

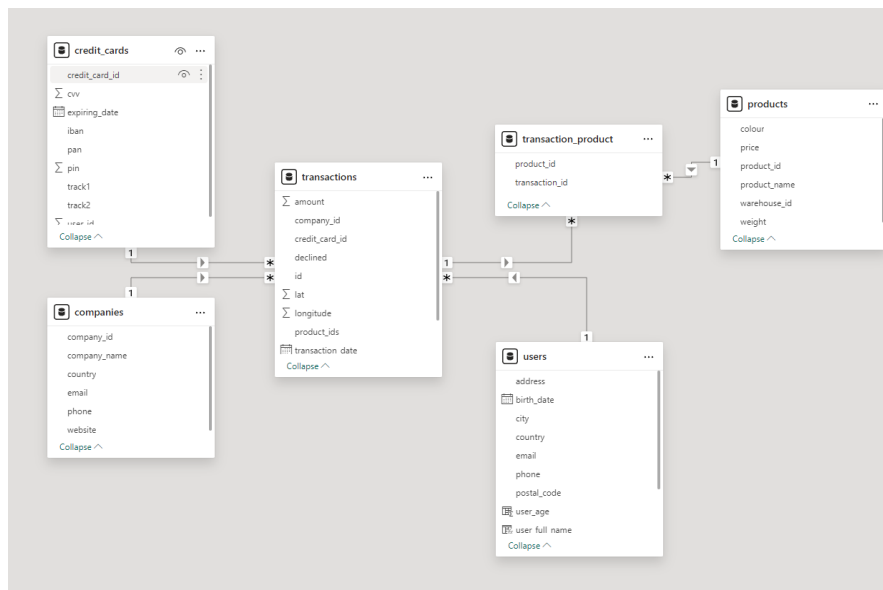
## Task 5.01.

### Level 1.

#### Exercise 1.

A database, 'transactions\_db', containing data from a company selling products online, was used to create reports in Power BI. The database was upload via connection to MySQL.

### ER diagram



## Exercise 2.

Evaluation of the total sum of transactions over the years.

The business objective is €25,000 for each year.

### 2022

Total Amount

€ 24.829

Goal:

€ 25.000

*The KPI was set up to track the total sum of all transactions, including declined ones, against the annual business goal of €25,000. In 2021, the total transaction amount exceeded this goal by six times, indicating strong performance. In 2022, data for the first three months alone shows a total transaction sum of €24,829, nearly reaching the annual target already — suggesting positive dynamics for the rest of the year.*

- ¿por qué crees que en 2022 no se ha alcanzado el objetivo?
- Entonces, tomando en cuenta que del 2022 solo tienes 2 meses y medio ¿crees que se podría alcanzar el objetivo?
- ¿cuál es tu opinión del objetivo planteado tomando en cuenta lo que sabes del 2021 y lo que va del 2022? ¿es adecuado para la empresa?

*In 9.5 months of 2021, we exceeded the goal by six times, suggesting a monthly amount of around €15,000. Therefore, for 2022, we could expect approximately €30,000. The actual total is lower; early-year sales might be slightly weaker due to post-holiday slowdowns, common in many industries. Still, we are nearly reaching the annual target already, indicating positive dynamics for the rest of the year. It is very likely that the 2022 target will be met or exceeded.*

*Regarding the target, the €25,000 annual goal seems conservative given the 2021 results. For 2022 and beyond, the company could reassess its objectives to better reflect market performance and drive growth. A new target can be set based on past performance and the company's financial situation.*

### Exercise 3.

The average of the transactions made during 2021 visualized in a meter. The business objective for average sales is set at € 250.

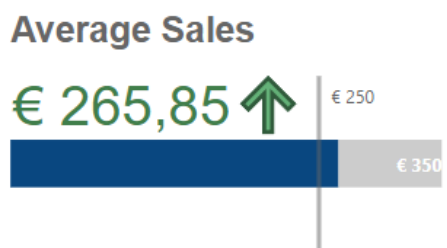
A DAX measure was created to calculate the average amount of valid (non-declined) transactions specifically for 2021. Declined transactions were not taking into account because business objective is sales.

```
avg_sales_2021 =  
CALCULATE(  
    AVERAGE('transactions'[amount]),  
    'transactions'[declined] = False,  
    YEAR('transactions'[transaction_date]) = 2021)
```

*However, on the dashboard, a more general DAX measure was applied to calculate the average of all valid transactions, excluding declined ones.*

```
avg_sales =  
CALCULATE(  
    AVERAGE('transactions'[amount]),  
    'transactions'[declined] = False)
```

*To facilitate filtering by year, a new column, `transaction_year`, was added to the `transactions` table. This allows a slicer to dynamically adjust the gauge, reflecting the average of valid transaction amounts (sales) for the selected year.*



*For 2021, the average transaction amount met and exceeded the €250 business goal, as visualized in the linear gauge chart.*

- Si la media fue superada en 9.5 meses ¿crees que es una buena medida para evaluar?
- ¿crees que es un objetivo acorde?

