



# Characteristics of an effective self-directed work team in the gold-mining industry

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## Synopsis

The gold mining industry in South Africa stands to benefit much from the implementation of the self-directed work team concept. Its introduction implies flatter hierarchical structures, empowerment of the workforce and increased participation. Research indicates that half of the initiatives to implement self-directed work teams, however, fail, and it is therefore imperative for companies to be aware of the factors impacting on the effectiveness of self-directed work teams in order to focus on these early in the implementation phase. The objective of the study was to qualitatively determine these factors. Semi-structured interviews based on the phenomenological method were carried out. The sample included members of, and individuals involved with, self-directed work teams ( $N = 26$ ) from a large gold mining company in South Africa. Results show that most respondents rated the availability of resources to do their work as the most important factor affecting their effectiveness.

## Introduction

The concept of self-directed work teams (SDWT) as a leading work practice can be traced back mainly to changes in work methods in British collieries and Japanese factories. The idea spread later to the United States, where it was popularized by Kimball Fisher and others<sup>1</sup>. Internationally, companies have learnt that the key to production effectiveness lies in the better utilization of their own employees. They recognize that those closest to the work know best how to perform and improve their jobs and have found that to 'remain competitive' means tapping into the vast, under-utilized resource of knowledge within their workforces<sup>1</sup>.

From the early 1990s, SDWT started to receive attention in South Africa, and a variety of experiments was initiated, mainly in the private sector. These initiatives were usually associated with multi-skilling, team-building and work group empowerment, resulting at times in workforce downscaling and a change

in the role and powers of mid-managers and supervisors<sup>2</sup>.

Most organizations are aware of the power of teamwork. A lot of research has gone into the subject, yet very few organizations really get it right so that teams and the individuals within teams perform at their optimum levels<sup>3</sup>. There is growing awareness that the aggregate of all the skills, competencies and knowledge that resides within the individuals of an organization does not necessarily translate into a collective organizational knowledge and wisdom<sup>4</sup>.

Self-directed teams are small groups of employees who have responsibility for managing themselves and their work. Team members typically handle job assignments, plan and schedule work, make production-related decisions, and take action on problems. Self-directed teams require minimal direct supervision. The teams operate with fewer layers of management than traditional organizational structures. They require team members to learn multiple jobs or tasks and to take on many tasks that were once reserved for supervisors or managers, including hiring, firing, conducting appraisals, disciplinary action and scheduling tasks<sup>4</sup>. According to

McNamara<sup>2</sup>, a self-directed work team can be defined as a multi-skilled or cross-functional work team whose members are empowered to regulate their own affairs and are jointly accountable for delivering a defined value-adding product or service to the organization. Fisher<sup>1</sup> defines a SDWT as '...a group of employees who have day to day responsibility for managing themselves and the work

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© *The South African Institute of Mining and Metallurgy, 2006. SA ISSN 0038-223X/3.00 + 0.00. Paper received Aug. 2005; revised paper received Jan. 2006.*

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they do with a minimum of direct supervision. Members of a SDWT typically handle job assignments, plan and schedule work, make production and/or service-related decisions and act on problems.'

A recent study on self-directed work teams in the gold mining industry in South Africa found that the concept has not been purely applied when compared with the above international definitions<sup>5</sup>. It was found that hybrid forms of the concept had been introduced as a quick fix to boost stagnant efficiencies. Two of the mines in the study managed to double their efficiencies after the introduction of the self-directed work team hybrid, but the effects of the introduction of work teams are confounded by the introduction of new incentive schemes that were introduced at the same time.

Companies committed to the SDWT concept hope to streamline processes, gain productivity, flexibility, quality, employee commitment and customer satisfaction. Operational efficiency is enhanced, production cycles are reduced and there is an increased ability to respond swiftly to changing needs of the environment<sup>4</sup>. Teams are empowered by receiving the authority to make decisions, the resources to effect them, the information to justify them and the accountability for their decisions' outcomes. Strydom<sup>5</sup> refers to the core advantages of SDWT as streamlining of the operation, improved flexibility, quality and safety. Apparently, the benefits and results of successful SDWTs are impressive<sup>6</sup>. They include higher productivity, improved service quality, lower unit costs, faster cycle times, continuous process and systems improvements, flexibility to meet rapidly changing market demands, greater employee satisfaction levels, higher team motivation and commitment to the organization's success, and flatter organizational structures.

