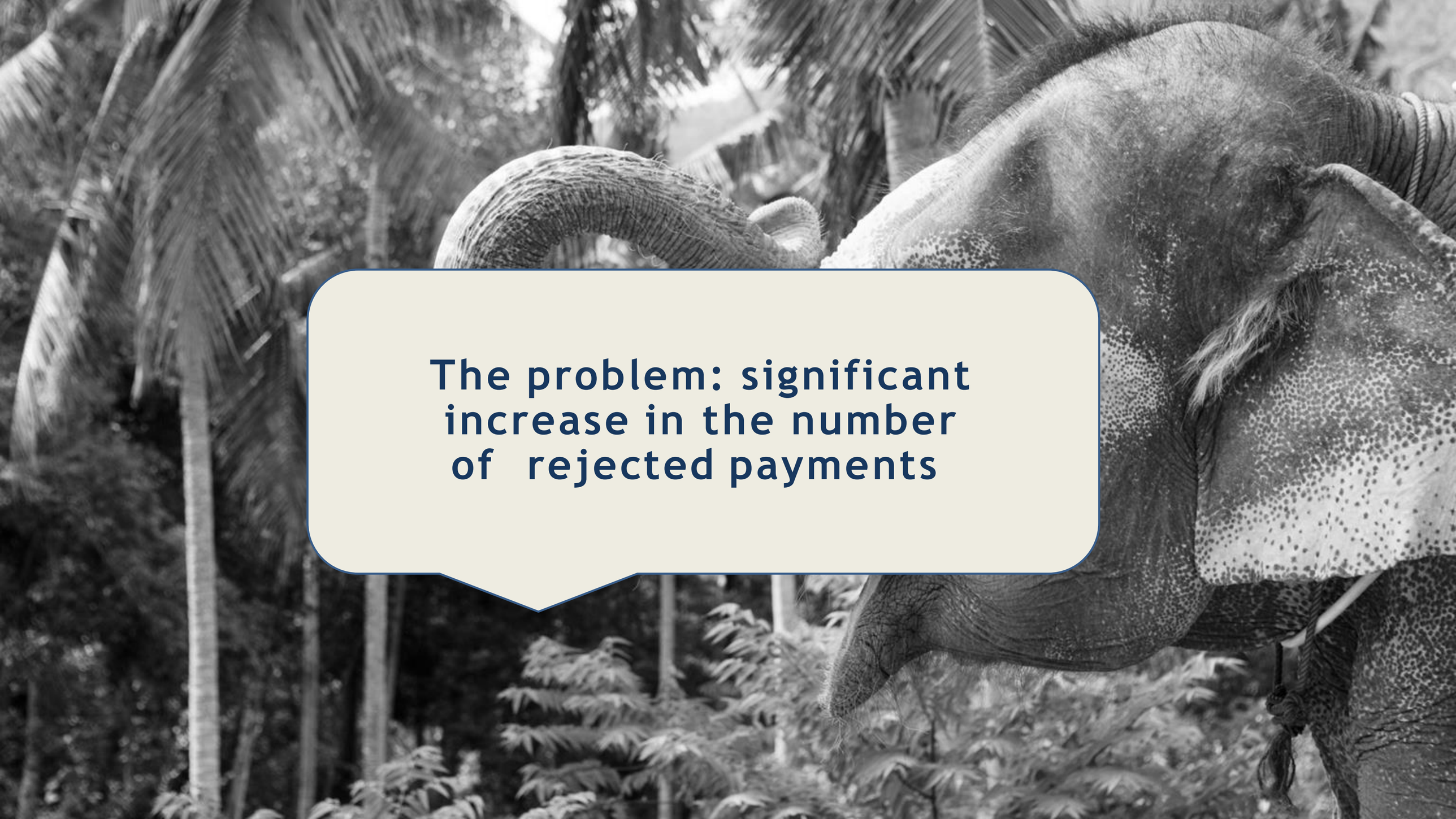
Case Study's Objectives

Data This study examines the recent problems in the Clearing Process that were pointed out by the company "My Favorite Taxi Company ".

Focus It aims to investigate the scale, impact as well as possible reasons that may cause the problem. In the further part, the case focuses on estimating the raw data in order to apply basic predictions that can be used to have an insight into product development.

Structure The case consists of 3 main parts:

1. Quantifying the problem of Clearing Errors occurring recently
2. Estimating and predicting the rates in order to improve the performance among competitors
3. Elements that are important to achieve operational scalability



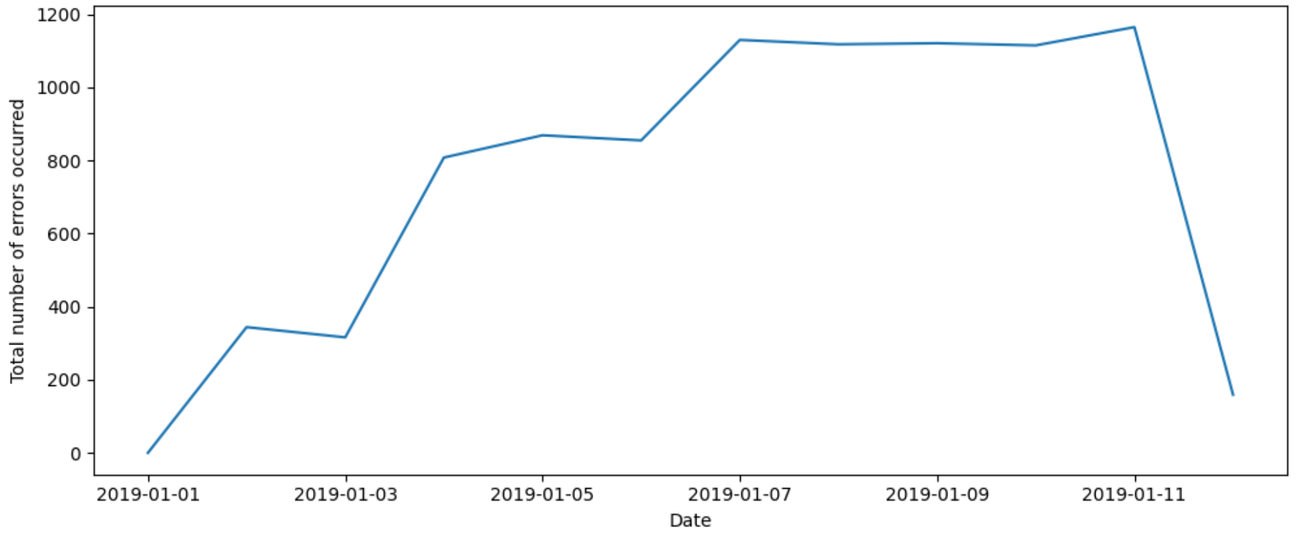
The problem: significant increase in the number of rejected payments

