Problem Definition

Method & Assumption

- Calculated amount of diversion by subtracting q_distA,B,C from q_loadA,B,C.
- The diagnosis of the current diversion trend was made using data from 2024.

(Result) The problem of diversion increase is only evident in *supply C*. After the shock at the end of 2023, the diversion in supplies A and B was stabilized. However, supply C showed another jump right after the shock and is showing a gradual increase during early 2024. [Annex1]

Analysis

Method & Assumption

- The given datasets are correct and the prices of packaging material were static before 2023/12/20
- Utilized visual analysis, cutting the time-series graph into three parts : before, during, and after spike.
- A moving average was adopted to find out trends and mitigate possible time lags. (Was also used in problem definition)

Relationship with Diversion and the market price of packaging material

The material's market price, which has a negative correlation with diversion, may be one factor in the recent increase in divergence, but additional investigation and analysis are needed to confirm the causal relationship.

The completely stable packaging price began to rise at the end of 2023, and the graph below shows a similar spike and divergence on the same day, suggesting a negative relationship between the two. After Jan 1st, 2024, the diversion shows an incremental trend in supply C while the price is still fluctuating. This suggests that the abrupt change in package price severely shocked the market and that the gradual increase in diversion took place as the price was still high following the shock. [Annex2]

Other factors explaining the diversion of humanitarian supplies

The price of the product is *not* likely to have a decisive impact on the diversion. The amount of price increase in three supplies does not match the amount of diversion. The diversion of supply C is the largest, however, the increase in price of supply C is not notable. Supply A, which showed a large jump in price (80%) did not show much diversion.

Rainfall is an important underlying factor that has an impact on diversion. The jump in rainfall and drastic drop in temperature match the drastic increase in diversion during the end of December 2023. The weather cannot be controlled by other factors, making it a potential deciding factor in price, quantity, or diversion. [Annex 3-1,2]

