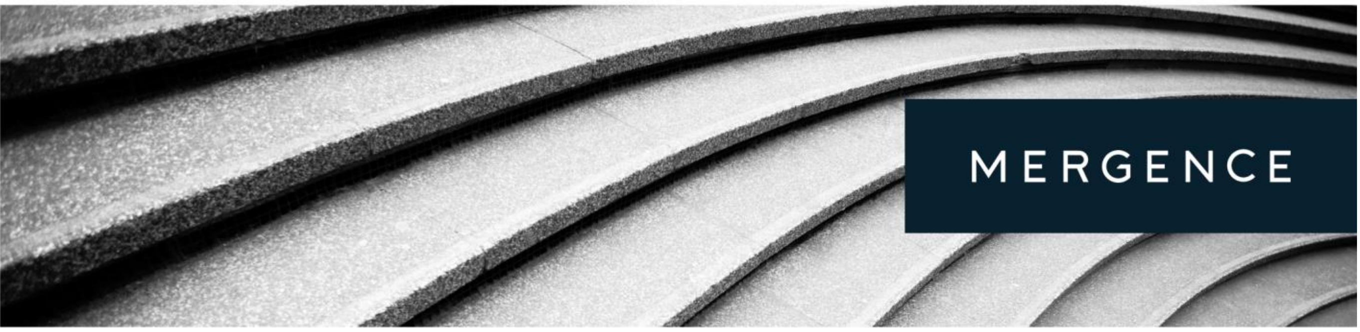

An update on safety in the South African mining sector

prepared by

Mergence Investment Managers Equity Research

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For more information, please contact

Company Name	:	Mergence Investment Managers	
Physical Address	:	6th Floor, Equinox Building cnr Main & Milton Roads Sea Point, 8005	
Contact Persons	:	Brad Preston	Thobela Bixa
Title	:	Director: Listed Investments	Investment Analyst
E-mail	:	bradp@mergence.co.za	thobela@mergence.co.za
Telephone	:	+27 21 433 2960	

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1. Executive summary

Last year we published the report, *Safety in the South African Mining Sector*.[1] The research looked into 14 mining companies listed on the Johannesburg Stock Exchange (JSE), tracking their Lost Time Injury Rates (LTIR), training expenditure per employee and earnings performance from 2007 to 2015. In the current report we highlight safety industry and company specific trends. We have increased the number of companies to 17, included the 2016 results, and added other factors such as the number of fatalities and the fatality rate.

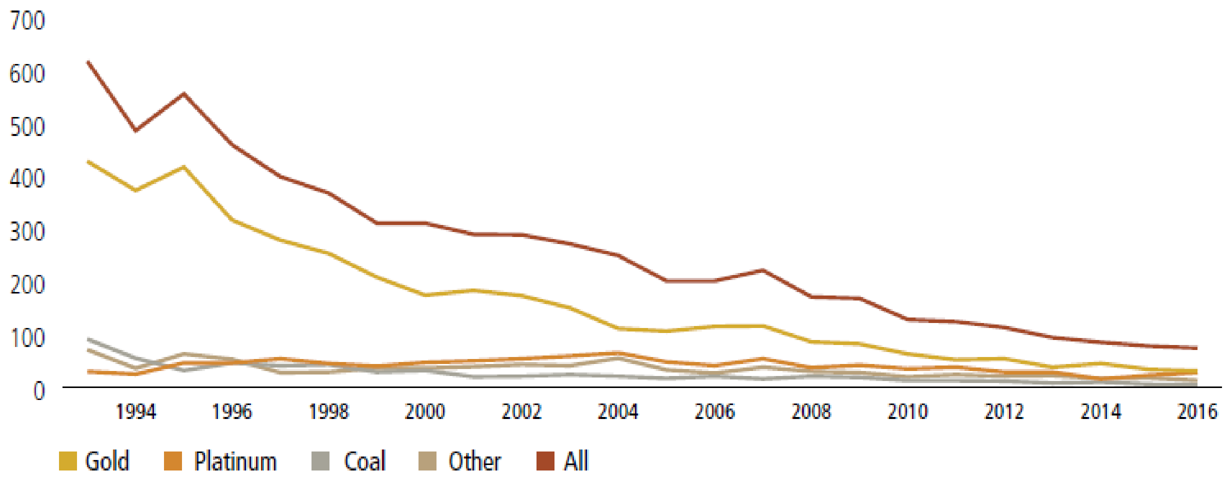
Safety in the South African mining sector has improved tremendously since the early 90s. All industries - Gold, platinum group metals (PGMs) and Diversified operations - have become safer by reducing the number of fatalities, fatality rate and LTIR. Diversified refers to diamonds, coal, iron ore, chrome and all other commodities except Gold and PGMs.