- quiero lo que tu opinas ¿se debería cambiar?

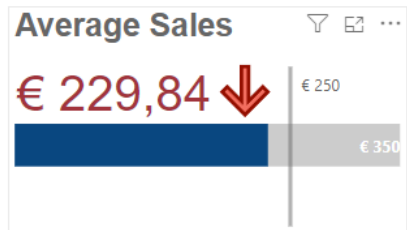
*For 2021, the average transaction amount met and exceeded the €250 business goal, as shown in the linear gauge chart. However, average amount may not fully reflect annual trends, especially if there are seasonal fluctuations. Considering the strong performance, the current target seems conservative. It would be beneficial to reassess and possibly raise the goal to better align with the company's actual sales patterns and encourage further growth.*

#### Exercise 4.

The average of the transactions made during 2022.

The business objective for average sales is € 250.

*By selecting 2022 in the slicer, the gauge dynamically displays the average of valid transactions for the year.*



*Currently, the average sales for the first three months of 2022 is below the target. However, as the year progresses, there remains potential for improvement, and the average could still meet or exceed the business objective by year-end.*

Exacto! lo que resta del año la media debe ser superior al objetivo para poder llegar, entonces ¿lo ves muy justo? ¿crees que es un buen evaluador?

*Currently, the average sales for the first 2.5 months of 2022 are below the €250 target. To reach the annual objective, the remaining months must have an average above the target, which makes it a tight goal. While it's achievable, relying solely on the average might not be the best evaluator, as it can be skewed by a few large or small transactions. Complementing it with metrics like median sales or transaction volume could provide a more balanced view.*

### Exercise 5.

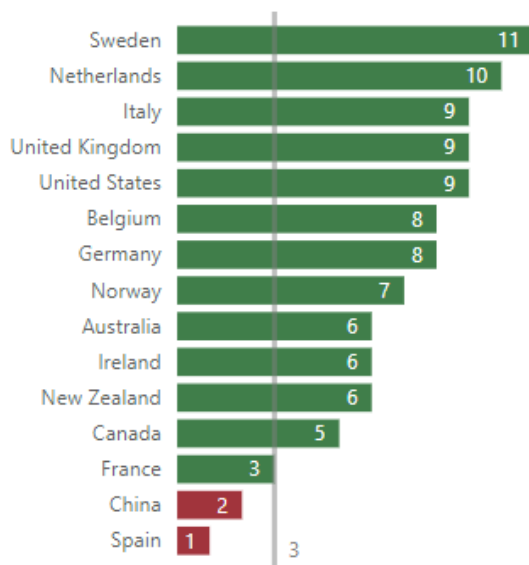
The number of distinct companies participating in transactions by country. The business goal is to ensure **at least 3** participating companies per country.

A general DAX measure was created to calculate the number of unique companies involved in transactions.

```
n_companies =  
DISTINCTCOUNT(transactions[company_id])
```

*By applying country-level granularity in the visualization, this measure displays the number of active companies for each country.*

### Number of Participating Companies



*Most countries meet the target of at least 3 active companies per country. However, activity is lower in Spain and China, and France also falls close to the threshold, suggesting that these markets may need additional attention to reach desired activity levels.*

Si, claro que se necesita atención en los puntos donde no se cumplen los objetivos, pero

- ¿qué tipo de atención sugieres?
- El objetivo es tener al menos 3 empresas por país y esto se cumple en casi casi todos los países que tienes ¿consideras este un buen objetivo evaluador? ¿es adecuado?

- ¿que propondrías?
- ¿sería correcto evaluar el cúmulo de empresas durante todo el período y no por año o trimestre?

