



An evaluation of the Self-directed work team concept as a means to improve overall performance on South African gold mines

by C.F. Strydom* Paper written on project work carried out in partial fulfilment of B.Eng (Mining Engineering) degree

Synopsis

The Self-directed work team concept is the product of relentless performance pressure on American industries during the late eighties and early nineties from other world industrial leaders like Japan. The concept proved to be a successful vehicle by which the Americans could increase their production and improve their safety statistics. The aim of this study is to evaluate the concept as a means to improve the overall performance on South African gold mines.

The study is directed by a historical research section, answering questions like:

- Why do we need to change?
- What is a Self-directed work team?
- What are the principle advantages of the concept?
- What are the essential requirements for the concept to succeed?

The study also includes an empirical research section that focuses on the current Self-directed work team situation in the South African gold mining industry. The empirical research section is limited to three case studies within AngloGold due to a study period of only six weeks. The mines chosen for the case studies have been labelled Mine 1, Mine 2 and Mine 3. The latter being the base mine allowing for a more in depth study. This includes a perception analysis towards Self-directed work teams within the mine.

The study proves the truth of the Latin proverb 'Tempora mutantur, nos et mutamur in illis' meaning 'The times are changing, and we are changing with them'. The chief change catalysts identified are a dwindling gold price and a projected labour crisis. From the study it is evident that the Self-directed work team concept disposes of the critical parameters required for a dramatic improvement in performance. The study also indicates that for the concept to succeed, certain factors like top-level commitment and management-employee trust have to be in place.

Sadly, the concluding part of the study proves that very few of the identified critical success parameters are present in the South African gold mining industry. This can serve to explain why the industry only has success with the concept when monetary gain is the chief motivator. The study only focuses on the reasons why the concept is not performing to its full potential and does not wander into explaining the reasons for the current unsupportive milieu in the industry.

Self-directed work teams could well rescue the South African gold mining industry but currently we are driving a square pin into a round hole!

Terminology

SDWT—Self-directed work teams
ISW—In-stope worker
TEC—Total employee costed

AEL—Adventure Experiential Learning
POLC—Plan, organize, lead and control
Silo—The confinement of departments preventing networking

JCI—Johannesburg Consolidated Investment Co. Ltd

Introduction

Change really infers that employees' worldviews are challenged. Everybody sees the world, and all its truths in different ways. If a person sees the current world as perfect, it is only natural that he will resist change. So, many people see the past as being perfect, and always refer to the 'good old days'. Well, if they actually had to live in the 'good old days', one wonders how many of them would then also want to go back another hundred years or so, until eventually they end up at the beginning of time!

The fact is that we live today, and today demands that we consider today's realities. The company that can change the fastest, produce the best at the lowest cost will be the only survivor.

The challenge therefore is to ensure that everyone appreciates the fact that the enemy is the competition, not management, labour nor anybody within the organization. Our worldview must change from seeing the past as perfect and the future as a disaster to everybody seeing the future as our challenge and leaving the past behind. Everybody must understand and appreciate that there is a clear need for change (after G. Hamel 1994). The question now is: 'Why change?'

Background

The gold price has been a cause for concern to the gold mining industry over the past decade, with various factors contributing to its vicious downward spiral. The problem is amplified by the fact that our production cost has not decreased by the same margin over this period, placing enormous pressure on mine

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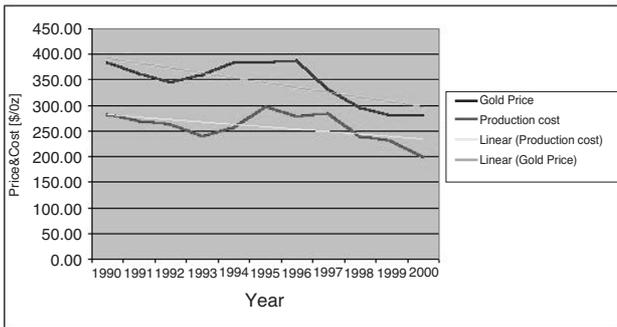


Figure 1—Gold price vs. production cost

profitability. Figure 1 shows the declining gold price in US dollar terms for the past decade as well as production cost.

Managing cost is the buzzword in the mining industry as of late and many attempts have been made to decrease our costs.