Introduction to the data and problem

Issue: Because of the recent failures of the clearing process, the taxi company does not receive the money that should be paid for a service performed a few days ago.

Info: We are in possession of the data concerning
- authorization dates - transaction amounts - card providers and their products used by NaTC clients - usage of security codes

Total number of error occured in the last days



5 WHYS?

Initial intuitions and factors that may possibly influence the number of errors in the clearing process

1. **Types of Errors**
2. **Use of 3D Security code**

   does the extra layer of security make Clearing process harder?
3. **The card provider**

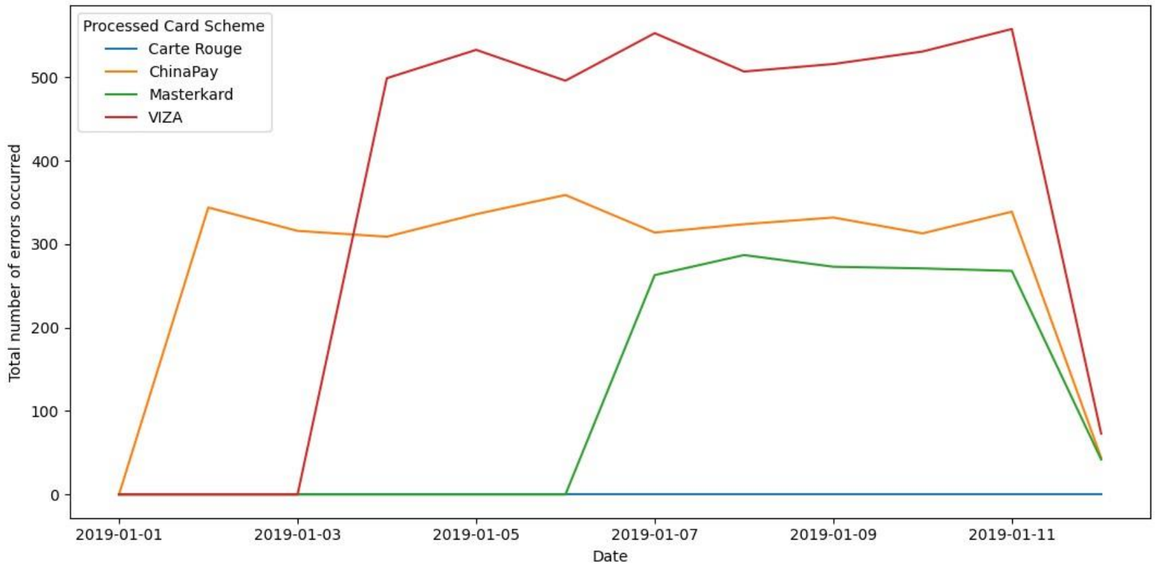
   does the particular card provider Rich Elephant Company work with face the error more often than the others? why?
4. **Product Type**

is a particular product (payment method) more prone to fail the clearing process?
5. **Transaction amount**

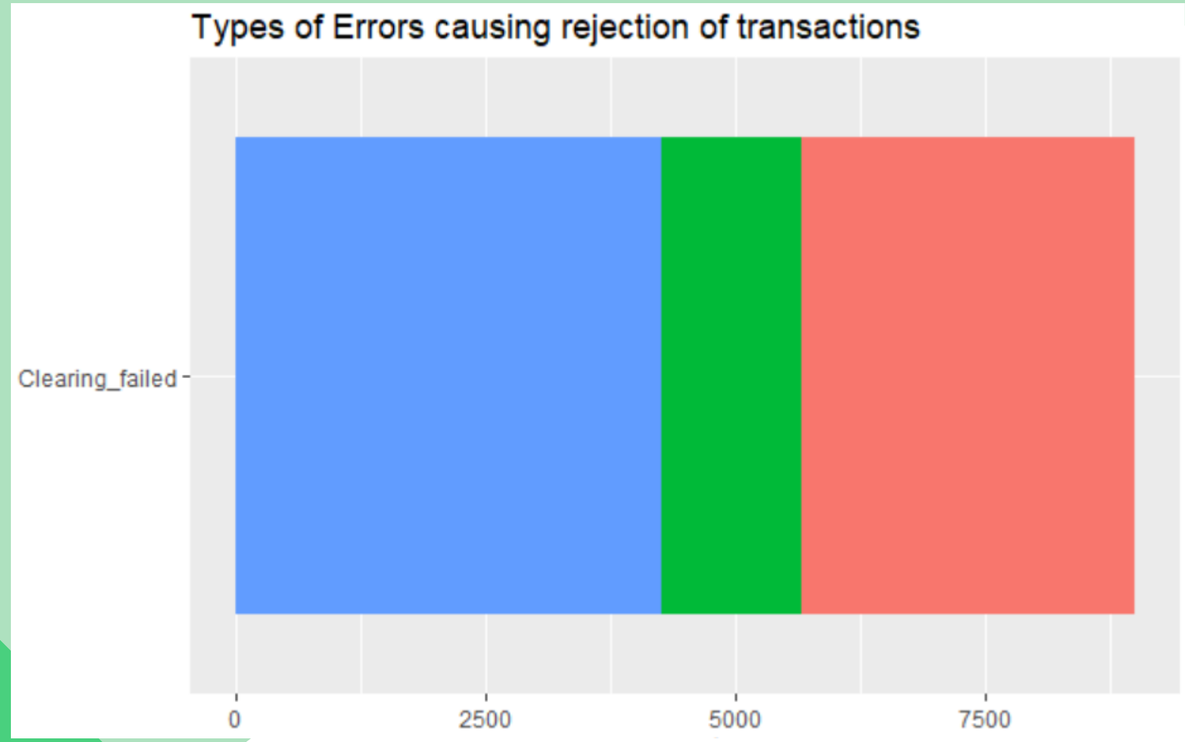
   does the amount of money transferred influence the Clearing, ex. more money → more frequent clearing issues?