*Most countries meet the target of at least three active companies. However, Spain and China show lower activity, and France is close to the threshold. To improve participation in these markets local partnerships or tailored incentives for companies could be effective strategies. Considering that nearly all countries meet the current target, the objective may be too low to drive further growth. Raising the goal or focusing on company engagement quality might be more meaningful. Evaluating by year is preferable, as companies can be gained or lost annually, providing a more accurate picture of market presence. Additionally, considering the number of transactions per company can offer better insight, as one highly active company may contribute as much as ten less active ones.*

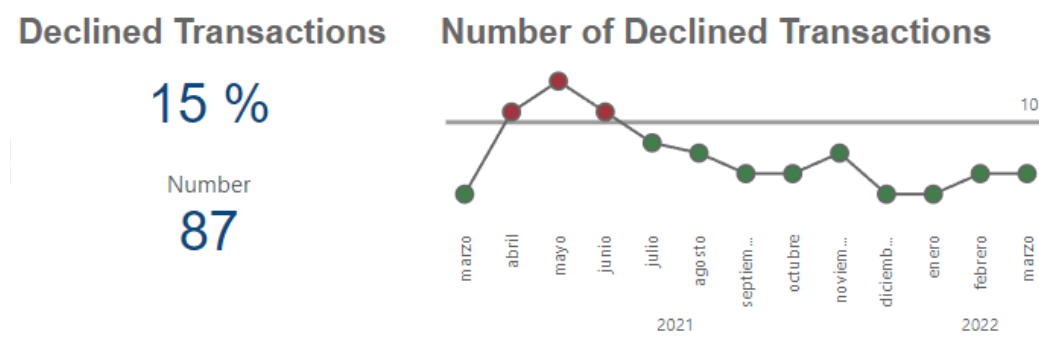
## Exercise 6.

The amount of declined transactions over time. The business goal is to maintain **fewer than 10** declined transactions per month.

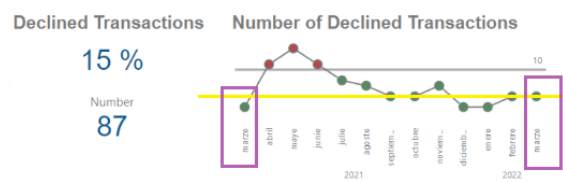
A DAX measure was created to count the declined transactions:

```
n_declined_transactions =  
    CALCULATE(  
        COUNT(transactions[id]),  
        transactions[declined]=True)
```

*Using monthly granularity, the visualization shows the trend of declined transactions over time.*



*From April to June 2021, the number of declined transactions exceeded the target. However, all subsequent months met the goal, suggesting that the company likely made effective efforts to reduce declined transactions. Data for these months in 2022 is still pending, but this trend indicates promising progress.*



Tomando en cuenta lo que comentas te hago más preguntas para que completes la idea: con la línea amarilla que te marco vemos que, ya con solo la 1era quincena de marzo del 2022, supera la cantidad de transacciones declinadas que había en la 2da quincena del año anterior y en los meses siguientes se registra esos picos con mayor volumen que sobrepasa el objetivo

- ¿qué puedes recomendar?



- ¿qué crees que hay que tener presente?
- ¿qué opinas? ¿crees correcto evaluar cantidad de transacciones o proporciones?
- ¿el objetivo es correcto?

*From April to June 2021, declined transactions exceeded the target, but subsequent months showed improvement, indicating effective corrective measures. However, in early 2022, the first half of March already surpassed the declined transaction volume of late 2021, with subsequent months showing similar spikes above the target.*

*We should analyse the reasons behind the declined transactions—such as payment processing issues, customer errors, or fraud detection policies—and implementing targeted solutions like system optimizations or clearer customer instructions.*

*While tracking the absolute number of declined transactions is useful, evaluating proportions (declined vs. total transactions) could provide more context, especially if overall sales volume fluctuates. Regarding the target, maintaining fewer than 10 declines per month is reasonable, but it should be regularly reviewed to ensure it remains challenging yet achievable.*

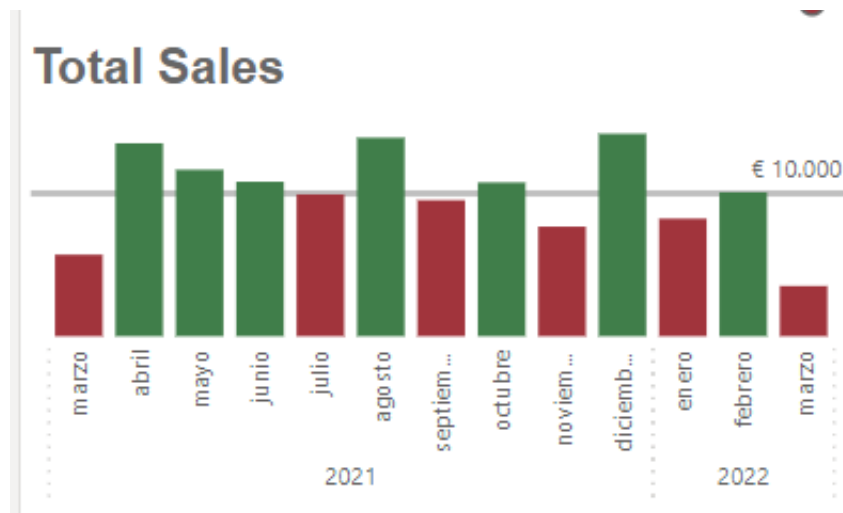
## Exercise 7.