In all matrices under consideration, the Diversified industry has outperformed peers followed by PGM, with the Gold industry ranking last. Kumba Iron Ore and Exxaro have both consistently outperformed peers where higher investment spend on employee training was coupled with low fatalities, low fatality rates and low LTIR. On the other hand, Harmony Gold was a standout underperformer where lower investment spend on employee training was coupled with high fatalities, high fatality rates and high LTIR.

2. SA mining safety has improved significantly

Figures 1 to 4 below illustrate that safety in the SA mining sector has improved significantly. Total fatalities have declined by 88% between 1993 and 2016, **Figure 1**. Major improvement has come from the Gold industry which saw a 90% decline since 1993. Since 2007 total fatalities have consistently declined year-on-year and since 2013 the industry has reduced fatalities to below 100.

Figure 1: Number of fatalities have declined significantly

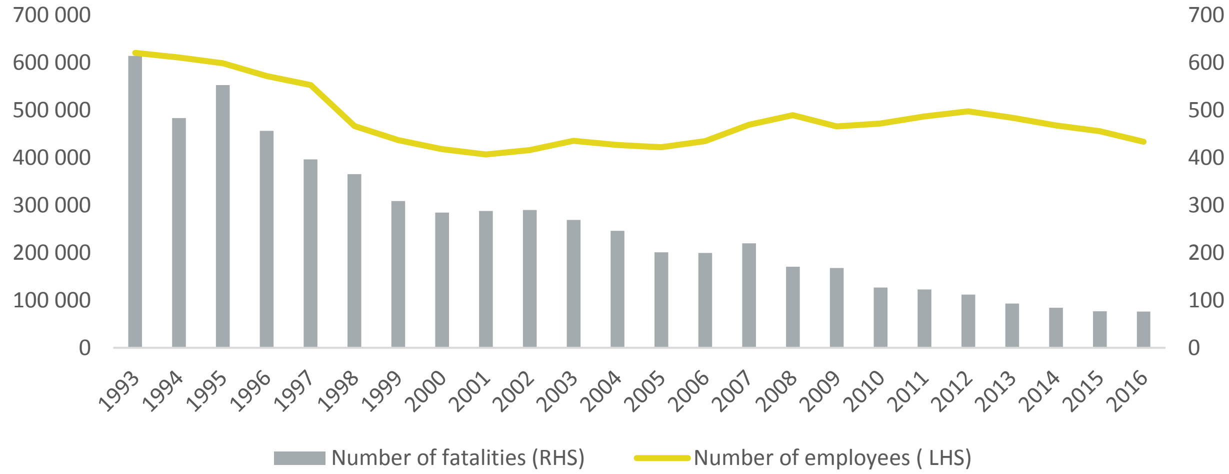


Source: SA Chamber of Mines

[1] Available on request

More significantly, while the number of fatalities has declined by close to 90%, the number of employees has only reduced by 30% since 1993 (**Figure 2**). This implies that the SA mining sector has not only reduced fatalities in absolute numbers but has also become far safer than it was 24 years ago.

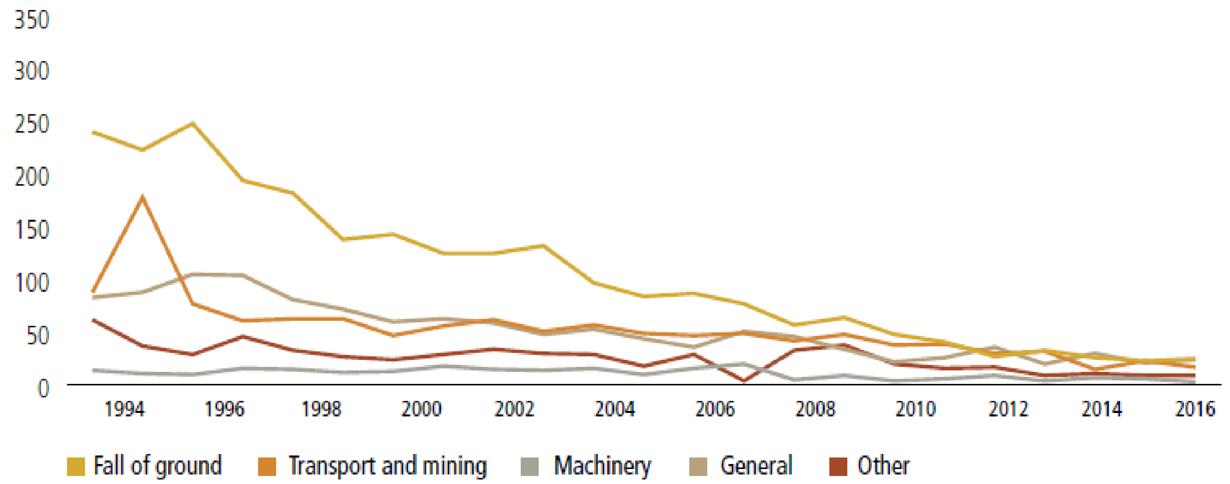
Figure 2: Fatalities decline while workforce remains flat



Source: SA Chamber of Mines

Fatality causes have also been declining with fall of ground (which has been the biggest cause for fatal incidences) declining by over 80%.