Total amount of rejected transactions per Card Provider in Time

- VIZA Cards face a significantly larger amount of rejections than the other Card Providers
  - Is there a certain VISA product that is more prone to fail the clearing process?
- According to the data payments provided Carte Rouge products do not cause the Clearing Failures
- Masterkard payments commenced facing some failures in clearing only after first 6 days of January
- All rejections noticably decrease in the second week of January



Ratio of types of errors among all the rejections

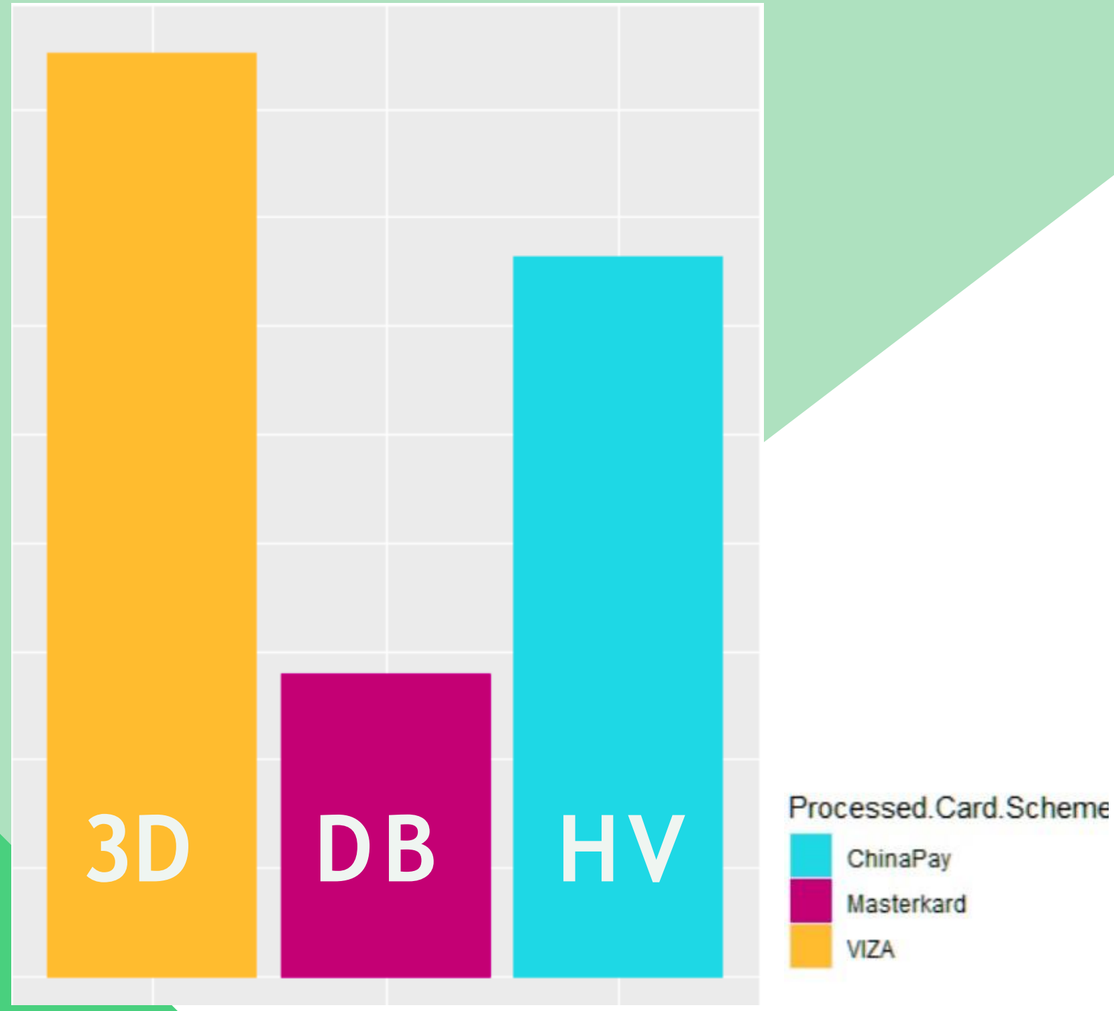


Too high value for card scheme

Impossible to process dual brand for card product

Processing secure 3D transaction was not enrolled but used

Investigating the source of errors

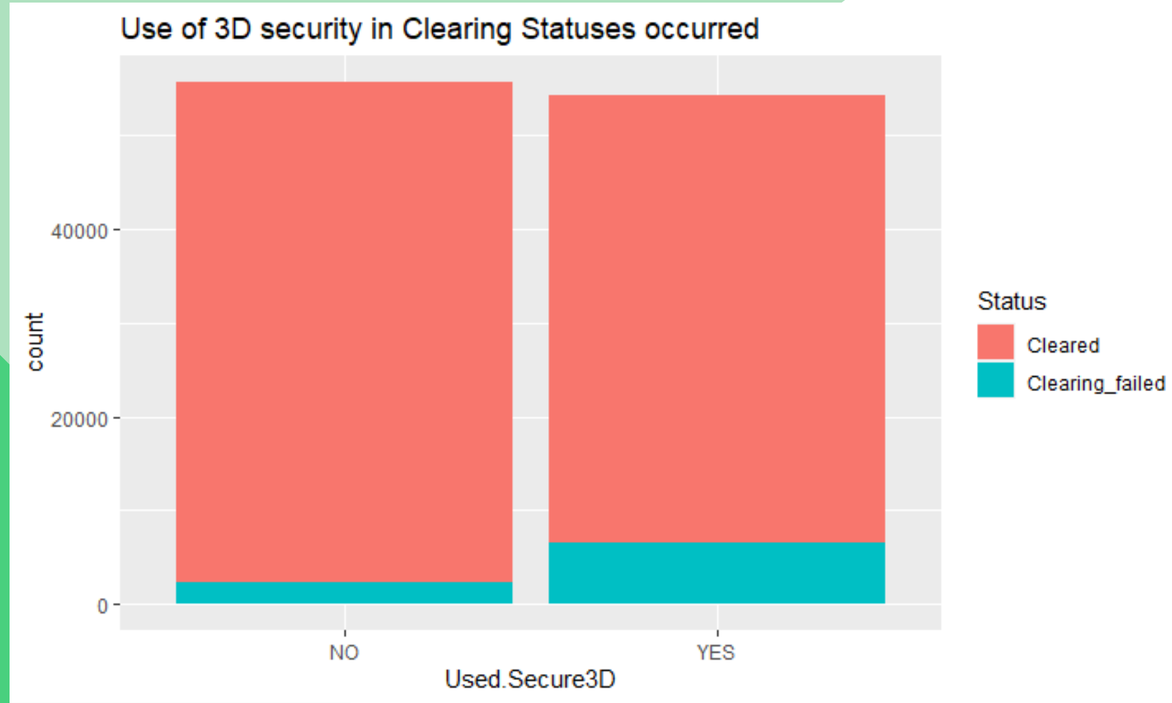