Sum of sales by month visualized in grouped column chart. The company aims to achieve a total sales amount of **at least € 10,000** per month.

The new DAX measure was created to calculate the sum of sales.

```
total_sales =  
CALCULATE(  
    SUM('transactions'[amount]),  
    'transactions'[declined] = False)
```

*Using monthly granularity, the visualization displays total sales over time.*



*In March, July, September, and November of 2021, as well as January and March of 2022, sales fell below the €10,000 target. The dip in sales during July, September and January may be partially attributed to reduced user activity during pre-/post-holiday/holiday periods. The other months (both years have low sales in March) indicate potential areas for improvement in sales strategies to meet the business goal.*

- ¿podrías hablar de una tendencia estacionaria?
- ¿qué cosas se podrían aprovechar al conocer esta tendencia?
- ¿a qué departamento le pasarías esta información para que la aprovechen?
- Ahora, viendo que casi el 50% de los meses estudiados no se llega al objetivo ¿crees que está difícil ese objetivo? ¿lo crees adecuado?

*In July, September, and November of 2021, as well as January of 2022, sales fell below the €10,000 target (March is incomplete, with only 15 days of data). These dips suggest a seasonal trend, with lower sales during holiday and post-holiday periods. Recognizing this pattern allows the company to adjust strategies—such as launching targeted promotions, strengthening marketing efforts, or introducing new products during typically low-performing months.*

*This information should be shared with the sales and marketing departments to plan timely campaigns, and with inventory management to align stock levels with expected demand fluctuations. Given that only 4 months out of the studied period didn't meet the target, the goal seems realistic (March likely would also meet the goal if the full month was included), but strategies should be enhanced to ensure more consistent performance.*

## Exercise 8.

Transactions carried out by each user:

- user name and surname (in one column);
- user age;
- average amount of transactions in euros;
- average amount of transactions in dollars (conversion: € 1 = \$ 1.08).

Users who had an average of € 300 or more and \$ 320 or more in their transactions are highlighted.

Two new columns were added to the *users* table – 'user\_full\_name' and 'user\_age'.

```
user_full_name =  
'users'[user_name] & " " & 'users'[user_surname]
```

```
user_age =  
DATEDIFF('users'[birth_date], TODAY(), YEAR)
```

DAX measures were created to calculate average transaction amounts.

```
total_amount = AVERAGE(transactions[amount])
```

```
avg_amount_user_dol =  
[avg_amount_user_eu] * 1.08
```

User Information				
	User Name	User Age	Avg Transactions, €	\$
●	Sacha Compton	43	€ 494,82	\$534,41
●	Gary Robbins	29	€ 485,31	\$524,13
●	Zelenia Good	36	€ 481,75	\$520,29
●	Brody Goodwin	42	€ 478,54	\$516,82
●	Guinevere Kemp	37	€ 476,75	\$514,89
●	Genevieve Nolan	34	€ 474,76	\$512,74
●	Astra Baldwin	25	€ 472,18	\$509,95
●	Clark Hewitt	27	€ 471,78	\$509,52
●	Irma Whitehead	36	€ 471,47	\$509,19
●	Urielle Holman	39	€ 466,46	\$503,78
●	Damian Mcgee	36	€ 465,97	\$503,25
●	Duncan Romero	34	€ 460,82	\$497,69

¿Qué ocurre cuando no hay información en los registros de esta tabla? ¿debo suponer que son los usuarios que no han realizado transacciones?

Si, son usuarios sin transacciones. Seria mejor utilizar 0 (usando ISNULL or COALESCE?)

La condición te dice que debo poder identificar a los usuarios que cumplen la condición de que sea  $> 300€$  Y  $> 320\$$ . En este caso solo identifica a los superiores de 320\$.

Si, jo no leí bien ... Pensaba **OR**.

*Users with an average transaction value of €300 or more (or \$320 or more) are highlighted. This table provides a comprehensive overview of users' transaction behaviours and helps identify high-performing users based on their average transaction amounts.*

podemos utilizarlo como un filtro de esos usuarios con un perfil alto

- ¿y qué puede hacer el cliente con esta información? ¿qué le recomiendas?