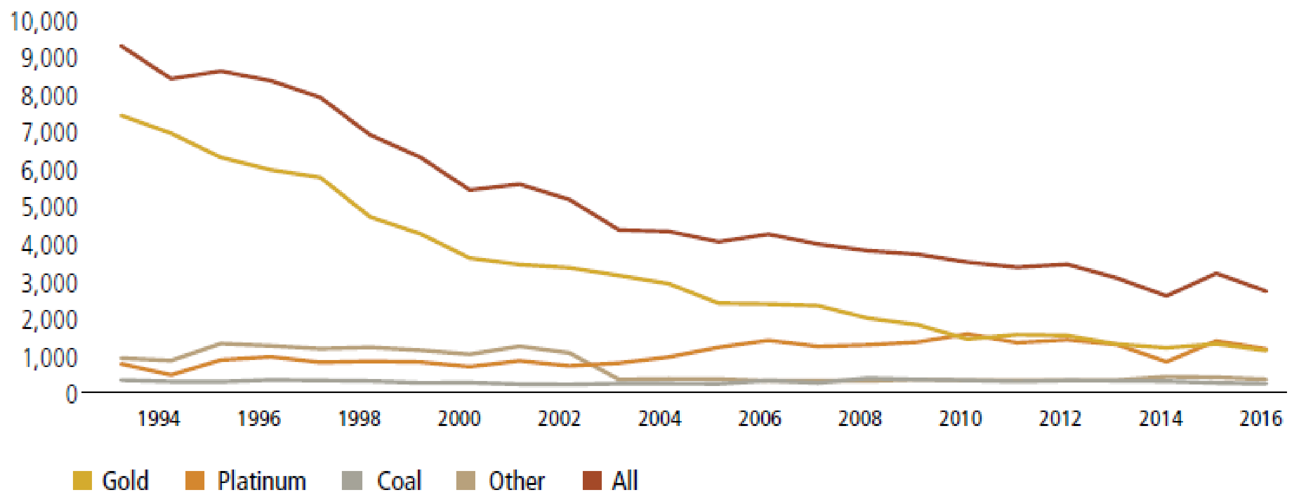
Figure 3: Fatality causes have also been declining



Source: SA Chamber of Mines

Finally, the number of reported injuries has also declined tremendously, by over 60% since 1993. Again, the Gold industry saw a greater reduction in injury incidents by over 70% compared to peers. In the same period, the PGM industry reduced injury incidents by over 50%.

Figure 4: Reported Injuries have also declined



Source: SA Chamber of Mines

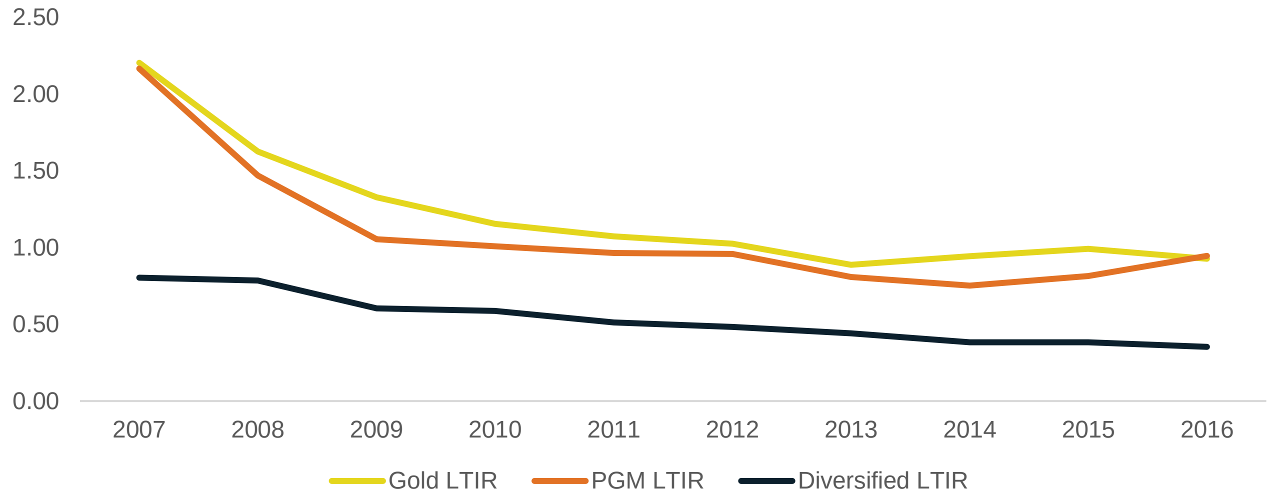
3. Methodology

The data used in this research were obtained from company reports (sustainability reports, annual reports or integrated annual reports), the SA Chamber of Mines and Bloomberg. The research covers 17 JSE listed mining companies. LTIR is based on 200 000 man working hours.