Numerous improvements that might be anticipated following the successful implementation of SDWT have been identified<sup>7</sup>. Successes include productivity and quality improvements, increased customer volume and reduced turnover and absenteeism. Reports from organizations with the work forces organized into self-managed teams also indicate that job classifications have been streamlined, and relationships with unions have improved, following implementation. Further reported improvements include better employee and management morale, quality of products/services and improved customer service, productivity and safety<sup>8</sup>. Executives attribute improved productivity and quality, reduced waste and an increased level of job satisfaction within their companies due to the use of teams. In a 1991 poll, executives from 340 different companies indicated that for the three most serious problems—customer service, cost reduction and product quality—improved teamwork is consistently cited as one of the most important solutions<sup>9</sup>.

In South Africa, mining operations are underground due to the nature and location of the ore reserve. Mining takes place at up to four kilometres under the surface, which makes gold mining in South Africa dangerous and especially labour intensive and costly. For South African companies to cope with pressures and remain competitive, they need new and improved practices and processes that encompass

employee participation, empowerment, teamwork, decision-making power and democracy. The introduction of SDWT could address this by diminishing layers in the organization, increasing flexibility and cutting cumbersome bureaucracy<sup>10</sup>.

In the South African business context the mining industry has to deal with factors such as rapid technological developments, increased involvement of and dictation by the government in the mining sector, low literacy level of the workforce and affirmative action. Added to this is a diverse and divided work force in which morale and work ethics are alarmingly low, pressures from the world arena for improved quality and adherence to global standards, and most importantly, the huge amount of unutilized potential<sup>11</sup>. The rand-dollar exchange rate and fluctuating gold price are factors influencing gold mines in South Africa, which are out of the control of the industry itself. Cost containment and increasing productivity levels are paramount in order to increase the lifespan of current operations and the viability of exploration activities.

The labour intensiveness, and its high cost, makes productivity levels very important in the ore extraction process. Work teams need to be multi-skilled, self-directed and as small as possible, to maximize productivity levels, efficiencies and to minimize costs. The role of the team leader and miner are especially important in the self-directed work team, since they have the potential to influence directly the productivity levels of the team and to minimize costs by effective planning and usage of material.

Findings about self-directed work teams elsewhere in the world could not uncritically be applied to South Africa because of widely different circumstances. The implementation of self-directed work teams require extensive top-down commitment, and often is a costly exercise, with teams taken out of their workplaces to undergo training and process and job redesign initiatives. It is therefore important to determine the characteristics of an effective self-directed work team, in order to ensure these factors are sufficiently addressed in the implementation phase, and subsequently yield a rapid return on investment. The gold mining industry stands to gain much in terms of productivity increases, should the concept be effectively applied. Very little South African research has evaluated the concept, implementation and effectiveness of self-directed work teams<sup>5</sup>.

In great teams, working together involves a great deal of overt communication but also substantial subliminal and intuitive communication among team members. This is something that cannot be easily taught and certainly not something that happens quickly. It is a faculty that develops over time, and requires focus and hard work to inculcate into each member and the team as a whole<sup>12</sup>. This is also not typically information that can be assessed via self-report questionnaires or quantitative research. A thorough qualitative investigation is needed to identify team members' perceptions of factors contributing to their effectiveness in the gold mining industry. The objective of this study was thus to qualitatively investigate factors related to SDWT success, as experienced by members of such teams in the gold mining industry.

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## Method

A qualitative research design was applied in this study. The qualitative research approach is one where the procedures are not so strictly formalized, is more widely applied, and where one works more in philosophical terms. The goal of qualitative research is to understand, whereas the goal of quantitative research is to explain<sup>13</sup>.