Muestras también las edades, pero no dices nada al respecto

- ¿crees que es información innecesaria?
- ¿no podrías recomendar hacer una segmentación de clientes según edades en este filtro para hacer recomendaciones o campañas mas personalizadas y buscar aumentar las ventas?

*Users with an average transaction value of €300 or more (and \$320 or more) are highlighted, providing a clear view of high-performing users based on their transaction behaviour. This table can serve as a filter for identifying valuable customers.*

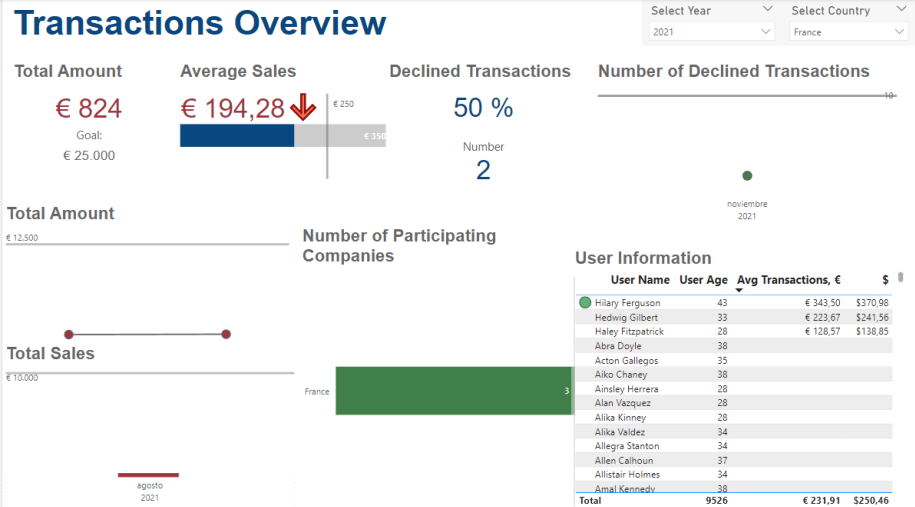
*We can use this information to tailor marketing efforts, such as offering exclusive promotions, loyalty programs, or personalized offers to high-value users, ultimately driving customer retention and increasing sales.*

*Regarding age data, while it's not directly related to transaction amounts, it can offer valuable insights for segmentation. By analysing transaction patterns by age group, we could better understand customer preferences and design more personalized campaigns or product offerings.*

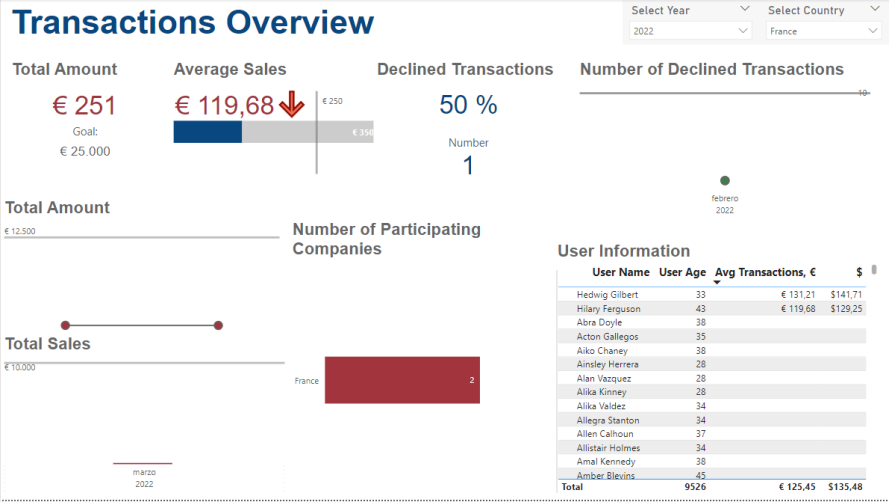
Exercise 9.

The French market needs attention, as it has fewer than 3 active companies in 2022, with 50% of transactions declined. Additionally, most users are inactive or low-performing. Improvements should target user engagement (marketing) and company-level activity (business initiatives) to drive growth.

2021



2022



## Level 2.

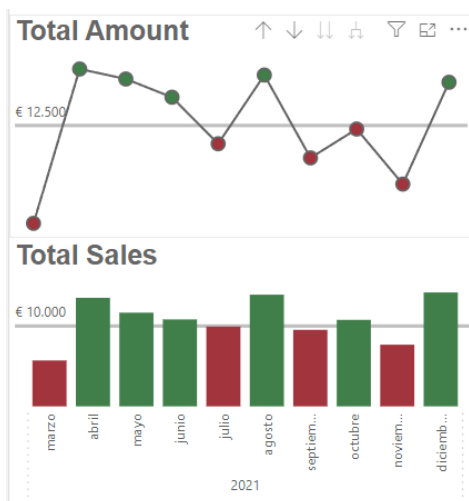
### Exercise 1.