Other factors for country office to consider

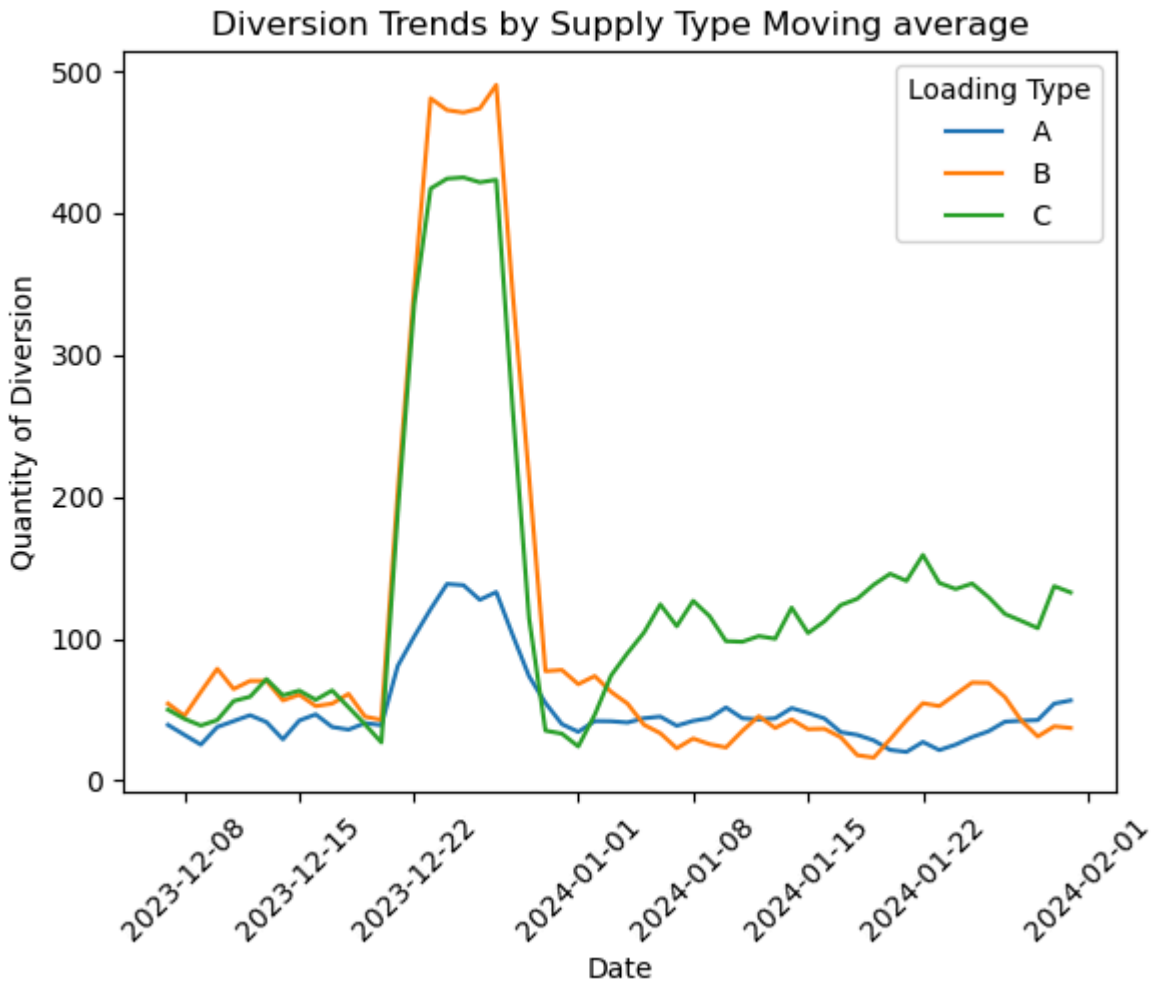
1. The data quality issue - requires a second look - While the price has its natural quality to have noise, the package price data is too straight during early December 2023. This can be suspected as a data error. Plus, huge rainfall around 12/20 2023, could have caused errors in data collection as it can have a physical influence on the supply chain.

2. The impact of weather. Extreme weather conditions can have a lasting impact on many different factors including the price of the packaging material and the efficiency of the supply chain. Thus, the country office should try to understand what happened due to the heavy rainfall during the end of December 2023.