Certain Errors occur explicitly for certain card providers

- (**DB**) Impossible to process dual brand for card product occurs only for **Masterkard** when paying with **Mastro**
- **(HV)** Too high value for card scheme only occured in **ChinaPay** transactions: **all** the products
- (**3D**) Processing secure 3D transaction was not enrolled but used is an error faced only by VIZA users: **all products**

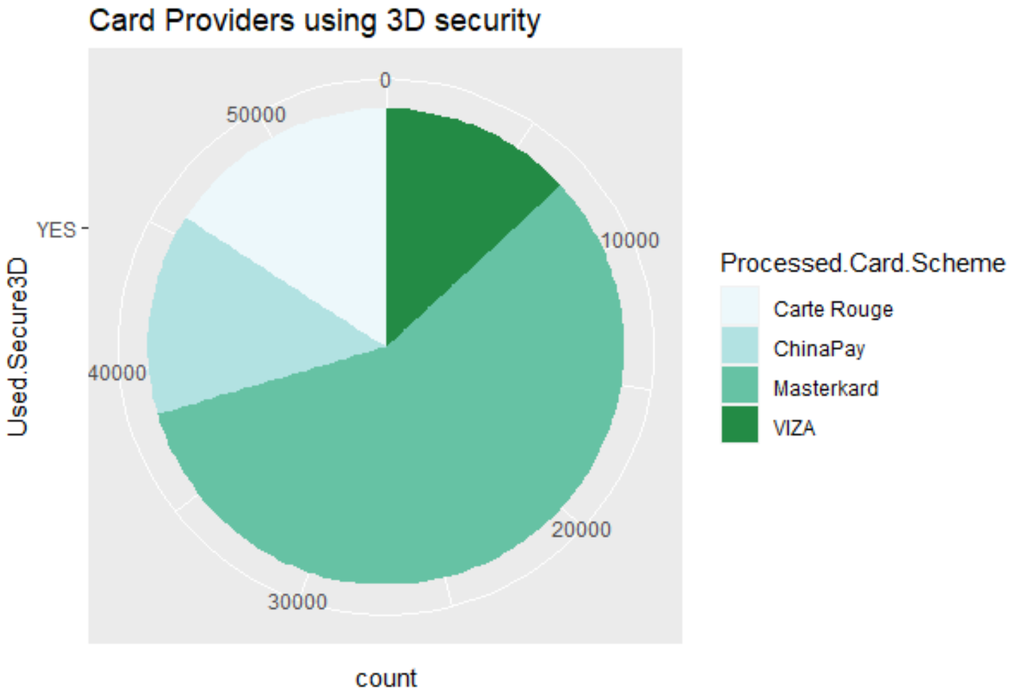
Role of 3D code in clearing status

- Number of Failed and Cleared Statuses grouped by the payments using/not using 3D security code
- Approx. 50% of payments go through 3D security
- Generally the use of 3D Security does not depend on the transaction amount (plot2)
- Noticable larger amount of rejected transactions among the ones using 3D code compared to ones that don't use it