The monthly trend of transactions in 2021, with a business goal of achieving **at least € 12,500** per month.

A DAX measure was created to calculate the total amount of the transactions for 2021.

```
total_amount_2021 =  
CALCULATE(  
    SUM('transactions'[amount]),  
    YEAR('transactions'[transaction_date]) = 2021)
```

*However, in the dashboard, a general DAX measure for the total amount of transactions was utilized, filtered by year to visualize monthly totals.*



*The established goal was not met in March, July, September, October, and November. Despite a high number of declined transactions from April to June 2021, total transaction amounts exceeded the target, highlighting these months as strong sales periods with strong potential, that should be leveraged.*

¿En qué gráfica ves **esto?** de esas dos que muestras ninguna muestras % de transacciones declinadas ni cantidades totales.

¿Cómo aprovecharías ese fuerte potencial de las ventas?

¿Crees que es un buen objetivo? ¿es un buen evaluador? Tomando en cuenta que el objetivo se plantea como un único valor en todo el año ¿crees que es correcta la forma de medirlo?

*The established goal of €12,500 per month was not met in March, July, September, October, and November. Despite a high number of declined transactions from April to June 2021 (as we have seen in L1E6), total transaction amounts exceeded the target in these months, indicating strong sales periods with significant potential. However, neither of the charts presented shows the percentage of declined transactions or total amounts, which could have provided additional insight into these trends.*

*To leverage the strong potential of sales, the company could focus on reducing declined transactions during these periods. For example, optimizing payment systems or offering alternative payment methods could help maintain the momentum during these strong months.*

*Regarding the business goal, while it's an attainable target, using a fixed €12,500 per month objective might not fully capture seasonal fluctuations or market variations. It could be more effective to set dynamic goals based on historical performance or adjust monthly targets based on trends observed throughout the year.*



## Exercise 2.

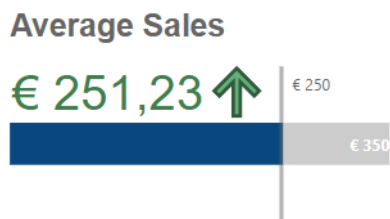
Average sales in Germany. The business goal is to achieve € 250 per year.

A DAX measure was created to calculate average sales in Germany.

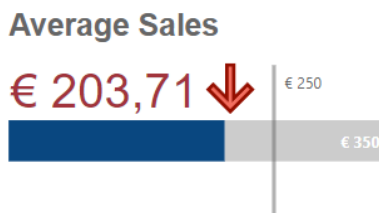
```
avg_sales_Germany =  
CALCULATE(  
    AVERAGE(transactions[amount]),  
    companies[country] = "Germany",  
    transactions[declined] = FALSE()  
)
```

*However, to visualize the average sales in Germany, a filter by country was applied in the dashboard.*

**2021**



**2022**



*The business goal was met in 2021; however, in 2022, average sales are currently at 80% of the target, suggesting potential to reach it by year-end.*

Entonces, de estos primeros meses del 2022 tienes una media muy por debajo del objetivo ¿qué deberá pasar con las empresas de Alemania para poder alcanzar esa media los meses siguientes?  
¿crees realmente que se puede alcanzar? es una media, no es una suma!

*In 2021, the business goal of €250 per year was met. However, in 2022, average sales are currently at 80% of the target, indicating*

*there's still room to catch up. To reach the target by year-end, companies in Germany will need to significantly increase their average sales in the upcoming months. This could involve boosting sales volumes through more aggressive marketing, introducing new products, or improving customer retention strategies.*

*Since we're dealing with an average and not a total, it's important to note that even if a few months see high sales, the lower-performing months will still weigh down the overall average. Therefore, for the target to be reached, a consistent increase across all remaining months would be needed. While it's possible, it would require sustained efforts, and the goal might be challenging depending on market conditions and seasonality.*

**Exercise 3.**

In March, July, September, October, and November, the transaction amounts fell below the proposed goal of €12,500, indicating potential areas for improvement in sales strategies.

### Level 3.

#### Exercise 1.

Transactions carried out by users:

- The key statistical measures of the variables relevant to understanding the transactions made by the users.
- Quantity of products purchased by each user.
- Average purchases made per user, users that have an average of purchases greater than 150 are highlighted.
- the price of the most expensive product purchased by each user.
- the geographical distribution of users.