4. Safety has Improved on JSE listed mining companies

All mining industries have seen improved safety as depicted by the decline in the LTIR over the past decade, **Figure 5**. The Gold industry took the lead LTIR declining by 58% while PGM and Diversified declined by 56%. Diversified mining companies have consistently outperformed both the Gold and PGM miners. This can be attributed to the nature of operations of Diversified miners which have newer mines compared to Gold and PGM mines. Also, Gold and PGM mines have deeper underground operations with some as deep as 3 000m compared to the shallower underground or open-pit operations of Diversified miners.

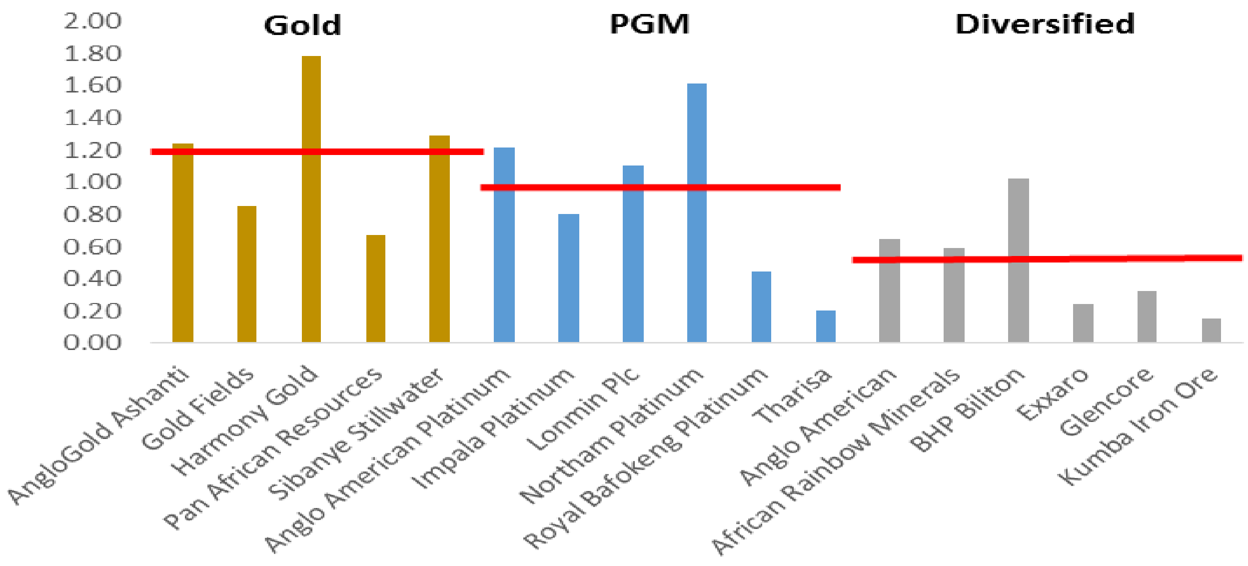
Figure 5: Improved Lost Time Injury Rates



Source: Company Reports, Bloomberg, Mergence Calculation

Below we averaged each company's LTIR from 2007 to 2016, **Figure 6**. The Gold sector has the highest average LTIR at 1.17 followed by PGMs at 0.90 and Diversified at 0.50. Harmony Gold, Northam Platinum and BHP Biliton stand out from each sector with the highest average LTIR over the period under consideration. Pan African Resources, Tharisa and Kumba Iron Ore have outperformed their peers in each respective industry. Again, one can see that the older and deeper Gold mining companies have underperformed newer and shallower companies in Diversified mines.