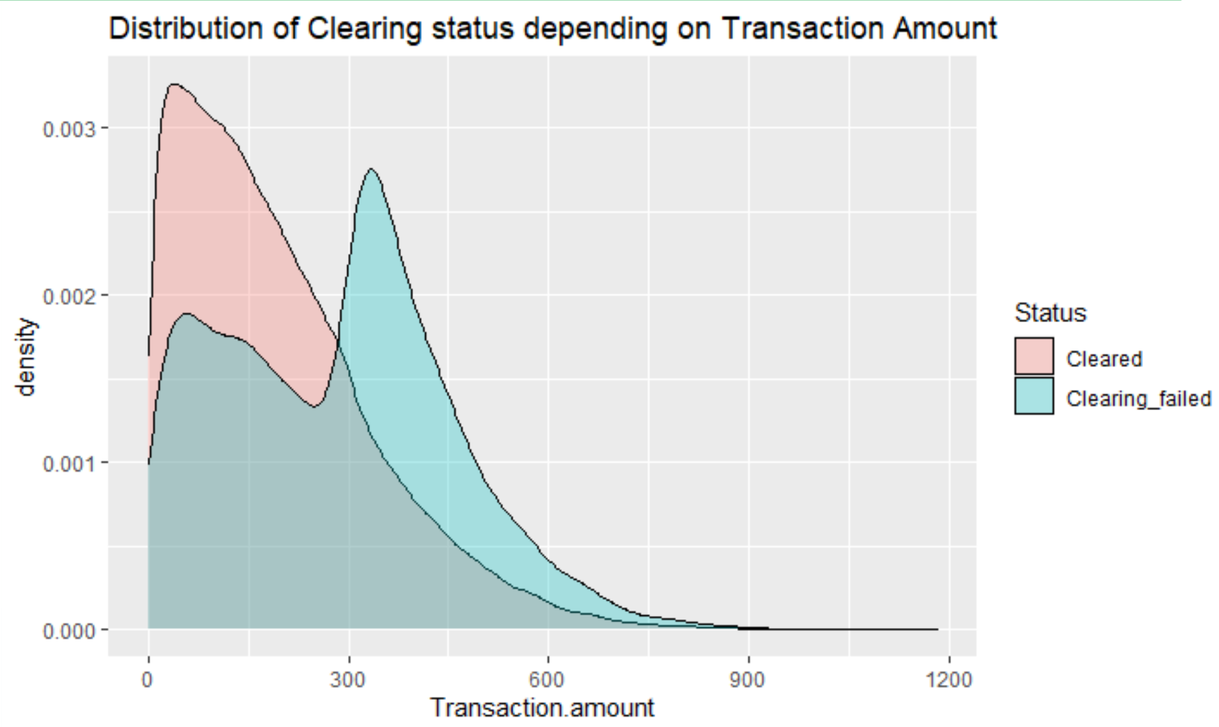


Use of 3D Security Code among different Card Providers

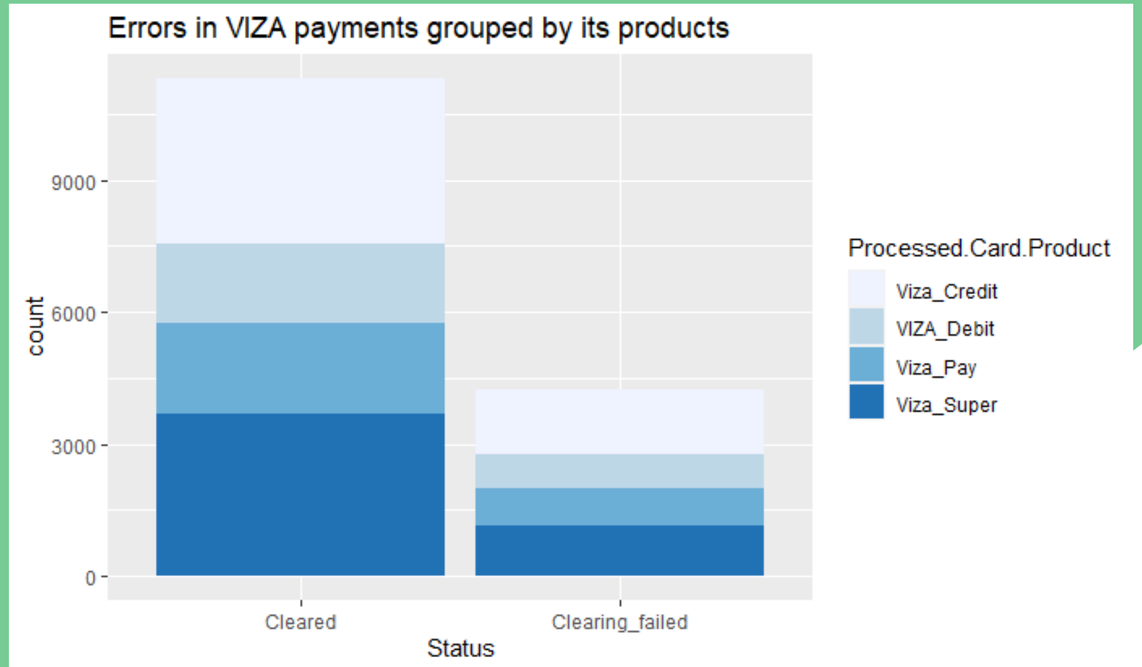
- 54% of the payments using 3D Code are done by using cards provided by Masterkard
- The rest of the 3D payments is fairly evenly distributed among VIZA, Carte Rouge and China Pay (each aprox. 15%)
- Insight: Masterkard transactions donot result in higher number of rejected transactions, hence we can suspect 3D securtiy code is not generating an issue itself