The following statistical measures were taking into account:

##### 1) User metrics:

- total number of users
- percentage of active users: the proportion of users who have participated in transactions

```
%_active_users =  
DISTINCTCOUNT(transactions[user_id]) / count(users[user_id])
```

##### 2) Averages for users:

- average purchase amount: the mean spending per transaction
- average total purchase: the mean overall spending per user

```
avg_purchase_user =  
DIVIDE([total_sales], DISTINCTCOUNT(transactions[user_id]), 0)
```

##### 3) Purchase behaviour

- average number of purchases

```
avg_n_purchase_user =  
DIVIDE([n_valid_transactions], DISTINCTCOUNT(transactions[user_id]), 0)
```

- median number of purchases

```
median_n_purchase_user =  
MEDIANX(  
    VALUES(transactions[user_id]),  
    CALCULATE(COUNTROWS(transactions),  
        transactions[declined] = FALSE)  
)
```

##### 4) Declined transaction: percentage of users experiencing declined transactions

```
%declined_transactions =
[n_declined_transactions] / COUNT(transactions[id])

%user_with_declined_trans =
SUMX(
    VALUES(transactions[user_id]),
    IF(ISBLANK([%declined_transactions]), 0, 1)
) / DISTINCTCOUNT(transactions[user_id])
```

## 5) Individual user metrics:

- average amount of purchases
- total purchase
- number of purchases

```
n_valid_transactions =
CALCULATE(
    COUNT(transactions[id]),
    transactions[declined]=FALSE()
)
```

- number of distinct purchased products

```
n_products =
CALCULATE(
    DISTINCTCOUNT(transaction_product[product_id]),
    transactions[declined] = FALSE()
)
```

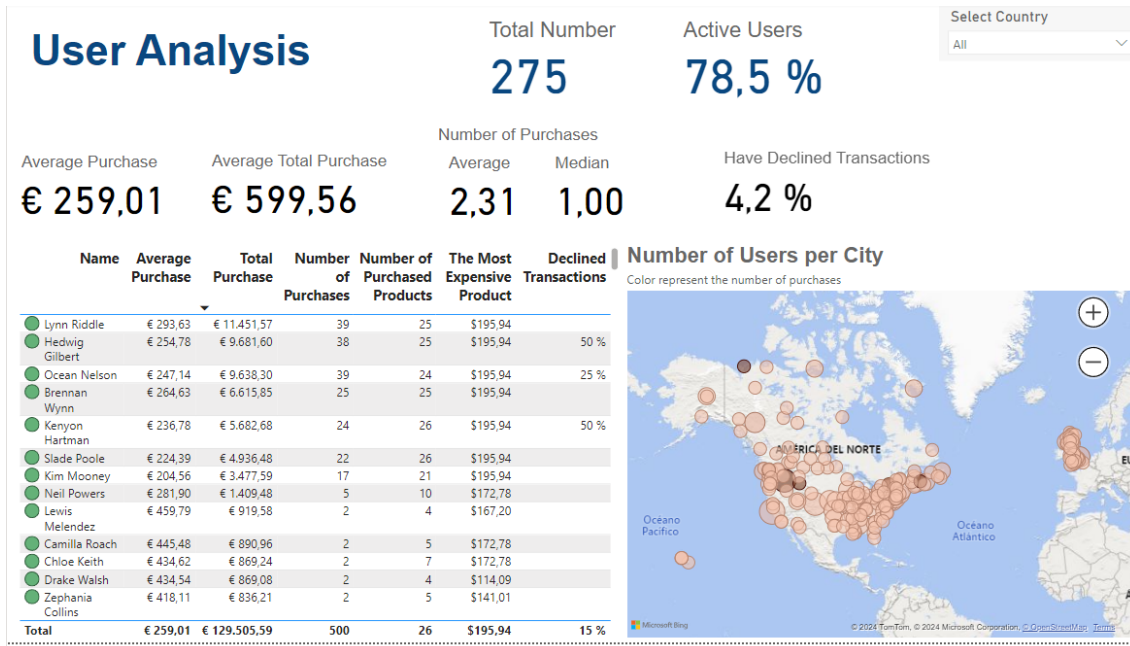
- price of the most expensive product purchased

```
most_expensive_product =
CALCULATE(
    MAX(products[price]),
    CROSSFILTER(
        transaction_product[product_id],
        products[product_id],
        Both),
    transactions[declined] = FALSE()
)
```

- percentage of declined transactions

```
%declined_transactions =
[n_declined_transactions] / COUNT(transactions[id])
```

The geographical distribution of users by city (with bubble size for user count and colour intensity for transaction volume) enables targeting for marketing efforts. Clicking on a city reveals user-specific metrics, making it easier to analyse key markets; filtering by country allows to analyse three primary markets: the US, Canada, and the UK.