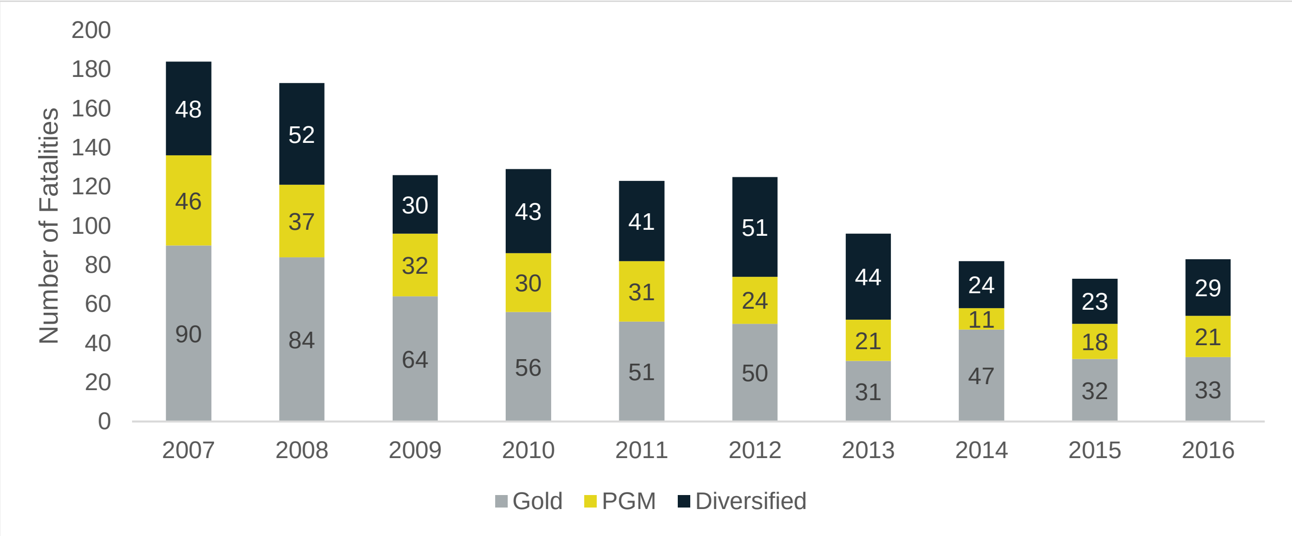
Figure 6: Company and sector LTIR averages between 2007 and 2016



Source: Company Reports, Bloomberg, Mergence Calculation

The absolute number of fatalities on JSE listed mining companies in our analysis has declined by 42% over the last decade, **Figure 7**. Fatalities from the Gold industry took the lead with fatalities down by 63%, followed by PGM down 54% and Diversified down 40%. However, the Gold companies still have the highest number of fatalities in SA mining. The death toll in the Gold sector can be attributed to the age and depth of the Gold mines compared to PGM and Diversified mining companies.

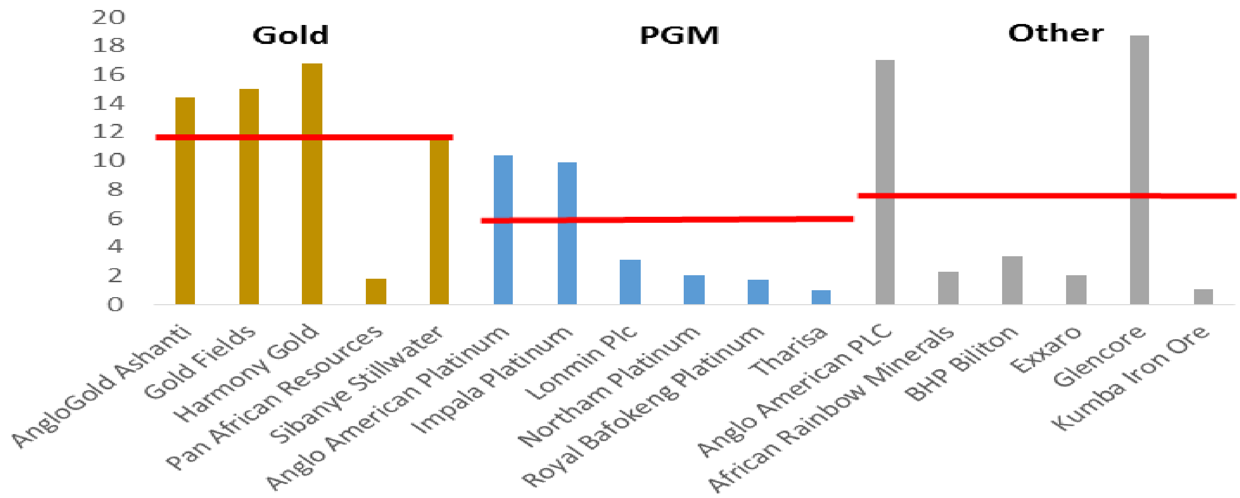
Figure 7: Fatalities for companies under analysis have been falling



Source: Company Reports, Bloomberg, Mergence Calculation

Pan African Resources outperformed Gold peers significantly over the past decade in the average number of fatalities, **Figure 8**. We attribute the outperformance to the smaller workforce compared to peers which are at least four times the size of that of Pan African Resources. In the PGM industry, Anglo American Platinum and Impala Platinum significantly underperformed peers. Both Anglo American Platinum and Impala Platinum have the biggest workforce in the group. Finally, Anglo American PLC and Glencore underperformed peers significantly in the Diversified industry. Again, both Anglo American PLC and Glencore have the biggest workforce in the group. One can therefore conclude that the bigger the workforce the more difficult it is to achieve lower fatalities. Both Tharisa and Kumba Iron Ore outperformed peers in the PGM and Diversified industries respectively.