In most industries technology has risen to the occasion and improved many a company's cost crisis. The gold-mining industry probably lags the rest of the mining world in respect of applied technology where the ore is actually mined. Moves towards more sophisticated equipment place demands on the members of the mining discipline. These members' inability to cope with the increased demands has led to the failure of many projects. We tend to silo operations and maintenance, which leads to a downward spiral of accusations and counter accusations when an item of equipment fails to meet expectations. Consequently, we developed 100% hindsight knowing that future developments will not work, even before they leave the drawing board. Almost all operational problems could also be traced back to this continual feud between either engineering and mining sections or management and workers or different work shifts. Typical examples of these feuds are the ones between day and nightshift regarding the state of the strata or sub-standard support, each one blaming the other for the sorry state of affairs. We have to ask ourselves the question: 'What are the reasons for our lack of advancement, for our inability to achieve quantum leaps in efficiency?'

Over the past decade, we have seen that our workers' efficiency has only improved by 11.89% to a current 3.87 [m²/TEC/year] in 2000. The reason why this is cause for concern is that labour accounted for 53.3% of all mine costs during the year 2000. Therefore, if we can decrease our labour cost we can improve our cost equation and consequently be more profitable in the face of a decreased gold price. The lack of improvement over the past decade was not only limited to cost and worker efficiencies; we find that safety statistics have not improved either.

Injury rates for 1990 were 19.21 (injuries/1000 persons at work) and 18.6 (injuries/1000 persons at work) for 2000 indicating a 0.61 (injuries/1000 persons at work) improvement. The industry at large needs to improve cost, safety and efficiency in order to stay competitive in the global arena. To do this we need to effect change in the dark corners of habitual management and company structure. These two critical aspects have changed very little since the beginning of gold mining in South Africa. The reality is that

if we do not change from within, the economy and opposition will most certainly change us from without.

Problem statement

The Self-directed work team concept has dawned as a possible solution to improve the South African gold mining industry's cost, production and safety statistics. The purpose of this project is to evaluate the Self-directed work team concept as a means to improve overall performance and to identify problems associated with the introduction thereof.

Objectives

To address the problem as stated, the following objectives have been set:

- Determine the current management structure and style in the gold mining industry
- Define the concept of Self-directed work teams and its history
- Determine the principal advantages of the concept and essential requirements for its success
- Determine the current situation of the Self-directed work team concept in the South African gold mining industry as well as its problems and identified pitfalls.

It is not the purpose of this report to extrapolate these findings as a criticism or appraisal of the industry in general, but rather to define and stress the importance of key parameters for a successful implementation of SDWT.

The following is a summary of management development in general industry since the 18th century (Torres and Spiegel 1990). The purpose of this summary is to label the gold mining industry regarding company structure and management style development over the past century. Figure 2 below shows the spiral of management development.

From the study of management development the South African mining industry was labelled to be early 20th century managing by 'directing'. The following serves to illustrate and justify this bold statement.

Management by directing (early 20th century)

Thanks to Stevenson and Watt, mechanization and with it mass production saw the light during the early 20th century. With it they unleashed immense potential to increase productivity. This resulted in a sudden demand to develop an effective and efficient method to manage the large and ever growing workforce. Max Weber, a German sociologist

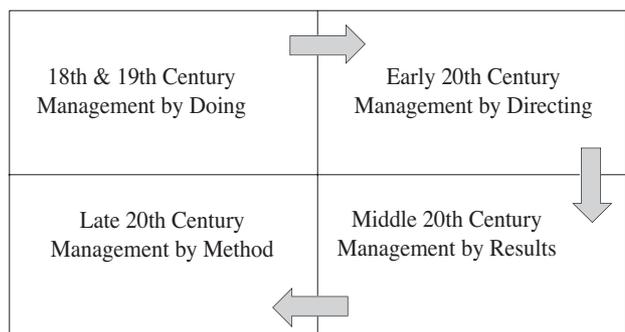


Figure 2—Management development cycle (Torres and Spiegel 1990)

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developed **bureaucracy**, a concept by which people in large organizations can be managed.

Weber identified the following as the fundamental principles of bureaucracy:

- A hierarchy of command based on rational authority; which was established by the person's position in the hierarchy
- Specialization and division of labour by functions, which was the birth of silo's within company structure
- Managing by policies and procedures to ensure adherence and control of people
- A system of promotion based on skills and experience (measured by objective standards)
- A system of communication within the organization, and with the public, characterized by written rules (decisions kept on public record).