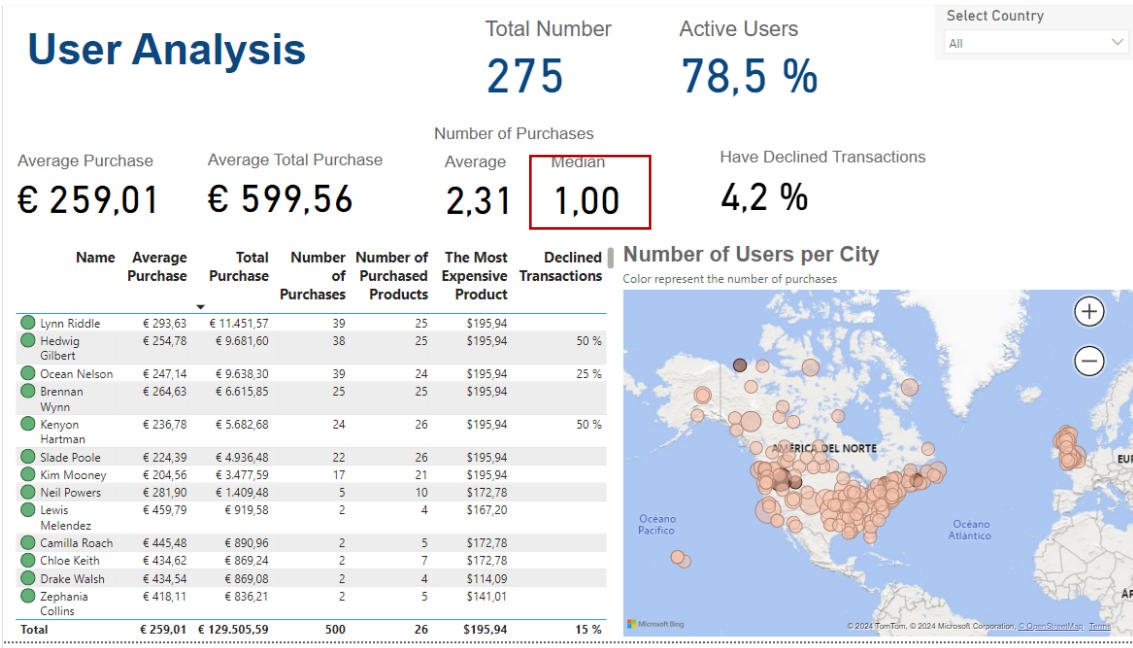
The dashboard provides an overview of user transactions, highlighting active users, purchasing behaviours, and areas for improvement regarding declined transactions.

A notable insight is that most users perform only one transaction (median purchases = 1), suggesting potential to increase repeat engagement. Additionally, some users remain inactive, indicating further marketing focus is needed to encourage initial purchases. Several high-performing users experience a high rate of declined transactions (up to 50%), which may hint at technical transaction issues, rather than solely client card problems.

#### Additional Metrics and Filters:

- More metrics can be included, such as days of inactivity, to assess user engagement levels.
- Implementing filters by age group can also enhance insights into purchasing behaviour across different demographics.
- Comparing metrics by country can reveal trends and performance differences, providing ideas for targeted marketing strategies.
- Additional visualizations of distributions and dependencies (e.g., user age, valid and declined transactions, purchase amounts), combined with country filters, can help better calibrate marketing approaches by identifying potential weak points.

Te marco en cuadro rojo una duda que me surge ¿Dónde ves la mediana de las compras?



- ¿qué propondrías para que esos usuarios aumenten su participación?

- ¿a qué departamento le enviarías esta información o ese listado de usuarios?

¿Que sugieres para disminuir ese porcentaje de transacciones declinadas de esos clientes de alto rendimiento que comentas en el cuadro amarillo?

To increase participation from users, I would recommend implementing loyalty programs or incentives for repeat purchases, such as discounts, exclusive offers, or rewards for engaging more frequently. Personalized follow-up communications could also help re-engage inactive users, encouraging them to make their first purchase. This information should be shared with the marketing and customer retention departments to design targeted campaigns and re-engagement strategies.

To reduce the high rate of declined transactions, technical improvements are needed, such as optimizing the payment gateway, offering alternative payment methods, and ensuring smooth user experience during checkout. It might also be helpful to provide better error messaging or proactive support for users facing issues during transactions.