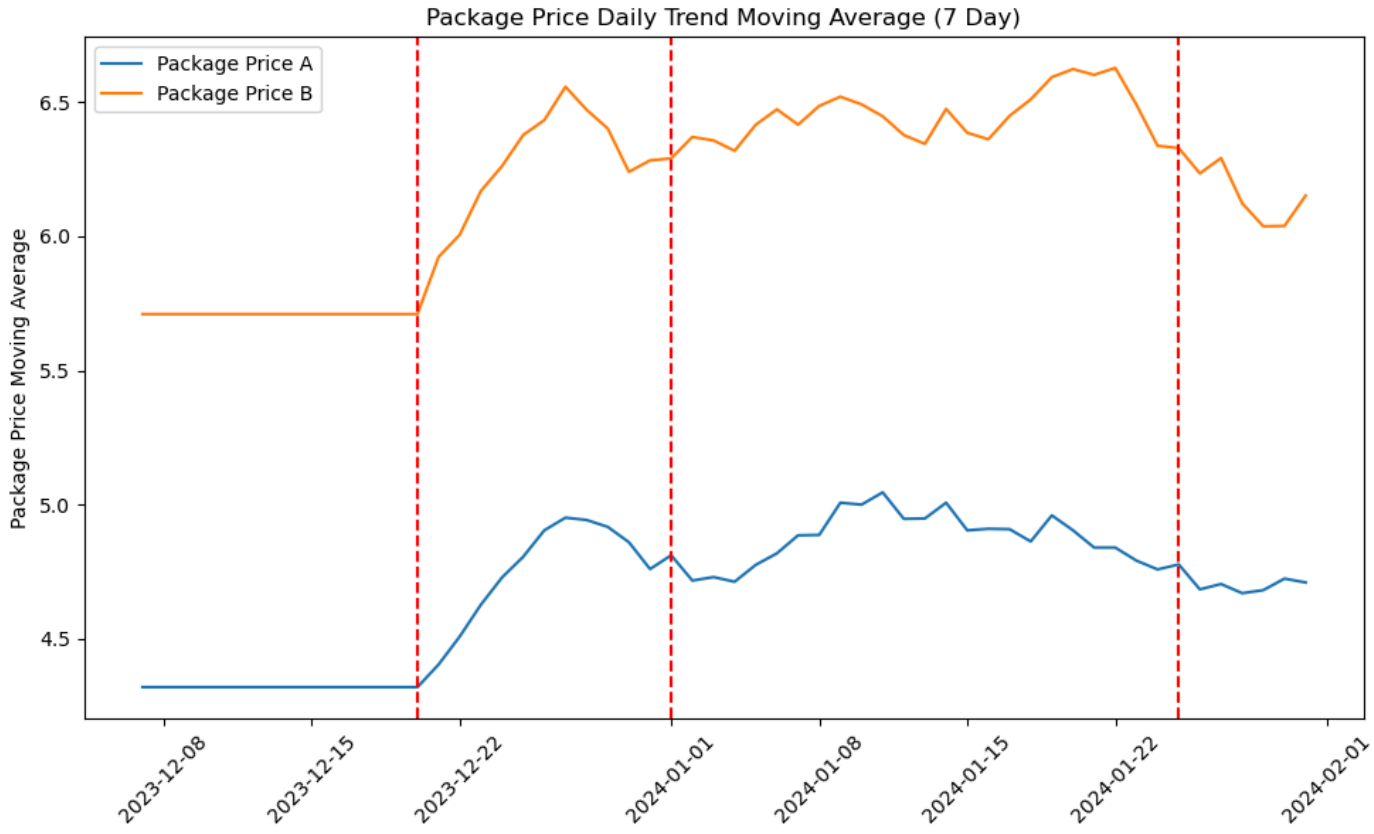
3. Deep dive into factors that affected diversion trend only in supply C. As the diversion increase is most obvious in supply C in recent weeks, factors that have a high impact exclusively on supply C should be investigated. This includes : An issue in the supply chain that deals with product C (Data quality, any accident or increase in inefficiency in supply chain, and potential security issue in supply chain of C) / Specific packaging material that was more used for product C compared to other supplies / Whether there was any change in the price of supply C different from the reality