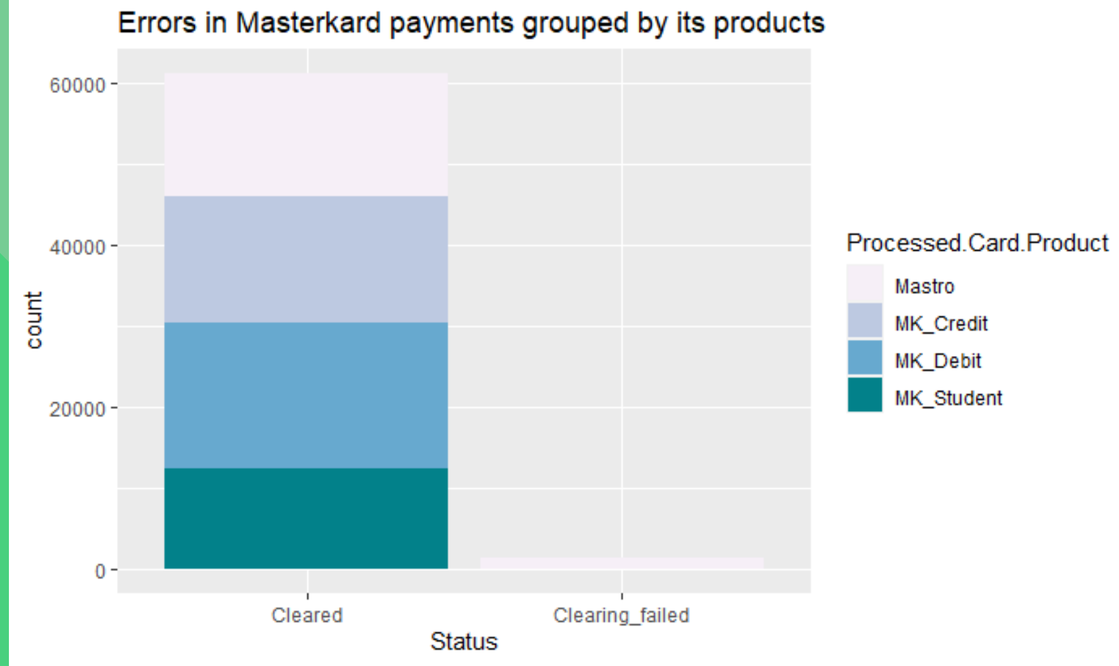


Transaction amount in relation with clearing status



- Density function of Cleared (Successful) transaction reaches its peak for transactions that concern smaller amount of money (from 0 to 300 euros)
- Noticeable decrease in Cleared Transactions that are higher than 300 euros
- Significant increase in the probability of rejecting the transactions that are approx. 300 euros - 500 euros





- There does not seem to be a correlation between any particualr VISA product with the frequemcy of rejections?
- Similary to above, ChinaPay products are equally prone to clearing errors
- Masterkard failed payments happen only when using Mastro Card
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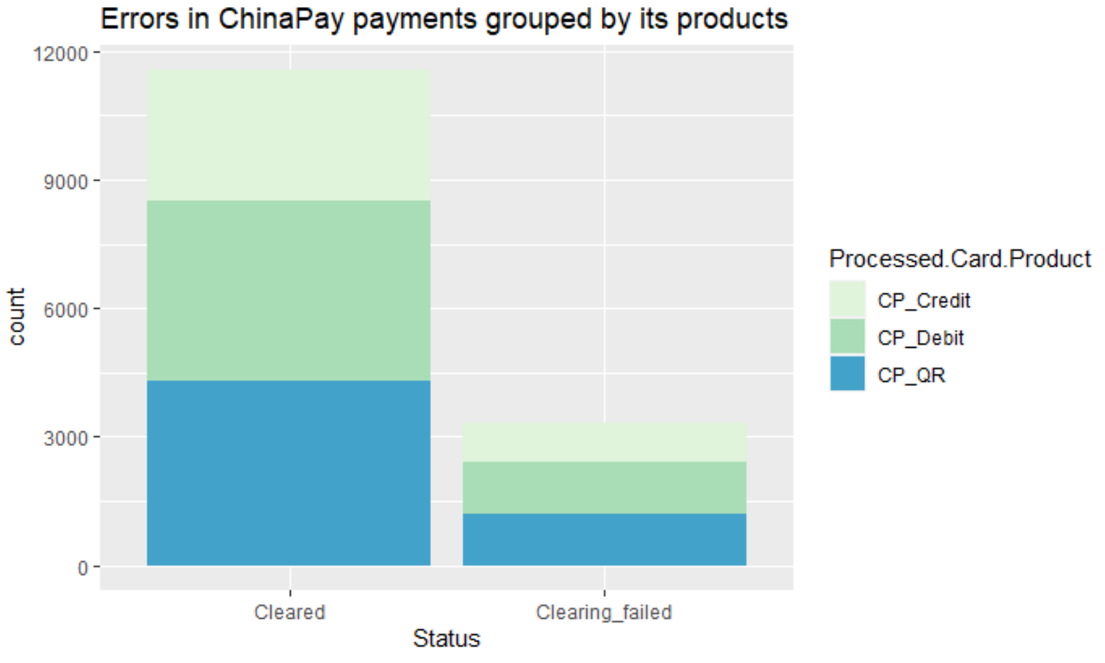


Rich Elephant Company's rates vs Competitor's Estimation and prediction Comparison