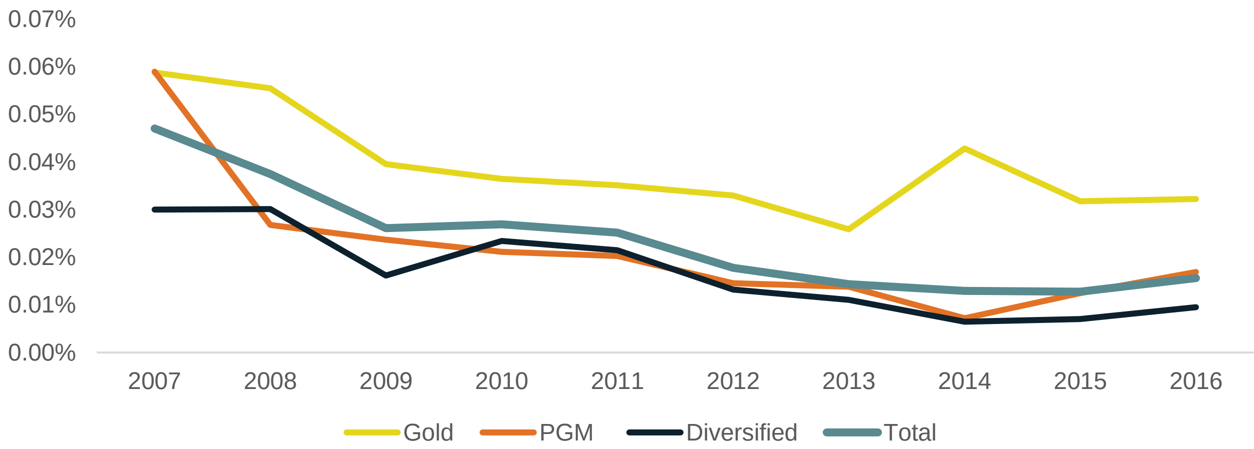
Figure 8: Company average fatalities over the past decade



Source: Company Reports, Bloomberg, Mergence Calculation

The number of fatalities as a percentage of the workforce (fatality rate) has also been declining (-67%) over the past decade, **Figure 9**. In the period between 2007 and 2016 the Gold industry decreased employee numbers by 33% while PGM and Diversified increased by 59% and 90% respectively. This implies that the Gold industry has managed to reduce labour and the number of fatalities simultaneously. Both PGM and Diversified have decreased fatality numbers while increasing their labour workforce, thus making their operations safer per additional employee.

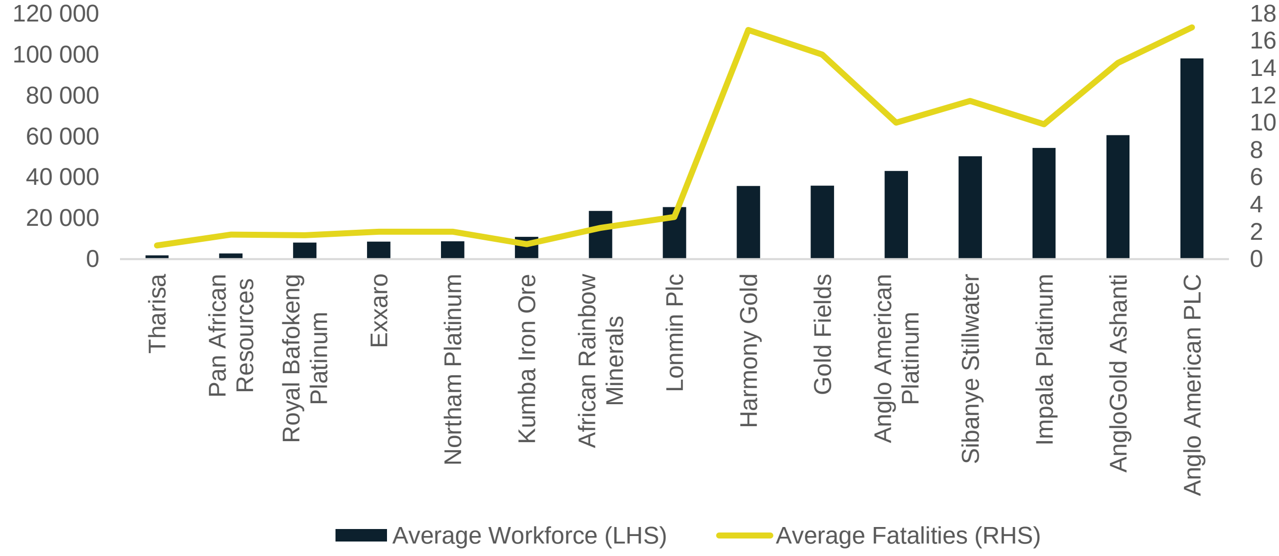
Figure 9: Fatality rates have also been on the decline



Source: Company Reports, Bloomberg, Mergence Calculation

Companies with a larger workforce suffered more fatalities in their operations compared to those with a smaller workforce, **Figure 10**. Harmony Gold and Gold Fields underperformed peers because, though they have a workforce that is a third of Anglo American PLC, their average fatalities are on par with Anglo American PLC.