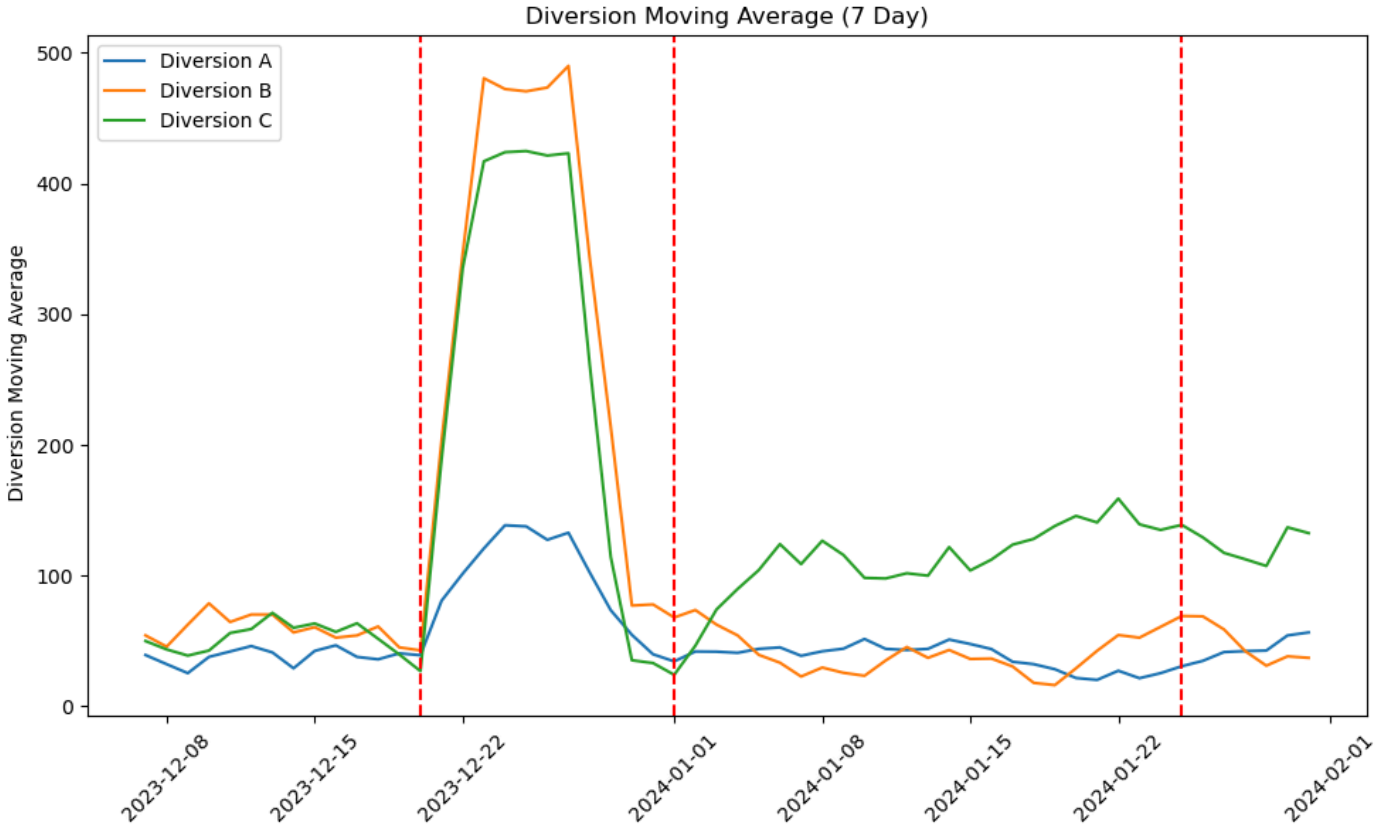
Annex

[Annex1]