In the qualitative design a single group of subjects is obtained. The reason for this approach is that the phenomenon in question is based on the perceptions and observations of people or factors that lead to the high performance of teams. It will therefore be up to the researcher to accurately describe a person's observations and perceptions and analyse them for specific themes or trends<sup>13</sup>.

## Participants

The sample consists of members of high-performing self-directed work teams. Individuals contacted for interviewing include mine overseers (Paterson D-lower), shift overseers (Paterson C-upper), miners (Paterson C-lower), team leaders and team members (Paterson B). A total of 26 individuals was interviewed ( $N=26$ ). The characteristics of the study population are reported in Table I.

It can be seen from Table I that most of the participants are from Paterson A-B level and that only males participated in the study. This is due to the fact that, at the time of the study, very few women were employed in underground gold mining. It is also noticeable that the participants are mostly older than 36 years and most had service in the gold mining industry of more than 11 years, which shows that the participants were generally experienced underground workers. Where values do not add up to 26, it is due to missing values.

## Data collection and analysis

Semi-structured interviews based on the phenomenological method were used to establish the factors perceived to significantly affect the performance of SDWT. The interview guide is designed to be an unstructured question format, which is open-ended enough to let the interviewees introduce any ideas that they think might be pertinent to the discussion and to allow the interviewer to explore concepts introduced by the interviewee. Questions are worded to elicit responses from the interviewees in their own words that would capture what they felt were key factors associated with SDWT success.

Interview data from the 26 interviews were used to develop major groupings, or general classifications of broad categories of themes, where a theme is a recurrent topic of discussion or often-mentioned key factor affecting on the success of SDWT<sup>14</sup>. Each broad category was broken down into themes, which provide a classification label for a common idea or issue articulated by the interviewees. Interview data from the 26 interviews were then coded onto

the theme list. On completion of the coding, the importance of a theme could be evaluated by the number of interviewees who mentioned the theme in the interview sessions.

The themes that have the largest amount of support based on the number of times they were mentioned by interviewees were then identified in order to rank the theme list.

## Results

The following themes were identified as the most important

*Table I*  
**The characteristics of the participants ( $N = 26$ )**

| Item              | Category    | Number of respondents |
|-------------------|-------------|-----------------------|
| Paterson level    | A-B         | 14                    |
|                   | C-Lower     | 4                     |
|                   | C-Upper     | 3                     |
|                   | D-Lower     | 2                     |
|                   | D-Upper     | 3                     |
| Gender            | Male        | 26                    |
|                   | Female      | 0                     |
| Age               | 18-25       | 0                     |
|                   | 26-35       | 3                     |
|                   | 36-45       | 15                    |
|                   | 46-55       | 6                     |
|                   | 56-65       | 1                     |
| Length of service | 0-3 years   | 1                     |
|                   | 3-10 years  | 4                     |
|                   | 11-20 years | 11                    |
|                   | 21-30 years | 8                     |
|                   | 31-40 years | 1                     |
| Race              | Black       | 16                    |
|                   | White       | 10                    |
|                   | Indian      | 0                     |
|                   | Coloured    | 0                     |

*Table II*  
**Themes identified by respondents and frequency of reporting of themes**

| Factor                                       | Number of respondents | Percentage of total sample |
|--|-----------------------|----------------------------|
| Logistics                                    | 19                    | 73.08                      |
| Leadership                                   | 17                    | 65.38                      |
| Interpersonal relationships                  | 15                    | 57.69                      |
| Communication                                | 14                    | 53.85                      |
| Teamness                                     | 11                    | 42.31                      |
| Incentives                                   | 11                    | 42.31                      |
| Planning                                     | 10                    | 38.46                      |
| Absenteeism                                  | 10                    | 38.46                      |
| Mining standards                             | 6                     | 23.08                      |
| Ground conditions                            | 5                     | 19.23                      |
| Skills/experience/physical effort            | 5                     | 19.23                      |
| Support systems/<br>infrastructure/transport | 5                     | 19.23                      |
| Safety                                       | 4                     | 15.38                      |
| Work-life balance and overtime               | 4                     | 15.38                      |
| Night shift preparations                     | 3                     | 11.54                      |
| Training and development                     | 3                     | 11.54                      |
| Job satisfaction                             | 2                     | 7.69                       |
| Personality profile                          | 1                     | 3.85                       |
| Technology                                   | 1                     | 3.85                       |

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factors affecting on the work performance of self-directed work teams. Table II summarizes the themes and the number of respondents that referred to each, whereafter the main themes are defined in the context of the study population.