The problem with this approach is that the organization is rendered inflexible. People were seen as mere extensions of the machine being interchangeable and expected to react unemotionally to the job. They managed by **control**.

Another contributor to the management by directing was Frederick Taylor, called 'the father of scientific management'. Taylor developed a methodology for increasing the efficiency of the work force. He did this through training workers in one particular task and then combining them to form a process.

Taylor's principles were as follows:

- Time and motion studies to determine the most effective way of doing things
- A differential piece/rate system by which workers were rewarded for exceeding predetermined standards of performance
- A line foreman and the planning department did selection, placement and training of workers
- Standardization of the tools, methods and cost systems in which workers were interchangeable and easily replaced.

The worker was expected to work and not to think. They were never involved in decision making or planning. The reward system during this time was very unfair. Management set production standards that when met they would imply financial reward. The problem was that in some cases, the standards were unreachable and in other cases, management would constantly move up the standard to ensure growth but at the cost of the workforce. Because of this, there was a phenomenal increase in the amount, and activity of unions.

From the above it is evident that the South African gold mining industry still exhibits an early 20th century character. The industry fully complies with Max Weber's fundamental principles of bureaucracy as discussed previously.

Traditionally the structure of mines has been organized around the various disciplines, e.g. Mining, Engineering, Metallurgy, Administration, etc. and tended to operate in fairly watertight compartments, keeping communication between the divisions to an absolute minimum.

It has long been believed that setting high technical standards is a prerequisite to becoming an effective leader. This perception placed pressure on organizations to reward technical competence with a promotion into management.

Today the realization is that leadership has more to do with 'how' a person is rather than 'what' he or she has accomplished technically. It is also possible that a person is proficient in both realms.

Legislation of the past, and present, has underpinned this 'separateness'. Job allocation with one function per employee creates an artificial shortfall in skills supply, while the legal requirements placed upon holders of various certificates of competency artificially restricts broadening of the scope of activities between the various disciplines.

Structures, therefore, tend to support empires built up within disciplines in order to fulfil a function but they do not necessarily support a business unit.

Discipline-based structures do have positive aspects in that skills are developed and honed, but in fairly narrow fields. On the negative side, this leads to fragmentation within departments and a resultant lack of team effort towards a common goal. Managers in divisional silos tend to see each other as contenders for finite budgets and competitors for increasingly narrow promotional opportunities.

The competitive nature amongst management also finds its way down the hierarchy to the middle managers where they in turn compete for a dwindling equipment supply, none of this supports the cause.

The main motivation for moving away from hierarchical management structures is that they are divisive and undermine productive potentials. They nurture a competitive and confrontational environment. The Self-directed work team concept is said to remove these inhibiting characteristics and improve overall performance.

Self-directed work teams

To determine who was actually responsible for the Genesis of Self-directed work teams in the global arena is very difficult. The reason being that many companies who introduced the concept had such phenomenal successes that they regarded their teams as a trade secret, resulting in a lack of proper historical documentation.

Japan emerged with the 'quality circles'-concept and proved to be the world industrial leaders from the early nineties. Because of this, and many other countries also showing improved productivity and service, America was forced to surrender entire industries to foreign competition. In an effort to improve their productivity and the quality of output, they started the Renaissance of Self-directed work teams.

The effects of the concept varied, with many companies showing phenomenal successes but others not. As an industry average, all companies that moved toward the Self-directed work team structure showed an increase of 30%–40% in their overall output. All sectors of industry were represented amongst these companies including manufacturing and service operations.

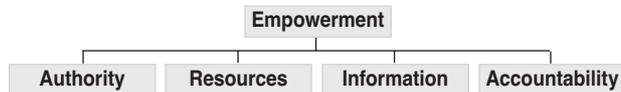
In his book 'Leading Self-directed work teams', Kimball Fisher (1993) defines Self-directed work teams as follows:

'A group of employees who have day to day responsibility for managing themselves and the work they do with a minimum of direct supervision. Members of self directed teams typically handle job assignments, plan and schedule

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work, make production and/or service-related decisions and act on problems.'