Average Rich Elephant Company's Rates per Product

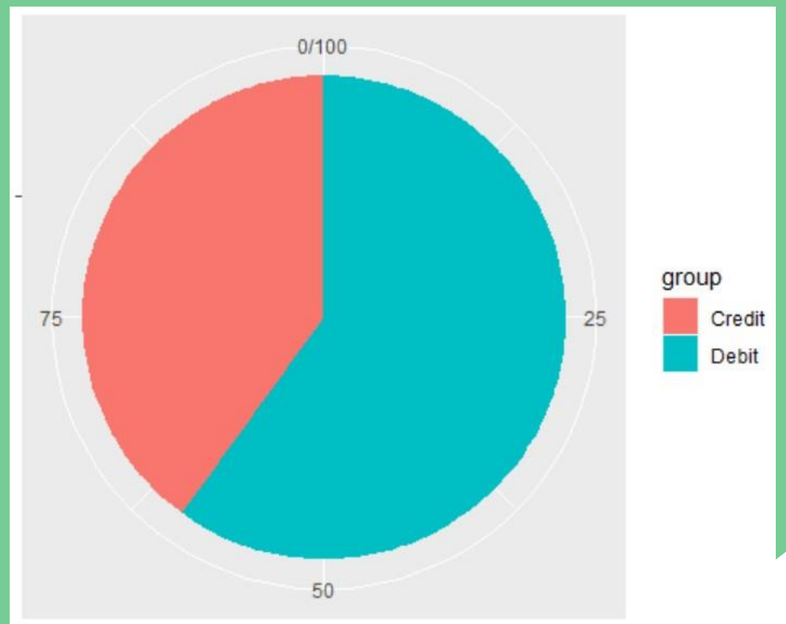
- Based on all rates for the transactions made using different products the average rate per product for derived

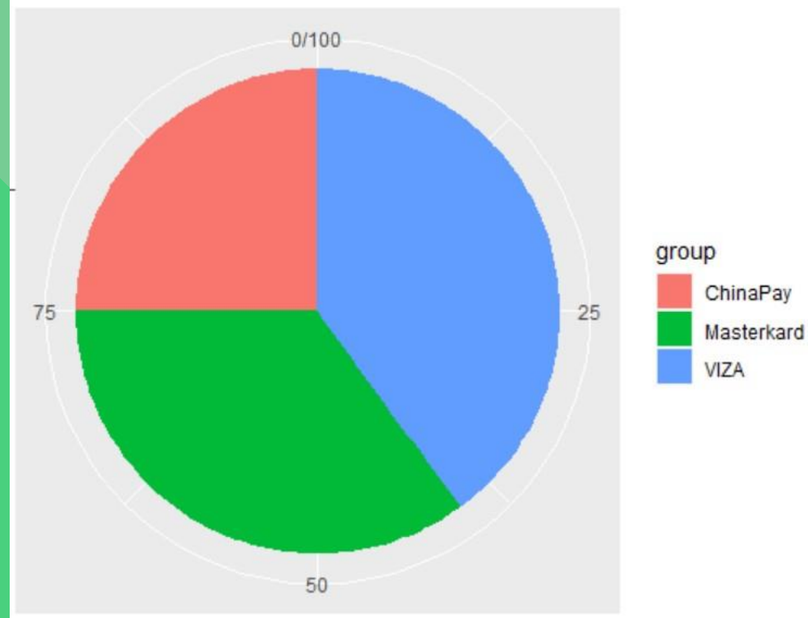
- The rates range from 0.45% up to 2%
  - Intuition: even at first glance at the average rates one can guess Rich Elephant Company's offer can be much more profitable than the offer of The Other Company (flat 3%)

- Debit card tend to have lower rates than credit cards

	Processed Card Product	Rate percent
0	CP_Credit	1.298111
1	CP_Debit	0.522029
2	CP_QR	2.000000
3	MK_Credit	1.364686
4	MK_Debit	0.451272
5	MK_Student	0.698785
6	VIZA_Debit	0.699070
7	Viza_Credit	0.928691
8	Viza_Super	2.145267

Card and product specification of the potentail customer





Assumptions

In order to conduct the prediciton of the amount of rates that would be paid by the PC in Rich Elephant Company a few assumptions were done:

1. Fot the main estimation VIZA Super, CP_QR, Masterkard_Student were excluded from the estimation
   a. apart of VIZA Pay and Mastro mentioned by the client
2. For the alternative prediciton that includes the above exceptions the follwoing assumptions were made:
   a. VIZA Super and VIZA Student are treated as credit card
   b. To Mastro, CP_QR and VIZA Pay were applied average weights between debit and credit cards

Estimating fees paid by OC in Rich Elephant Company

In order to predict the amount in rates paid by OC in Rich Elephant Company the below equation was used. It concerns:

- **Dr** = % rate for debit cards - based on average calculated from Rich Elephant Company's data set ; **Cr** = % rate for credit cards - based on average calculated from Rich Elephant Company's data set ; **Pd** = 60% of debit cards in traffic; **Pc** = 40% of credit cards in traffic
- **V** = % of visa cards used in a total of the payments in OC;
  M = % MasterKard cards used in a total of the payments in OC;
  CP = % ChinaPay cards used in a total of the payments in OC;

$$\text{FEE} = \text{Total amount}*0.01*(\underbrace{DrV*Pd*V+crV*Pc*V}_{\text{VISA CARDS}}+\underbrace{DrM*Pd*M+crM*Pc*M}_{\text{MATERKARD CARDS}}+\underbrace{DrcP*Pd*cP+crcP*Pc*cP}_{\text{CHINAPAY CARDS}})$$

Fee is the total amount of money processed last month by OC.