Each of the themes identified is defined below within the context of the current population. Examples are given of words used by respondents to identify themes.

## Logistics

In the context of teams working underground in the gold mining industry, logistics refers to the timeous availability of tools, material and explosives, to enable the team to carry out their tasks. Material includes, for example, pipes, packs and rails. It is the responsibility of the miner to plan properly with the team, determine the kind and amount of material that will be needed, and to order it so that it is available when needed. It is also part of the miner's responsibility to follow up, ensure timeous delivery and oversee the transport of the material to the workplace.

Most of the respondents (73%) indicated this factor to be the most important affecting the performance of a self-directed work team. In a review of the literature on self-directed work teams, only two references could be found relating to the availability of resources as an important factor<sup>5,6</sup>. Generally, this factor is not prominent in the performance of self-directed work teams. Factors such as leadership and interpersonal skills were found to be more significant in the mentioned studies.

Interviewees have described this factor by using terminology such as 'getting all equipment'; 'shortage/availability of material'; 'working material (to be) available'.

## Leadership

Supervision (leadership) of a production team in the mining industry is hierarchical, with three main supervision levels between upper management and the production team itself. These are the shift overseer, the miner and the team leader. Leadership in the context of this study refers to the team leader. Typically a miner is placed in charge of more than one team, whereas each production team has its own team leader.

It must be pointed out that the self-directed work team concept described in literature<sup>4</sup> as 'small groups of employees who have responsibility for managing themselves and their work'; 'teams requiring minimal direct supervision' and 'teams operating with fewer layers of management', has not been applied fully in the South African mining industry. The reality is that certain business units have embarked on SDWT training initiatives, but the organizational structure and support systems have not been adapted to support the 'paradigm shift' that was supposed to take place. Teams are also not empowered to take decisions on their own without involvement of the miner, shift overseer and mine overseer. Structures remain multi-level, hierarchical and the management style remains authoritative<sup>5</sup>.

Sixty-five per cent of the respondents felt that the role of the team leader is an important factor. This is definitely supported by previous research findings<sup>15-17</sup>, which identified the team leader as an important contributing factor in self-directed work team success. It would be valuable to identify the characteristics of a successful team leader of a self-directed work team, and future research could attempt to isolate those characteristics. This information could be applied in the recruitment and selection of team leaders, as well as in their training and development.

Respondents have described leadership as 'supervisors has to be sober-minded at all times: this shows responsibility and good image'; 'good team leaders will stop wasting material underground and reduce expenditure'; 'talks in a right way with his team'.

## Interpersonal relationships

Good interpersonal relationships between team members, the team leader, miner, shift overseer and upper management, means having respect for one another, and the ability to manage conflict in the team constructively, caring about one another and treating each other with dignity.

Of the total sample, 57% of respondents cited interpersonal relationships as an important factor affecting the performance of self-directed work teams. Effective interpersonal relationships in successful self-directed work teams are characterized by trust, openness and acceptance<sup>17</sup>. These values are reflected in the current data by words and phrases such as 'Respectful to others', 'trustworthy', 'be supportive', 'open-minded' and 'feeling free to share an idea or problem with the supervisor'.

## Communication

Proper communication is important within the team, as well as among the team leader, miner, shift overseer and mine overseer (up and down the line of supervision). In the mining industry, people from different cultural and ethnic origins work together, and language poses a barrier to proper communication. It is also important for management to clearly communicate goals and objectives down the line of supervision, to the team.

More than half of the sample (54%) said communication is an important contributing factor towards team success. Research studies have confirmed the finding that communication within the team, as well as between management and the team, is an important factor in the performance of the team<sup>5,7,15</sup>.