In this definition we find the true reason for the successes of Self-directed work teams, namely voluntary employee effort. Voluntary employee effort generates from



employee commitment springing from empowerment, the cornerstone of self-directed work teams.

Empowerment can be represented by the following flow diagram:

By empowering teams, we supply them with the authority to make decisions, with resources to effect them, information to justify them and ultimately with accountability. By empowering workers, we kindle a mindset change. No longer does the workforce feel they 'have to' but rather they 'want to'. Apart from the mindset change, every member of the team shares equal responsibility for the team's function. The team member's focus is not only his particular technical function within the bigger picture but rather collaboration with the other team members to fulfil the team function.

All of these allow for streamlining of the operation, improved flexibility, quality and finally safety. These are the four core advantages of Self-directed work teams. When we combine them, we find the reason why so many American companies were able to produce more, function more safely, in a shorter time span and ultimately at a lower cost.

The successful implementation of Self-directed work teams does not happen at the drop of a hat. It takes a group of educated American employees, on average, two to five years to become a mature Self-directed work team. Furthermore, it takes a specific organizational climate as well as commitment to ensure the proper milieu for the functioning of Self-directed work teams. The following aspects are imperative to the success of the concept:

Top level commitment: The problem all too often with Self-directed work teams is that it is something where 'The top tells the middle what to do with the bottom'. In order for the teams to function well, they have to be supported by top management. Most organizations are set up to catch people doing things wrong rather than to reward them for doing things right. Self-directed work teams start with the belief system of top management that if people were given the option they would choose to be magnificent rather than ordinary at work.

Management-employee trust: The teams must really feel that management is supporting and encouraging them to make decisions. They have to feel that management is serious about the intervention and that it is not another management fad aimed at making fewer people work harder. In his book 'Empowerment takes more than a minute', Ken Blanchard (1996) explains that too many leaders today need to get over the notion that their people head off to work every morning asking themselves how they can get by with doing as little as possible. If management does not trust the

workforce to function at their optimum, then why would they?

Information flow: In order for the teams to manage themselves, they need management information. This would include information like financial reports and production objectives, as well as safety statistics. For this reason an efficient information flow network needs to be present to ensure employees are up to date.

Time: The implementation of Self-directed work teams is a long and tedious process and the organization has to be able to allow for that developing period. Self-directed work teams (empowerment) is a journey and there are no quick fixes.

Resources: The implementation of Self-directed work teams requires training, retraining and prompt access to resources. In short, the organization has to be able to fork up the initial capital to ensure long-term success and sustainability.

Training: Self-directed work teams stand and fall on the training they receive. The true purpose of training is to equip teams with the knowledge and skills to make functional, effective and workable decisions. Training is split up into three distinct categories, they are:

- ▶ **Technical skills:** Technical cross-training ensures that the team members have a sound understanding of the different functions within the team. This understanding fosters actions that will support one another and ensure a proper flow within the operation.
- ▶ **Administrative skills:** Because the team is going to be self-managing, they need the technical know-how to be able to do the job of a supervisor. Typically, the team members have to be trained to do budgeting and scheduling.
- ▶ **Interpersonal skills:** The interaction between workers within a Self-directed work team, differs tremendously from conventional workers. The main reason for this is that the supervisor had to ensure proper communication and the setting of priorities in the conventional structure. Now it is the team's responsibility. Because of this the team members must learn to collaborate in getting the right information, sending the right information and using the right information to increase productivity. We can conclude by saying: 'No train no gain!'

Union participation: Unions play an intricate role in our world of unionized operations. Because of this, we need to ensure that union and management see eye to eye. They must have a shared understanding that competitive advantage is the only way to ensure job security.

Effective incentive scheme: There are two schools of thought regarding monetary gain and its effects. The first is that money is a hygiene factor. This is usually true of a First World country where a few pounds or dollars more on the pay slip is insignificant compared to actual job satisfaction and self actualization. The second idea is that money is a motivator. This school of thought finds its applicability in Third World countries. To understand these phenomena we need to look at Maslow's hierarchy of needs.

