2.1. Is there a growing trend on e-commerce in Brazil? How can we describe a complete scenario? Can we see some seasonality with peaks at specific months?

Is there a growing trend on e-commerce in Brazil?

```sql
with order_updated as(
    select *,
        concat(opt_year, '-', opt_month) as opt_month_year
        from (
            select *,
                EXTRACT(
                    YEAR
                    FROM order_purchase_timestamp
                ) as opt_year,
                EXTRACT(
                    Month
                    FROM order_purchase_timestamp
                ) as opt_month_id,
                TO_CHAR(
                    DATE_TRUNC('month', order_purchase_timestamp),
                    'Month'
                ) as opt_month
            from orders
        ) x
)
select opt_month_year,
    count(distinct order_purchase_timestamp) as total_opt_quantity,
    sum(payment_value) as total_opt_price,
    round(avg(payment_value), 2) as avg_sales,
    opt_year,
    opt_month_id
from order_updated ou
    join payments p on ou.order_id = p.order_id
group by opt_month_year,
    opt_year,
    opt_month_id
order by opt_year,
    opt_month_id,
    opt_month_year;
```

opt_month_year	total_opt_quantity	total_opt_price	avg_sales
2016-September	3	252.24	84.08
2016-October	324	59090.48	172.78
2016-December	1	19.62	19.62
2017-January	793	138488.04	162.93
2017-February	1776	291908.01	154.78
2017-March	2674	449863.60	158.57
2017-April	2394	417788.03	162.50
2017-May	3677	592918.82	150.33
2017-June	3231	511276.38	148.80
2017-July	4004	592382.92	137.22
2017-August	4303	674396.32	148.22
2017-September	4264	727762.45	161.15
2017-October	4615	779677.88	160.43
2017-November	7475	1194882.80	151.96
2017-December	5643	878401.48	149.01
2018-January	7233	1115004.18	147.43
2018-February	6679	992463.34	142.76
2018-March	7151	1159652.12	154.37
2018-April	6903	1160785.48	161.02
2018-May	6839	1153982.15	161.74
2018-June	6143	1023880.50	159.51
2018-July	6252	1066540.75	163.91
2018-August	6477	1022425.32	152.65
2018-September	16	4439.54	277.47
2018-October	4	589.67	147.42

From the above result of "Month by Month" records of Total quantity, Total Sales, Rank based on Sales within available records, Average Sales and Rank based on Average Sales.

It is observed as:

1. There is a growing trend on e-commerce in Brazil.
2. Month by Month Sales & Quantity of Product sold increases (Observed from sales rank as it has an overall Upward trend)
3. Also, Sum of sales per month, Sum of product Sold (quantity) per month increases, It indicates trend for e-commerce grows.
4. But Average Sales didn't have significate increase, thus indicates purchase power and market didn't changed much.
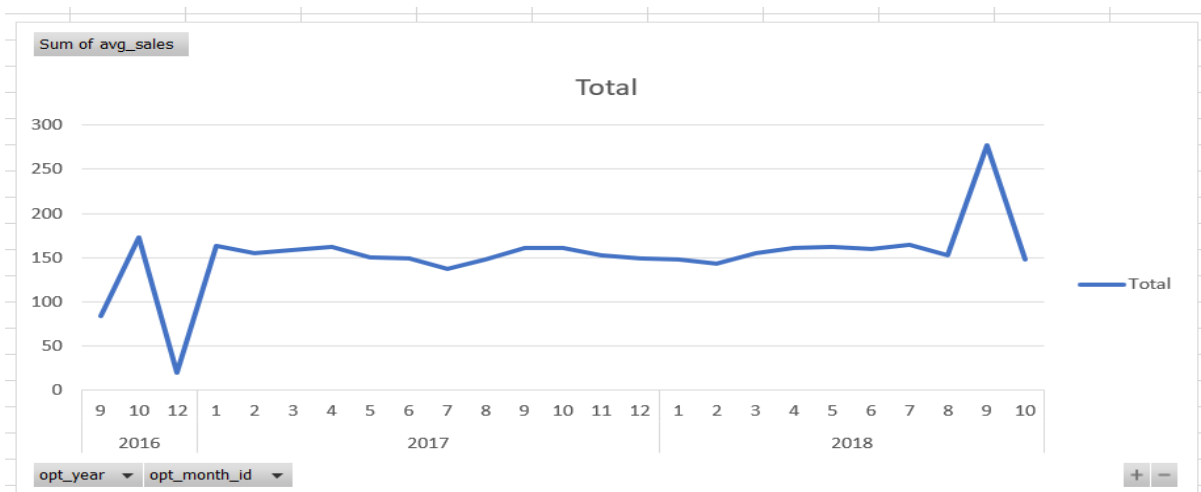
Sales by Months:
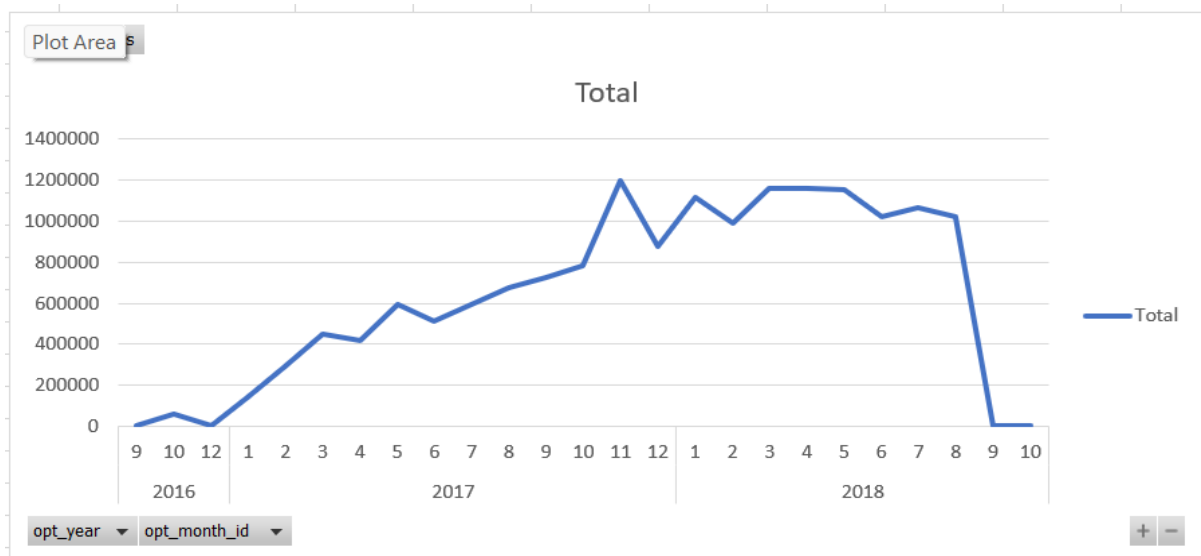
Quantity of product Sold by Months:
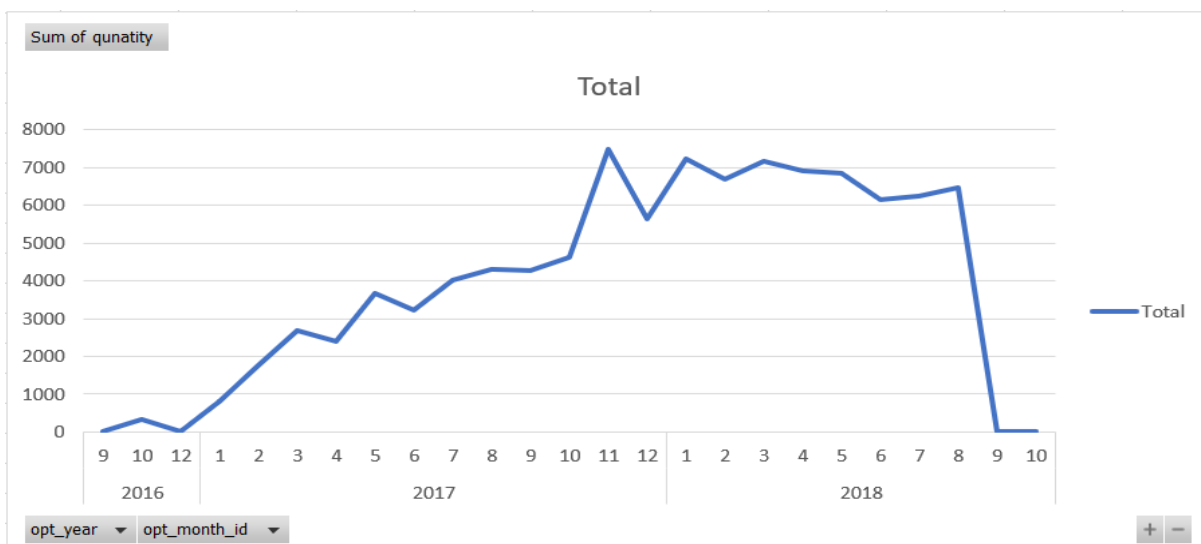

Average Sales by Months:

Can we see some seasonality with peaks at specific months?

```sql
with order_updated as(
    select *,
        case
            when opt_month_id in (12, 1, 2) then 'Summer'
            when opt_month_id in (3, 4, 5) then 'Autumn'
            when opt_month_id in (6, 7, 8) then 'Winter'
            when opt_month_id in (9, 10, 11) then 'Spring'
        end as seasons
    from (
            select *,
                EXTRACT(
                    Month
                    FROM order_purchase_timestamp
                ) as opt_month_id,
                TO_CHAR(
                    DATE_TRUNC('month', order_purchase_timestamp),
                    'Month'
                ) as opt_month
            from orders
        ) x
)
select seasons,
    opt_month,
    count(distinct order_purchase_timestamp) as total_opt_quantity,
    sum(payment_value) as total_opt_price,
    round(avg(payment_value), 2) as avg_sales,
    opt_month_id
from order_updated ou
    join payments p on ou.order_id = p.order_id
group by seasons,
    opt_month,
    opt_month_id
order by total_opt_price;
```

seasons	opt_month	total_opt_quantity	total_opt_price	avg_sales
Spring	September	4283	732454.23	161.51
Spring	October	4943	839358.03	161.23
Summer	December	5644	878421.10	148.99
Spring	November	7475	1194882.80	151.96
Summer	January	8026	1253492.22	148.99
Summer	February	8455	1284371.35	145.32
Winter	June	9374	1535156.88	155.77
Autumn	April	9297	1578573.51	161.41
Autumn	March	9825	1609515.72	155.52
Winter	July	10256	1658923.67	153.26
Winter	August	10780	1696821.64	150.86
Autumn	May	10516	1746900.97	157.68
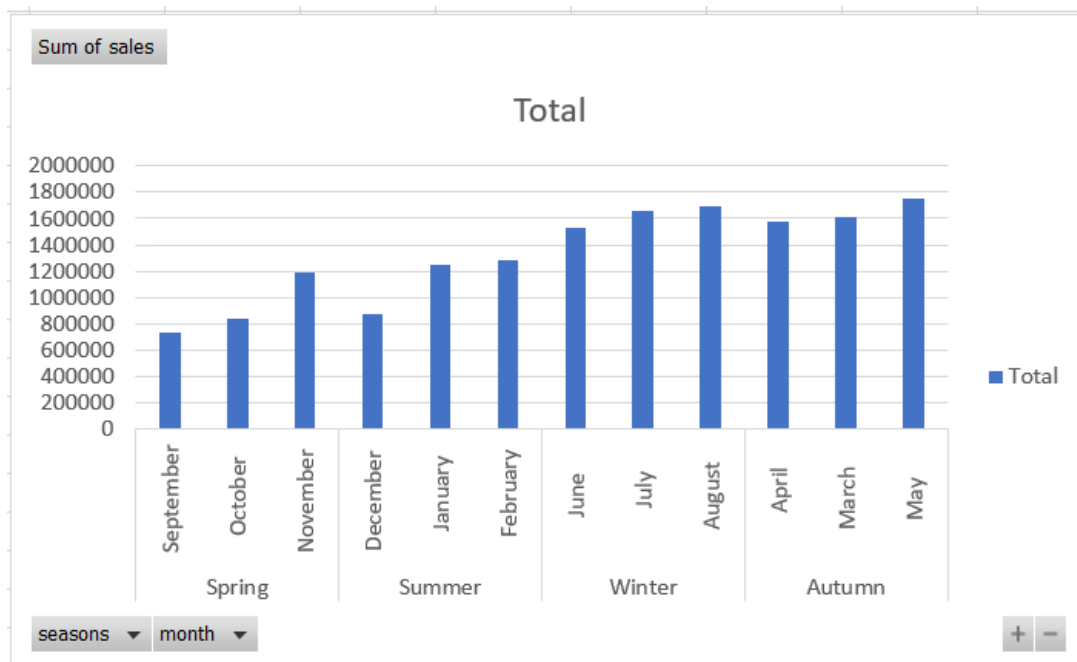
It explains there is a seasonality in data with peak at "May" month which is "Autumn".

2.2. What time do Brazilian customers tend to buy (Dawn, Morning, Afternoon or Night)?

```sql
with order_updated as(
    select *,
        case
            when opt_hour in (3, 4, 5) then 'Dawn'
            when opt_hour in (6, 7, 8, 9, 10, 11) then 'Morning'
            when opt_hour in (12, 13, 14, 15, 16, 17, 18, 19) then 'Afternoon'
            when opt_hour in (20, 21, 22, 23, 0, 1, 2) then 'Night'
        end as sales_time
    from (
            select *,
                EXTRACT(
                    HOUR
                    FROM order_purchase_timestamp
                ) as opt_hour
            from orders
        ) x
)
select sales_time,
    count(distinct order_purchase_timestamp) as total_opt_quantity,
    sum(payment_value) as total_opt_price,
    round(avg(payment_value), 2) as avg_sales,
    rank() over(
        order by sum(payment_value)
    ) as sales_rank
from order_updated ou
    join payments p on ou.order_id = p.order_id
group by sales_time;
```

sales_time	total_opt_quantity	total_opt_price	avg_sales	sales_rank ↑
Dawn	665	96713.48	139.96	1
Morning	22119	3541310.97	153.09	2
Night	26277	4152797.89	149.32	3
Afternoon	49813	8218049.78	157.28	4

From above result we found as, At "Afternoon" Brazilian customers tend to buy.