Respondents describe this factor as follows: 'team has to understand the vision of supervision and the objectives'; 'to achieve common goal the team has to communicate and participate and be supportive'; 'communication between crew members and line management up to top'.

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### Teamness

'Teamness' can be described as a group of people having the sense of working together towards a common goal, and the team having an identity of its own, different from that of other teams. It encompasses the management of internal conflict and the support of team members.

Forty-two per cent of the sample felt that the concept of 'teamness' was an important contributor to team success. Teamness has been defined as the positive effect of synergy on team results, and the more mature team seems to display a greater amount of synergy than newly formed teams<sup>7</sup>. Successful teams inevitably make use of ritual, ceremony and celebrations, which reinforce team spirit<sup>17</sup>.

'Team talk and discussion on daily performance and how to achieve targets set'; 'Working as a team'; 'No co-operation amongst the team (makes team perform poorly)'; 'The mind frame of workers working in a team, good (positive) attitude'; were some of the phrases used by respondents.

### Incentives

Incentive schemes (bonuses) were cited as an important factor impacting on the work performance of production teams. Factors such as the number of team members, number of times the team blasts per month and the safety record are taken into account when working out bonuses of employees. In this regard it would be important that the team leader and team know and understand the factors impacting on their potential bonus earnings, as this was frequently cited as a point of concern.

Of the sample, just less than half (42%) felt that incentives were important factors attributing to team performance. The self-directed work team concept can only be successfully implemented in the gold mining industry in South Africa if it is backed up by incentive schemes<sup>5</sup>.

Respondents referred to 'Good bonuses'; 'Bonus payments (incentives)'; 'Don't understand how the bonus is calculated'; 'No rewards for excellent job done'; 'Bonus makes the team perform good or bad'; 'Good bonus and overtime payment motivate the team to perform'.

### Planning

Planning in the context of this study refers to the mapping out of the mining area or section where mining activity is to take place, and usually takes place on a monthly basis. It also involves the setting of the monthly target in terms of square meters of ground to be mined, the methods that would be applied, and the material, tools and explosives that will be needed by the team to accomplish this. Planning for a section is done by the mine overseer in conjunction with the input from survey and geology departments, and is relayed to the miners and the teams.

Of the sample, 38% felt that planning was an important contributing factor to team success. In the context of this

study, planning is a unique factor relevant only to the current study population. The importance of planning is pointed out in previous research studies, but the concept refers to proper planning of the implementation process of teams. In the current study, planning directly refers to the planning and execution of mining activities.

Respondents refer to 'material has to be available at all times and preparations should be done by night shift'; 'a good team leader involves the team in planning' and 'job planning—contributes to job performance in that it makes the job done easier'.

### Absenteeism

Underground gold mining is an extremely labour intensive activity, and one of the biggest contributors to the high cost of mining, is labour costs. Because of this, team sizes are kept as small as possible. Therefore, if one team member is absent unexpectedly, it affects the work planned for that day by the team, and often a blast is lost due to absenteeism or poor timekeeping. This affects the team's performance negatively and has a negative impact on the bonus earnings of all team members.

Existing research studies do not refer to absenteeism as a specific important factor affecting the performance of self-directed work teams. Due to the labour intensiveness of underground gold mining, however, it is an important factor in this context, and 38% of respondents cited absenteeism as having an impact on the performance of self-directed work teams. Possible reasons for absenteeism in the mining industry could be the prevalence of HIV/AIDS and Tuberculosis, the physical arduousness of the work (the fatigue factor), alcohol and substance abuse, or it could indicate factors such as low levels of employee motivation.

Respondents make mention of the importance of being 'punctual at work, otherwise there is a long delay in achieving objectives'; 'absenteeism makes a team perform poorly'; 'workers must not be absent from work' and 'knocking-off late: you'll find that the next shift the people didn't have enough time to rest which results into not being able to perform the duties as expected'.

### Mining standards

Underground mining activity is strictly regulated by legislation. Very specific mining standards were developed, which define specifically how mining activities should be performed. All employees are trained in terms of mining standards and regulations, relevant to the specific jobs they perform.