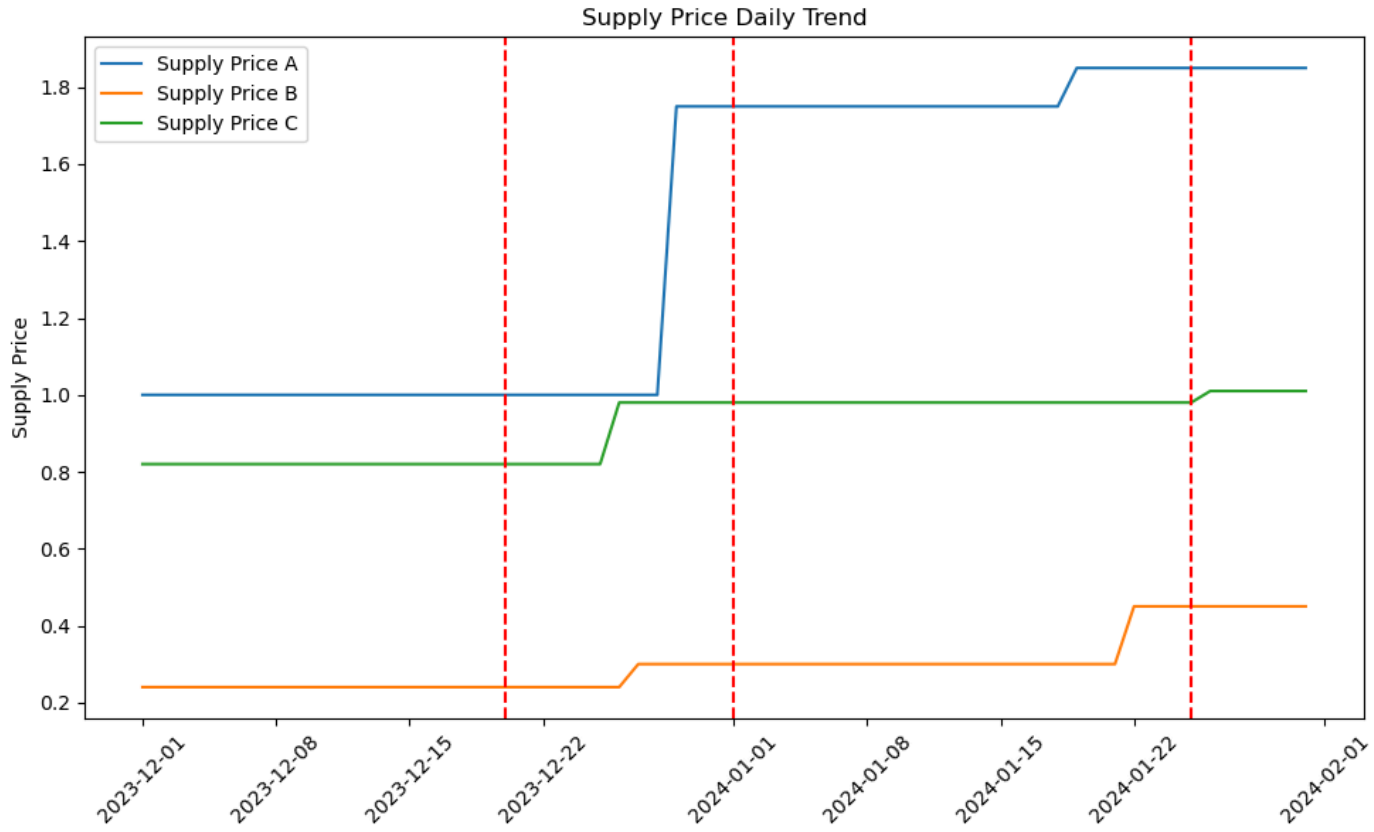


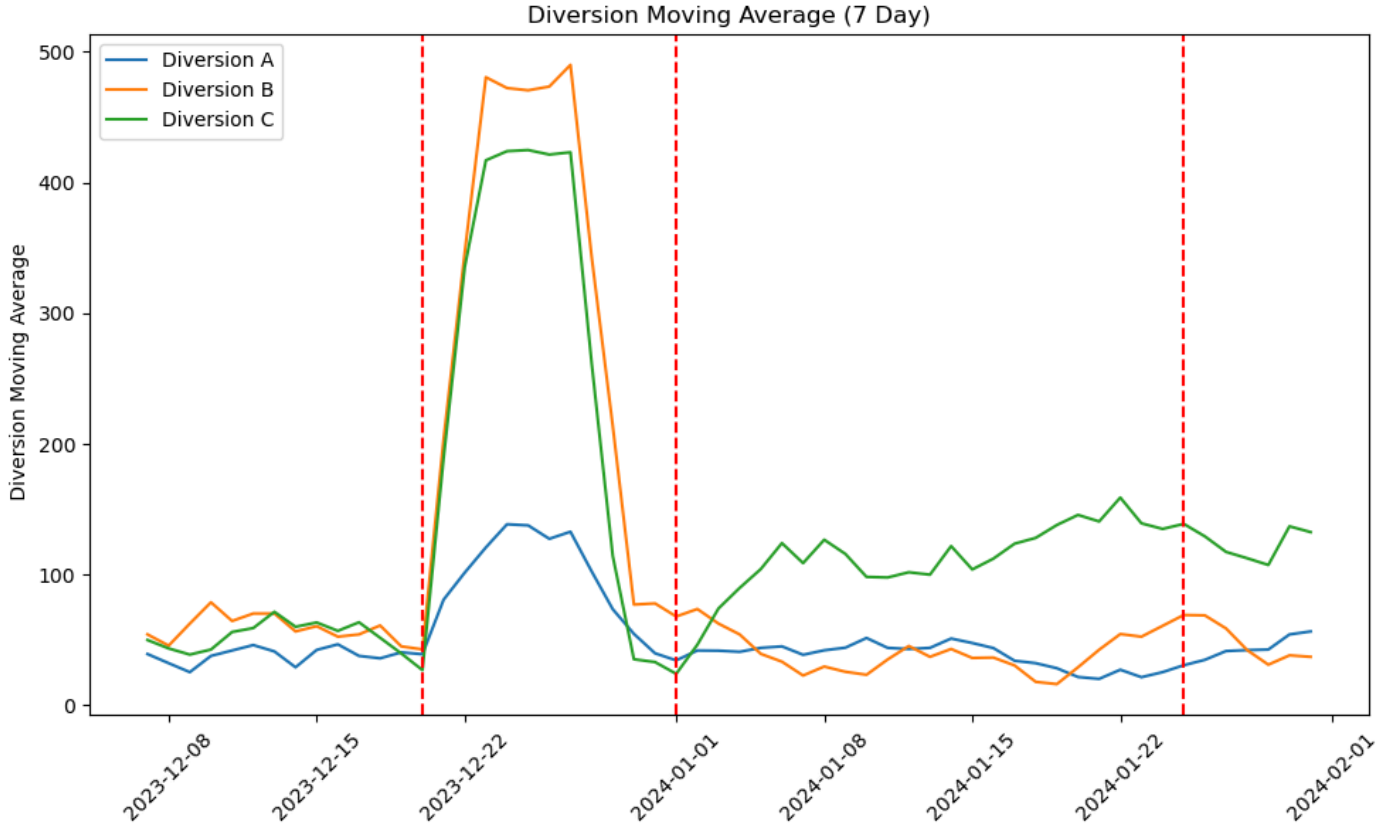
[Annex2]


Package Price Daily Trend Moving Average (7 Day)
Package Price A
Package Price B
Package Price Moving Average
6.5
6.0
5.5
5.0
4.5
2023-12-08
2023-12-15
2023-12-22
2024-01-01
2024-01-08
2024-01-15
2024-01-22
2024-02-01