Figure 10: Bigger workforce increases fatality chances

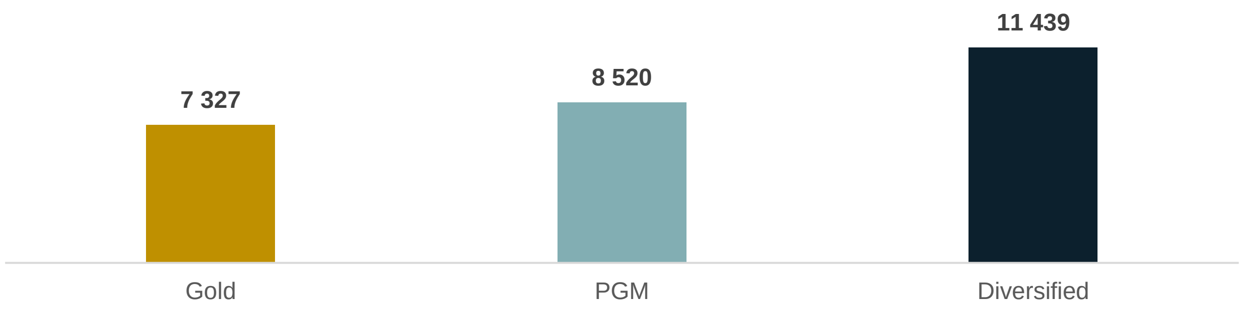


Source: Company Reports, Bloomberg, Mergence Calculation

5. Training expense per employee

On average, Diversified companies spend more on employee training followed by PGMs, and Gold companies ranking last, **Figure 11**. BHP Biliton and Glencore do not provide their annual training costs and were therefore excluded from the training expenditure study.

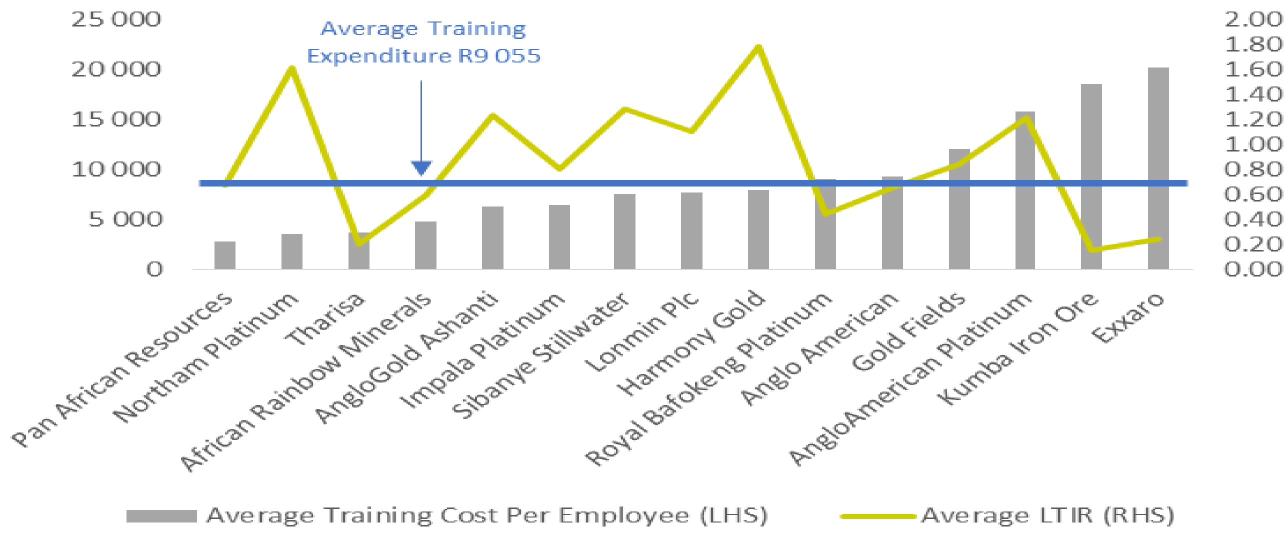
Figure 11: Average training expenditure



Source: Company Reports, Bloomberg, Mergence Calculation

With the exception of Pan African Resources, Tharisa and African Rainbow Minerals, companies that spend below the average training expenditure annually per employee (R9 055) over the period of consideration (2007-2016) saw higher LTIR compared to those that spend above this average, **Figure 12**. Northam Platinum and Harmony Gold had the highest LTIR compared to any other company. For Northam Platinum, the high LTIR was accompanied by a significantly low employee training expenditure. Tharisa, Kumba Iron Ore and Exxaro had the lowest LTIR compared to peers. Both Kumba Iron Ore and Exxaro significantly spend more on employee training. One can therefore conclude that Kumba Iron Ore and Exxaro benefited from their investment into employees while Northam Platinum seem to have suffered greatly with higher LTIR for under-investing.