Twenty-three per cent of the sample mentioned the application of mining standards as an important factor contributing to team success. This factor is unique to the current population. Respondents mention that they 'should apply rules and regulations: team has to abide to standards

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and work accordingly to achieve objectives'; 'team has to stick to instructions given and abide by rules and regulations of the company'; 'committed to safe work procedures'; 'we must know what type of technology to be used according to the ground, as well as what type of support will be needed'.

## Ground conditions

Ground condition (geological structure) determines whether an area can be mined or not, what mining methods and technology are to be used, and the type of support to be installed. It sometimes happens that a team mines a specific area, only to discover a geological obstruction (fault or dyke), which delays the process of getting the gold out. Sample drilling is done beforehand in order to 'map out' the geological structure of a piece of ground.

Of the sample, 19% of the respondents named ground conditions as an important factor influencing team performance. This factor is unique to the current population. Respondents identified the factor of ground conditions by terminology such as 'geological structure impacts on team performance. It is hard physical work and employees must know the ground conditions'; 'the factor that impacts most on the work of my team is the ground. We must look at it before we start stoping and know about them and use technology depending on them (ground conditions). We can use an open type stope, or not, and what form of support will be needed'.

## Skills and experience

Working underground takes a certain amount of getting used to, and experience plays a big role in the performance of individuals and teams. Although all employees undergo formal job training prior to placement underground, it takes time to get to know ground formations, to identify safe and unsafe work areas, and the 'unwritten rules' of working underground. Technical skills are equally important, and employees often become proficient in a particular skill only after performing on the job for an extended period of time.

Of the sample, 19% of the respondents felt that the skills and experience of team members significantly affect team success. Skills and experience are also cited in previous research<sup>18</sup> as important, but having underground experience is a factor unique to the mining industry.

'Driller competency is an important factor impacting on the work performance of a team'; 'it is hard, physical work, and employees must know the ground conditions. Novices do not make the grade'; 'we must know the ground conditions and choose technology depending on it, also what form of support will be needed', are some of the phrases used to identify this factor.

## Support systems/infrastructure/transport

In the context of this study, support systems refer to the processes that support the main business process (which is

ore extraction and development), namely ore transport, shaft engineering, human resources and finance. Twenty per cent of the sample cited this factor as important.

## Safety

Mining underground is dangerous due to the immense pressure exerted by the tons of ground on the mined-out areas from above. Seismic events cause the falling of ground in the mined-out areas and cause injury and death of miners annually. People working underground are also exposed to high temperatures and dust-filled air. The ore extraction methods still used today are labour intensive and require hard, strenuous physical activity, which induces fatigue and further increases the possibility of injury. Mining is therefore strictly regulated by legislation in an attempt to ensure the safety of underground workers.

Despite the dangerous nature of underground mining operations and the number of fatalities in the industry every year, only fifteen per cent of the respondents felt safety was an important factor influencing team success. The factor was identified by phrases such as 'safety—having safety equipment, ensuring that the proper clothing and equipment is being used'; 'work to be done in a safe area'; 'safety meetings at the beginning of the shift, committed to safe work procedures'; 'the team must make the place safe without hazards'.

## Work-life balance and overtime

The objective of underground gold mining teams is to blast rock daily. A lot needs to happen on a daily basis before blasting can take place, and sometimes teams work overtime in order to get a blast for the day. Excessive overtime disturbs a person's balance between work and other pastimes, and it was mentioned as a hindering factor by fifteen per cent of the participants.

## Night shift preparation

Twelve per cent of the respondents named night shift preparations as an important factor influencing team success. Mining is a cyclical process and attaining the month's production target entails a repetition of the same set of activities in sequence and on a daily basis, with the main objective being to attain a 'quality blast per shift'. The activities are split into making the area safe, charging up, drilling and blasting the area, and removing the broken rock from the area so that the process can be repeated. The removal of blasted rock is typically done by a team of night shift employees, who are supposed to prepare the area for day shift employees to perform their duties. If this does not happen, day shift employees spend their time cleaning the area and a blast is lost for the day.

