

# **1 INTRODUCTION**

The research will be focused on the management practices and continuous improvement tools that a first line supervisor of a production unit in an underground coal mine needs, compared to what is available in the management scholarship environment.

## ***1.1 RESEARCH ENVIRONMENT***

An underground coal mine consists of support functions, such as financial, human resources and information management departments, and the technical functions. These technical functions include the production units, maintenance units and the environmental management department. A typical production unit has the following resources: approximately 15 team members per shift, one continuous miner (the equipment that cuts the coal from the coal face) and three shuttle cars that transport the coal from the continuous miner to the continuous feeder (which feeds the coal onto the network of conveyor belts). The production unit also includes electrical switchgear and various other smaller equipment used in the production process. The team members are a combination of engineering and production personnel. The first line supervisor for the section can be from either the engineering or production field: the shift boss or the foreman. Roving maintenance teams also exist: they would have the responsibility for scheduled maintenance activities as opposed to the section maintenance personnel who would be responsible for the first line maintenance duties. A small mine (approximately 3.5 - 4 million tons a year) will have 4-5 production sections.

## ***1.2 CHALLENGES FACING THE FIRST LINE SUPERVISOR***

In the competitive coal mining industry it is important for a mining company to be flexible, lean, and profit driven. Coal prices can vary quite substantially from year to year placing enormous pressure on the bottom line of coal mining companies. The coal mining company needs to adapt to fluctuations in demand for coal and the type of coal quality needed (i.e. the percentage fine coal allowed, or the heat value (for power stations), or the percentage contamination allowed (non-carbon elements in the coal) very quickly in order to stay

profitable and to sustain profits over the long term. This creates pressure on the mine to continuously improve and stay lean, but still produce coal that is according to the quality and demand requirements.

To be able to adapt quickly, the coal mining company must be focused and business orientated with the end goal of the company in mind – to make profit now and in the future. This implies that all the employees of the mining company must be working towards this common goal and must be able to adapt quickly to the changing environment of the coal market. The top management team must set the strategic direction and the middle management team needs to implement specific actions to follow the strategy. This implies that middle management and the first line supervisors need to have the necessary skills to adapt quickly, make the necessary changes and then track progress continuously. The first line supervisors need to manage their production units on sound business principles using current world-class management tools and techniques in order to continuously improve the business.

The current reality is that most of the first line supervisors of production units are highly skilled in the technical and operational aspects of running a coal mining unit but lack in specialised operational management skills. They are therefore normally not adequately equipped to deal with the changing and stretched demands placed on them from middle management. The first line supervisor has a need for an operational management model that will assist him/her in running and continuously improving the production unit as a productive and profitable unit in the long term based on principles from accepted operational management philosophies.

There are many management philosophies that are used successfully in mainly manufacturing companies. These are for example lean manufacturing, quality management, constraint management, BPR (business process re-engineering) etc. These management philosophies all incorporate specific principles, operating rules and techniques and problem solving methods. For each philosophy many textbooks, articles, and case studies have been written on the subject matter. Therefore a detailed and very comprehensive information base is available for each management philosophy. Each philosophy has a different impact on how functional and operational activities must be carried out.

The management philosophies described are mostly developed for use in a manufacturing company. The principles, techniques, guidelines and tools refer to a factory environment with fixed workstations, the transformation of raw materials into final products and the distribution of these final products. The philosophies assume a company wide implementation and are more than just management tools – it is a total perspective of the way that business is done at the company.

It is important to note that there are physical, logistical and management differences between a coal mining production unit and a manufacturing company. For example in a mining unit the physical environment presents certain boundaries and increased safety risks that you would not normally find in a manufacturing plant. There are also many logistical challenges that face the maintenance team of a mining production unit that are not found in a manufacturing plant. These are for example the physical environment in which maintenance must be done, the distance from workshops and the physical bulkiness and size of the equipment to be maintained. The scale of operations of a mining production unit is also smaller in a mining production unit than in a manufacturing company, specifically if the number of personnel, the number of equipment and the product diversity are compared. It therefore implies that the implementation of one of the well known, widely used and accepted operational management philosophies in an underground coal mining production unit would need to be adapted to allow for the differences.

To summarise: there is a need in coal mining companies to have technical first line supervisors with excellent operational management skills as the current operational management skills that first line supervisors have are inadequate. Furthermore the current operational management philosophies that are available for use by first line supervisors are not developed for direct application in a mining environment and are also aimed at implementation for a whole company, not individual production units.