The First World worker's needs are centred on self-actualization and esteem needs. The reason for this is that their salaries already satisfy their level, physical and safety

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needs. The result is that money only maintains this state. Therefore, any increase in salary within reason has no effect on their approach to work. On the other hand, a change in management structure and style will have a more profound effect as this addresses upper levels in Maslow's hierarchy. By contrast, the Third World worker desperately requires physical and safety needs to be satisfied. The result is that any production-based incentive scheme will lead to a respective increase in productivity. If self-actualization and esteem needs alone are addressed the results are bound to be disappointing. How can we expect a hungry man to worry about how he interacts with his fellow workers and think about work? The hierarchy has no foundation. The Self-directed work team concept is focused in the top drawers of Maslow's hierarchy, and unless the lower level needs are met first by monetary gain the concept will not fulfil its potential.

Management style: Apart from top level commitment and management employee trust, a special management style is also required. A management style which takes management-employee trust to the limit. The conventional management functions of Plan, Organize, Lead and Control have to be replaced by management that develop, inspire, coach and teach. The teams have to be trusted with these previously management functions.

Self-directed work teams in the mining industry

The Self-directed work team concept was first introduced in an English coal mine in 1949. The fact that the first team described in the management literature worked in a coal mine is testimony to the fertile ground mining offers team applications. Examples of multi-disciplinary teams and Self-directed work teams can be found throughout the mining industry. These teams have had some success in South Africa but, have and will struggle to survive in industries where Max Weber's bureaucracy still has the upper hand.

The exact history of the concept within the South African mining industry and more specifically the gold mining industry is very difficult to determine. The reason for this is that nobody has actually implemented the purist's ideal of Self-directed work teams. Many mines implemented hybrids of the concept in their underground work teams either to relieve socio-political pressures or to boost stagnant efficiencies. In both cases, the concept was expected to be a quick fix. Sustainability is the password in any intervention and this has and will prove to be a problem in future.

To base the success of the Self-directed work team concept in the South African gold mining industry on that of hybrids to the concept is unfair. The study of the hybrids and their successes is not entirely worthless, as they will give a distorted yet invaluable picture of the concept's potential. Furthermore, current errors and future pitfalls can be identified and negated. For this reason, three case studies were conducted within AngloGold.

Case studies

The research was conducted over a six-week period and the base mine for the project was Mine 3. As the implementation of the SDWT process was only in its infancy stage when the study was conducted, more established interventions at Mines 1 and 2 were also visited. The purpose of these visits

was to determine what successes they have had with their interventions and to note any problems that they might have experienced. The purpose of the study was not to scrutinize the effect and affectivity of the training course material. Furthermore, it has to be noted that the visits to Mines 1 and 2 were both day visits. No study was conducted on the respective mines and therefore the results of these interventions are purely based on what was supplied by the respective project leaders. A comparison of the interventions will not give a true and just reflection of the different intervention successes as there are too many variables unaccounted for. The sole purpose of the case studies therefore was to determine what has been tried and tested regarding the SDWT concept.

The two case studies at Mines 1 and 2 proved that the concept has great potential, both mines having phenomenal success with increased production and improved safety. In the case of Mine 1 they improved their efficiency from 11–33 m²/ISW/month and Mine 2 recorded an equally impressive increase from 18–37 m²/ISW/month. The principle on which the concept is introduced in the respective cases differs considerably. In the case of Mine 1 it was found that concept was used with a very technical undertone. In the case of Mine 2 the concept was to an extent 'Africanized' using cultural traditions and stories to bring across the concept. The main problem in both cases were that the teams at the respective shafts are not yet Self-directed and any increase in performance might be attributed to the incentive schemes introduced with the concept in each case.

As mentioned, Mine 3 was the base mine for the study, which allowed for a more in-depth study of the Self-directed work team effect. The mine started training their Self-directed work teams in July of 2000 and completed 9 stoping teams by November 2000. These 9 stoping teams formed the basis of this research project.

The effect of Self-directed work teams, although only hybrids, can be expressed quantitatively as well as qualitatively. In the above case studies only the quantitative effects were measured. These are production increases. Regarding the qualitative effects, only safety statistics were measured. The hidden effect and true advantages, which govern the quantitative effects, were not addressed at all. These qualitative effects include:

- Co-operation among the workers and the supervisors
- Patience among the work force and cultural considerations between different ethnical groups
- Workers sharing one vision, resulting in stronger team cohesion
- Lower absenteeism
- Improved communication
- Workers being more aware of cost control as a result of business understanding.