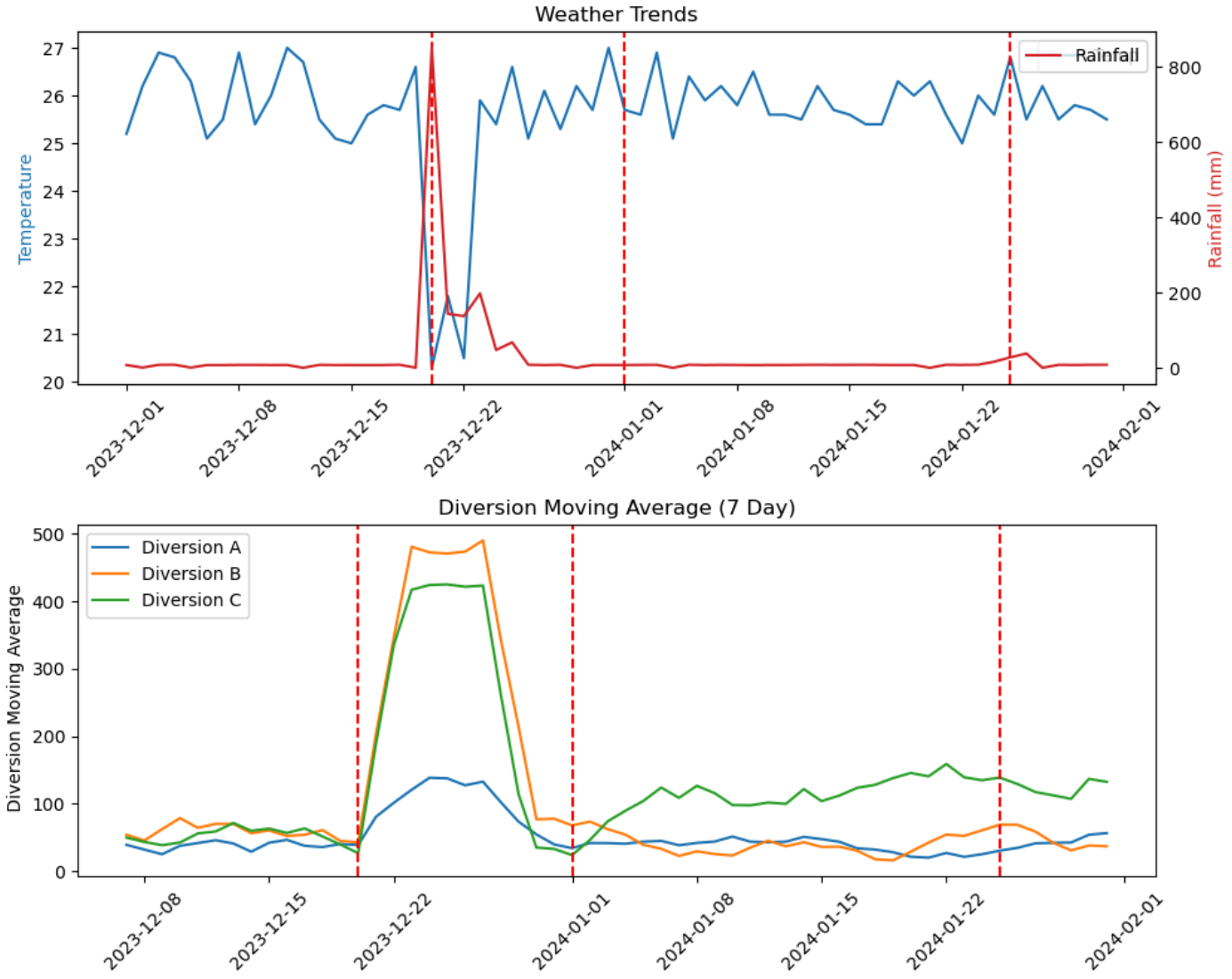

Diversion Moving Average (7 Day)
Diversion A
Diversion B
Diversion C
Diversion Moving Average
500
400
300
200
100
0
2023-12-08
2023-12-15
2023-12-22
2024-01-01
2024-01-08
2024-01-15
2024-01-22
2024-02-01

[Annex3-1]


Supply Price Daily Trend
Supply Price A
Supply Price B
Supply Price C
Supply Price
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
2023-12-01
2023-12-08
2023-12-15
2023-12-22
2024-01-01
2024-01-08
2024-01-15
2024-01-22
2024-02-01


Diversion Moving Average (7 Day)
Diversion A
Diversion B
Diversion C
Diversion Moving Average
500
400
300
200
100
0
2023-12-08
2023-12-15
2023-12-22
2024-01-01
2024-01-08
2024-01-15
2024-01-22
2024-02-01

[Annex 3-2]


Weather Trends
Temperature
Rainfall (mm)
Rainfall
27
26
25
24
23
22
21
20
800
600
400
200
0
2023-12-01
2023-12-08
2023-12-15
2023-12-22
2024-01-01
2024-01-08
2024-01-15
2024-01-22
2024-02-01
Diversion Moving Average (7 Day)
Diversion Moving Average
Diversion A
Diversion B
Diversion C
500
400
300
200
100
0
2023-12-08
2023-12-15
2023-12-22
2024-01-01
2024-01-08
2024-01-15
2024-01-22
2024-02-01