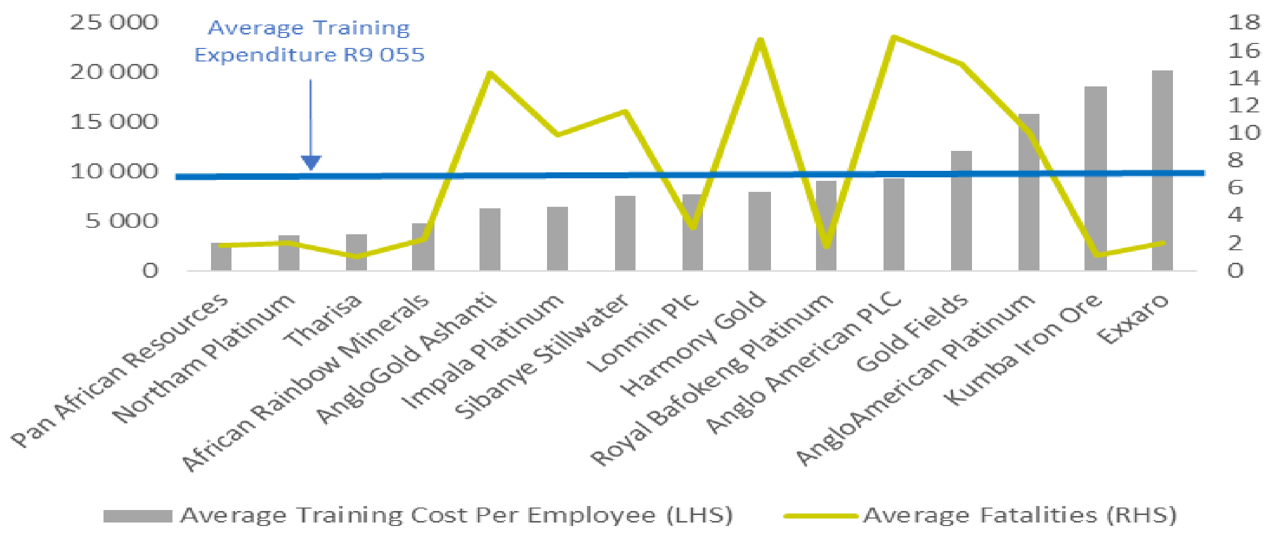
Figure 12: Employee training expenditure and LTIR



Source: Company Reports, Bloomberg, Mergence Calculation

Again Kumba Iron Ore and Exxaro seem to have benefited from the employee training investment by having fewer fatalities. With some exceptions, companies that spend below the average training expenditure (R9 055) over the period of consideration (2007-2016) saw higher fatality rates. Harmony Gold and Anglo American PLC seem to have been the most affected by under-investing into employee training.

Figure 13: Employee training expenditure and average fatalities



Source: Company Reports, Bloomberg, Mergence Calculation

6. Conclusion

The South African mining industry has drastically improved safety. Since 1993, fatalities, fatality causes and reported injuries all reduced by 88%, 80% and 60% respectively. Companies analysed by us improved their safety between 2007 and 2016. This was evident in the reduction of LTIR, fatalities and fatality rates which were down by 57%, 42% and 67% respectively.

Harmony Gold, Northam Platinum and BHP Biliton significantly underperformed peers in their respective industries. On the other hand Pan African Resources, Tharisa and Kumba Iron Ore outperformed their peers in each respective industry. Harmony Gold, Anglo American Platinum and Glencore had the highest number of fatalities in each respective industry. Pan African Resources, Tharisa and Kumba Iron Ore had the lowest number of fatalities in the different industries.

Diversified miners invested more on employee training followed by the PGMs, with Gold miners investing the least. Companies that spend above the average employee training expenditure of R9 055 seem to have benefited from the investment by having lower LTIR and lower fatalities. This was demonstrated by Kumba Iron Ore and Exxaro that invested more on employee training expenditure and thus had lower LTIR and fatalities. In contrast, Northam Platinum which significantly under-invested in employee training expenditure saw one of the highest LTIR in our sample of companies. Harmony Gold’s low employee training expenditure seems to have affected the company negatively by having both higher LTIR and fatalities. We are not arguing that R9 055 is the magic average employee training expenditure number in order to have lower LTIR and fatalities but it does appear that under-investment seems to have a negative effect on safety performance.