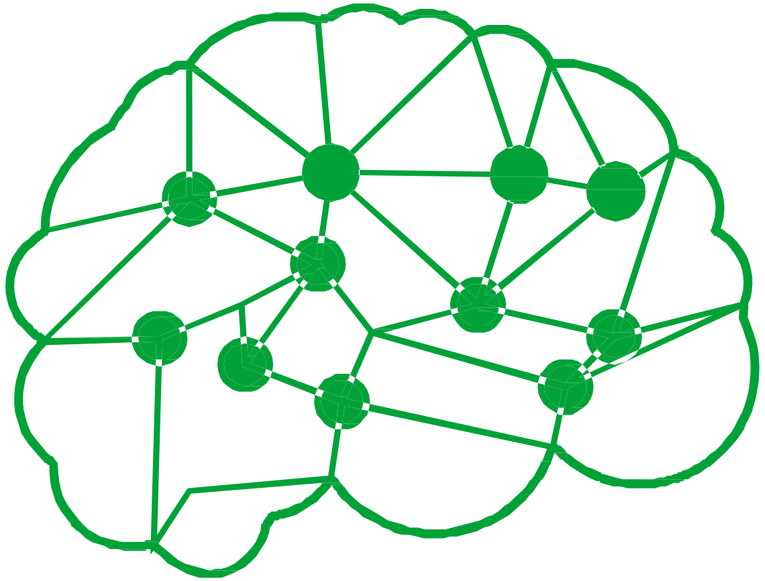
Fee = 94843723 EUR

Elements that are important to achieve operational scalability

Operational scalability

- Smooth and easy processes << Easy integration
  - Already written APIs to better include the new tool in the toolchain

- Automating processes and workflows
- Generalization and reusability
- Document what you do
- Split your resources
- Overestimate the workload of your hardware



Summary

Hello Anna,

I hope you are doing well today. I am writing to you to give you a brief insight on the issue that was noticed in NaTC transactions recently.

After taking a look into the data and a quick analysis it turns out the rejections of transactions for the mentioned company, **sky-rocked in the first days of January**. To give you a better glance at the situation:

- Total number of rejections increased **from a few** (beginning of January) **to more than 1000/day** in the first days of January
- Not all card providers face that problem (**Carte Rouge is performing well**)
- There are **3 main factors** of the increase in errors:
  - **45%** of rejections due to: using 3D security that was not enrolled in the first place: **VIZA users**
  - **35%** of rejections due to: too high value for a card: faced by **ChinaPay users**
  - **20%** of rejections due to: processing dual-brand for a card product: faced by **Masterkard** users

It is important to mention that in the last few days we noticed a significant decrease in the number of occurring errors, nevertheless, it is necessary to act fast. It is so, because the NaTC who raise this matter to our attention, will not see a drop as quickly as we see it now. What is more, because the process of money paid – money received takes a few days, **they will experience the biggest decrease in the incoming revenues soon**(the biggest peak in the number of errors occurring) so it's important to come up with some answers before that happens.

I would like to share with you my few intuitions concerning possible solutions that came up by now, based on the data.

- We should first focus on VIZA issues with 3D security code and investigate the general influence of the 3D code on the process
- The second biggest issue are transactions too high of a value for ChinaPay scheme, it ist important to research this and the correlation of the transaction amounts with the rejections

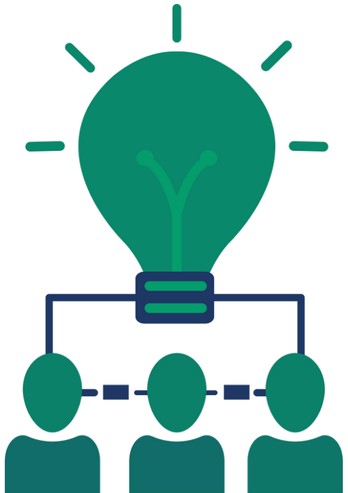
I hope I draw a coherent picture for you of what is the situation now and that we can start coming up with ideas for the solutions. In the attachment, I send the timely plot of the number of errors so that you can have a visual idea of how the situation is as of now.

Of course, after a deeper dive into the data, we will have more insights and information we could use to improve the transaction process for NaTC. Shall you have any questions or remarks please don't hesitate to reach me. I wish you a great day,

Best regards,

Quick-analysis conclusions and further questions

- According to the data payments Carte Rouge products do not cause the Clearing Failures
- The highest peak of erros occurring in the first days of January will be experienced in the decrease of incomes of the company before they will notice the improvement (decrease of number of errors in the second week of January)
- Possibly 3D securtiy code is not generating an issue itself, but does not cooperate well with VIZA products
  - All VIZA products face the mentioned problem equally
- Generally the use of 3D Security does not depend on the transaction amount
- Noticeable larger amount of rejected transactions among the ones using 3D code compared to ones that don't use it
- ChinaPay transactions are rejected because of too high value for card scheme and it occurs not only for the credit cards but for all the CP products
- It is important to deeper investigate a certain product of Masterkard –Mastro –as the failed payments happen only when Mastro Card is used
  - More precisely Mastro Cards are not able to process dual-brand for card product



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Things to further investigate:

- Masterkard payments commenced facing some failures in clearing only after first 6 days of January
- Why customers decide to enroll for 3D security
- Why VIZA's customers use 3D security when not enrolled for it (ex. internal condition on using 3D security above a certain amount of money transfered?)
- Why Mastro Cards are not able to process dual brand for card product?
- The specificity of Carte Rouge in all of the mentioned fields below, as it works perfectly not facing any errors. Can we incorporate some of the CR approaches to any of the matters?

Can it be improved from our side? By the Card Provider taking action? By the Card Owner taking action?

Thank You for Your attention and participating