CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

8.1 Conclusions

The following findings may be drawn out from the present research study.

1. The three-dimensional balancing diagram is an essential and precise tool for planning the tandem operation of draglines in the field. It determines the rate of coal exposure, percentage rehandle, and synchronizes the linear advancement of the draglines.
2. The percentage of material that needs to be rehandled is the same for a given cut width and stripping bench height, regardless of the capacity of the dragline used in horizontal tandem operation. The percentage rehandle remains unchanged for a given cut width and stripping bench height if both the draglines have equal capacity in both modes vertical of tandem operation.
3. While a single dragline is preferred if it can satisfy production requirements without rehandling, using tandem dragline operation can result in cost savings per ton of coal exposed, leading to greater economic benefits for the mine, even though it requires additional capital expenditure on procuring a second dragline.
4. As the rate of the ratio of leading dragline to lagging dragline capacity decreases, the thickness of the lower bench also increases in both modes of vertical tandem operations.
5. There are more benefits to vertical tandem operation than horizontal tandem operation and vertical tandem operation mode 2 has more benefits than mode 1.
6. The spoil dump space increases with the increase in seam thickness.

7. The percentage rehandle varies according to the capacity of the dragline if the cut width and the height of the stripping bench are constant when the draglines are operated in vertical tandem.
8. An increase in the height of the stripping bench increases the percentage of rehandling and decreases the rate of coal exposure, as well as decreasing the linear advancement of the draglines.
9. The field's actual production was discovered to be less efficient than predicted by software, but this can be addressed by implementing certain corrective actions.
10. The width of the cut should be determined first based on the maximum utilization of the dragline's reach, and then the height of the stripping bench should be decided based on the required rate of coal exposure.
11. In vertical tandem operation, it is necessary to accurately divide the bench in order to maintain the same linear advancement for each dragline.
12. A very large capacity leading dragline with a smaller capacity lagging dragline cannot feasibly operate in vertical tandem.
13. As the cut width increases, the percentage of overburden that needs to be rehandled decreases, and the rate of coal exposure increases, up to a certain width which depends on the leading dragline's reach.
14. The rate of coal exposure is highest while operating in vertical tandem mode-2 and lowest when operating in horizontal tandem mode.

8.2 Recommendations for future research

1. Research may be beneficial to analyze three different dragline deployment, such as a leading dragline on an upper bench, a lagging dragline on a lower bench, and a third dragline on an extended bench. This would then be compared to tandem dragline operation.

2. The current computer program is suitable for uniform-thickness single continuous coal seam. The program can be improved, or a new module can be added to the software so that geological discontinuities in the coal seam, such as faults and non-uniform single as well as multiple coal seams, can also be incorporated.
3. Mitigative measures should be taken to increase the percentage of cast blasting in opencast mines, as an increase in cast blasting would increase the overall productivity of the dragline system.
4. Artificial intelligence and machine learning models may also be incorporated or linked to this programme to predict the dragline production and productivity.