All of these are shadow advantages and are the fundamental reasons for the success of the SDWT-concept. To give a representative picture of the hybrid effect one needs to measure these advantages as well.

The following is a list of reasons why the qualitative effects were not measured as well as why the quantitative results are questionable for Mine 3.

- The intervention at the time was only in its eighth month.

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- Eight of the nine trained teams came from the same raise line. This meant that any external factors complicating production would reflect negatively on the intervention.
- The middle management had not received their training. This meant that the teams had to function in a different way but were still expected to conform to traditional standards as they were managed in the same way.
- The data pool was further depleted by the fact that December and January months are traditionally lower producing months due to public holidays.
- The teams' stability was not placed at a premium resulting in many transfers and thus the breaking of the team synergy.
- The geology of the mine does not allow the teams to stay in one working area for very long. The result is that some of the teams were moved around during the first month after their return to the workplace. This has placed enormous pressure on the teams having to adjust to the new working place as well as the implementation of their new Self-directed work team skills.

A final verdict on the effectiveness of the training can only be reached once at least half of the target group has been trained. The current 9 teams do not even account for 25% of stoping teams, let alone on the shaft as a whole. Note that for Mine 3, no safety statistics are given. The main reason for this is that injuries and fatalities are not everyday occurrences and therefore safety statistics of only eight months will not be able to show the impact of the intervention. To determine what effect the training had on the teams, efficiencies the following was done: In each case an average of the team's efficiency was taken pre- and post-training. Then an average of these was taken for all the teams pre- and post-training. This led to the following results:

Average pre-training efficiency = 18.2 [m²/ISW/month]
 Average post-training efficiency = 18.1 [m²/ISW/month]

The efficiencies basically remained the same. This statistic as mentioned above is not representative and future studies have to be conducted to determine the true effect of the intervention over a longer time with a larger test group and finally under more sustainable and supportive conditions.

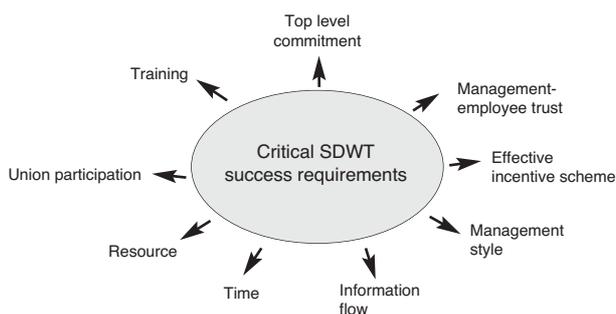


Figure 3—SDWT-requirements

Apart from the obvious statistical flaws, the lack of improvement can be related to a total absence or lack of commitment toward the fundamental requirements for the successful implementation of SDWT. These essential aspects were discussed and they are shown in Figure 3.

To establish to what degree these critical parameters were present at Mine 3, a perceptual analysis was conducted.

Perceptual analysis

All of the critical parameters as shown in Figure 3 and discussed in an earlier section can be related to employee perception. How do the respondents perceive the relevant parameters to be functioning in their working environment? The basis for the analysis was questionnaires, which were adapted from work done by Fisher and Wellins on Self-directed work teams in America during the early nineties.

The mine overseer, upper management, and shift overseer levels were chosen for the analysis as they are the first and second lines of management who interact with the teams.

The teams themselves were not included into the analysis for the following reasons:

- The teams' working environment did not allow for such a study
- The teams' education level did not allow them to complete questionnaires, as most are illiterate
- Interviews were also out of the question as language barriers prevented essential concept understanding, making any conclusions biased
- The final and most important reason was the fact that by asking the workers' opinion on company structure and work ethics, an expectation might be created which could not be fulfilled in the near future or at all.

From the study it was found that hardly any of the critical parameters were present at Mine 3 and that the mine represented the industry at large being very dependent on Max Weber's bureaucracy. However, this alone could not explain the disappointing yet expected results at Mine 3. For this reason the success recipe at Mines 1 and 2 was evaluated, 'incentive'. In the case of Mine 3 it was found that the incentive scheme on average paid-out 50% less than the other shafts for the same performance improvement.

So, in the case of Mines 1 and 2 we find that they have been able to more than double their efficiencies after the introduction of their SDWT-hybrids accompanied by the new bonus schemes. In the case of Mine 3, taking into account that their intervention is still very under-established, we find that their efficiencies have stayed virtually the same as well as their bonus scheme. This proves that an effective incentive scheme is of utmost importance to the success of any SDWT attempt.

Apart from these factors the team instability also contributed to the lack of success. The following is a brief discussion of the different in-house problems at Mine 3.

Team stability

The implementation of any learning exercise whether it is technical or behavioural is very fragile. The reason is that it is too hard to do something in a different way than you have

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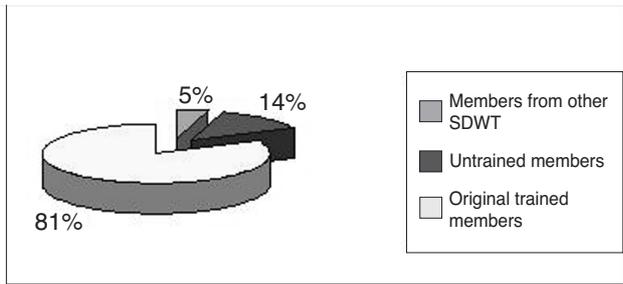


Figure 4—SDWT-composition at Mine 3

been used to. As mentioned above two facilitators visit the teams on a weekly basis and there is no provision for on-the-job training. It is one thing to acquire knowledge but quite another to implement it, in this regard on-the-job training is an absolute must.

The teams are expected to perform immediately; this added pressure of production makes the team fall back to the methodology they are familiar with, and the newly acquired skills are forgotten.

The training of the teams is very costly. The emphasis during training is very much on the team's synergy. All of the team building exercises in the training programme is rendered worthless if the unity within the teams is broken. This is done in one of two ways. Either by including untrained workers into trained teams or by transferring trained workers out of their trained teams. By doing this, management is sending a message to the workers that they are not committed towards the process and they themselves perceive it to be a sham. The teams find it very difficult to maintain their morale and they quickly slide back to a mindset of 'I do my job and you do yours', being disillusioned. Figure 4 shows the average Self-directed work team composition. Note that only 81% originality was maintained on average and this after only eight months. This spells disaster for the maintenance of team synergy in future.

Usually the guilty party tries to justify this worker shuffling by the labour call that has to be met. A study of the transfer history of the SDWT showed that none of the transfers could be justified and that poor labour planning was the reason for the poor retention of originality. A final possibility for the poor performance of the SDWT is that they themselves are not yet Self-directed and therefore cannot be expected to perform as such. This premature assessment of their performance reiterated the expected lack of improvement.

The purpose of the above discussion was purely to identify possible reasons for the lack of improvement with the implementation of the SDWT at Mine 3 and claiming these problems to be the only ones would be naive.

The great potential of the SDWT-concept as discussed at length in the paper has as yet not been realized in the three mines chosen for the case studies. Mines 1 and 2 cannot credit the concept for the successes they have had and they admit that incentive was the main drive behind their success. Testimony to this is the fact that Mine 3, all else being equal, could not match the improvements of Mines 1 and 2 because their intervention was not accompanied by an improved

incentive scheme. The question that needs to be asked though is; 'Do we want to implement incentive scheme teams?' where the sustainability is questionable or: 'Do we want to implement SDWT?' where the sustainability is assured.

None of the three mines studied can claim to have implemented SDWT. This situation cannot be condoned nor condemned as each one of the interventions is a victim of a lack in organizational change. In the paper the required management structure and style for the successful implementation of SDWT were discussed at length as well as the current unsupportive situation. If these two scenarios are compared it is soon found that we are lacking.

The current management style and company structure place enormous emphasis on line functions and other bureaucratic functioning. The success of the SDWT-concept is founded on the one thing that current structures and styles cannot supply: that is total empowerment.

Figure 5 illustrates the fate of any SDWT-concept without proper organizational change; the workers are bound to swimming across the current and will be swept away in time. The concept ends up being something the top tells the middle to do with the bottom. Sadly, this has been the case at all mines. The general management structure and style has stayed the same and the trained teams are expected to function differently and to perform. Middle management is placed under pressure. They have to front the sustained demands for production from upper management and the teams complicate matters, as they want to implement their SDWT-training.

From the wagon wheel of requirements for SDWT as given in figure 3 we find that it is not only management style and company structure that need to change, the training the teams received also has to be up to standard. Standard defined as being a level of worker competency at which management will be less sceptical to allow for worker Self-directedness. The evaluation of the training in this respect was not covered in the paper and it is recommended for future study.

Conclusions

The current socio-political environment within the gold mining industry necessitates change. The ever dwindling gold price and the possibility of a future labour crisis as a

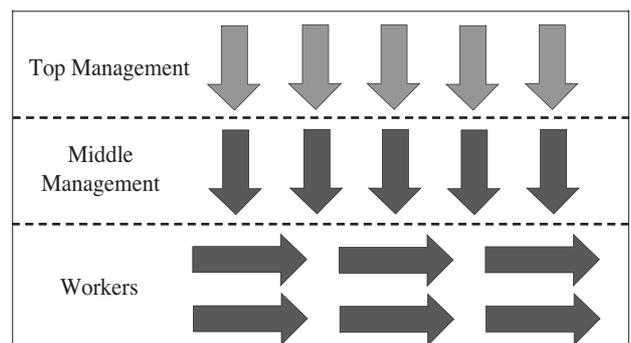


Figure 5—Organizational rigidity

An evaluation of the Self-directed work team concept

result of AIDS, justify the call for change. Many cyclical mining problems can be attributed to bad practice of the workforce often because they have no ownership of what they are doing and therefore do not realize the value of proper conduct.

The study proved that the concept of Self-directed work teams has great potential to improve overall performance if and when it is implemented successfully. The concept has been proved in America and in the Far East with a radical changed management structure—style as well as company culture deemed as the decisive factors for success. These world forces' management transformation syndromes are also discussed in the report proving that the introduction of the concept will not be without its fair share of growing pains.

Sadly the concept has as yet not proved itself in the South African gold mining industry. The reason for this is that no one has been able to implement the purist's ideal for Self-directed work teams. Hybrids to the concept have proven to be successful only when backed by incentive schemes, overshadowing the concept's true potential.

Lack of organizational change regarding management style, structure and company culture, loomed as possible reasons for the hybridization of the SDWT-concept. The current bureaucratic management style and hierarchical company structure are identified as the chief showstoppers to the concept. Furthermore, an in-depth study of Mine 3 proved that the governing principles as set out in the paper for SDWT are not present and few would argue that the rest of the current industry is any different.

The current situation regarding SDWT is illustrated in the following analogy.

The SDWT-concept has great potential but we are not able to enjoy it as our application of the concept and the general environment is not supportive. This results in us having to pump up the performance using incentives. We are pushing hard at a cart with square wheels.

If we are able to implement the concept under the requirements as set out in the paper we will definitely still experience growing pains but the successes will be endless. We will be able like the Americans to leapfrog our competitors with increased production and above all improved safety statistics.

This is very possible but we would do well to remember that: 'There is nothing more difficult to carry out, nor more dangerous to handle, than to initiate a new order of things. For, the reformer has enemies in all who profit by the old order and only lukewarm defenders in all those who would profit from the new order. The lukewarmers arise partly from fear of their adversaries, who have law in their favour, partly from the incredulity of mankind who do not truly believe in anything new until they have actual experience of it.' (Machiavelli; *The Prince*; 1513).

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Dates set for science quiz*

The dates for Mintek's popular science quiz for grade 12 learners have been set a bit later this year so as not to clash with the Easter school holidays.

The regional quiz, which will take place in all nine provinces, will be held on Wednesday, 17 April 2002, with the National Final (at which winners from the regional events will compete for cash prizes and bursaries) will be held at Mintek in Randburg on Friday, 10 May 2002.

The main aim of the competition is to popularize science and to promote interest in careers in the fields of science, engineering and technology (SET), especially in the minerals field, in an attempt to alleviate South Africa's problem of insufficient technologically-qualified youngsters.

Minquiz has been running for the past 14 years, and has provided Mintek with some excellent material for its bursary programme. Co-sponsors of the quiz this year include X-Strata, Sasol, AngloGold, and Afrox.

Entry forms for the competition are available from Ms Ann Guest at Mintek. Her details are: Tel: (011) 709-4266, Fax: (011) 709-4326, e-mail: ann@mintek.co.za. ♦

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