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'Night shift crews have to get full preparations done in order for the team to perform their duties'; 'night shift workers have to do all the preparations'; 'night shift work till late (not finished in time)', are some phrases identifying this factor.

### Training and development

In the sample population, all self-directed work teams undergo special training programmes designed specifically to train employees on how to work together as a team, business understanding, planning, and various other skills necessary to enable them to perform as self-directed work teams. Experiential learning activities are also included. The business units labelled these special training programmes differently on each mine ('Power Team Training', 'Super Team Training', 'Self-directed Work Team Training'), but these programmes had basically the same objectives and the content overlapped to a great extent. Follow-up or refresher training normally took place six months to a year after the first team training initiative.

Twelve per cent of the respondents named training and development as an important factor contributing to team success. Previous research has attributed much more importance to training and development than the current results, and has identified training and development as highly important in the implementation of successful self-directed work teams<sup>1,7,16,18</sup>.

Respondents have mentioned the following about training and development as a factor affecting on the performance of self-directed work teams: 'For the first time in their lives they are exposed to business principles, get taught conflict management skills, the principles of teamwork are explained. They are shown the bigger picture and where their team fits in'; 'They are shown how to take charge of their own destiny as far as bonus earnings are concerned, and having this understanding empowers them'.

### Job satisfaction

Underground gold mining is physically arduous and the work environment is dangerous and unpleasant to most people. Job satisfaction could be derived from the challenging aspect of the work. Eight per cent of the respondents named job satisfaction (or the lack thereof) as a factor affecting on the success of self-directed work teams.

### Personality profile

Personality profile refers to the personality characteristics of team members, and suggests that a certain personality profile will be more suited to this type of work than others. Four per cent of the participants felt that this factor affecting on the success of teams.

### Technology

Although underground gold mining is extremely labour intensive, certain technologies are also used in the ore

extraction and development processes. Four per cent of the respondents cited the appropriate use of technology as an important factor.

### Discussion

The most significant result of the current study is that it reveals a different factor as the most important one in the work performance of self-directed work teams than which is suggested in the literature. Furthermore, a number of factors that are relevant only to underground gold mining in South Africa were identified.

The highest number of respondents felt that logistics (availability of resources to do the job) is an important variable in self-directed work team success, and indicate the importance of this factor in self-directed work team performance. The results also suggest that problems in the area of material and resources supply might exist, and future research could be conducted to explore this.

The importance of factors such as team leader characteristics, communication, interpersonal relationships, teamness, incentives, skills and experience and training as derived from the literature study, were confirmed by the results of this study. These results also confirm the importance of the 'human factor' when implementing self-directed work teams, in that the significant drivers of success are often the 'unseen' factors such as relationships and team synergy.

Factors unique to the gold mining industry in South Africa that were identified include planning (seen in the context of daily mining activities), absenteeism, mining standards, ground conditions and night shift preparations. It is therefore advisable to keep these factors specifically in mind when self-directed work teams are implemented in the gold mining industry.

The planning process is important and relevant in the underground mining context because teams need to map out their piece of ground in relation to the whole, and plan their work for the following month. Traditionally teams were not involved in this process and it was performed by the mine overseer, shift overseer and sometimes the miner of the section, and instructions were relayed to the team. The implementation of self-directed work teams in the mining industry also saw the inclusion of teams themselves in the planning process, which empowers them and gives them ownership over their tasks and objectives.

Because of the labour intensiveness of underground gold mining in South Africa, the achievement of production targets rely heavily on the performance of the team members themselves. Teams usually have just enough members to perform all the tasks required for the day in order to blast, because labour is an expensive component of the cost of mining. Absenteeism affects negatively on production output, as the unforeseen absence of a team member often results in the team not being able to reach its targets or working excessive overtime in order to reach its targets.

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Each mine has a different geological structure and therefore has certain set mining standards according to which tasks are performed underground. This is regulated by legislation<sup>19-22</sup>. Mining standards affect the performance of teams because it requires work to be done in a certain way, mostly for health and safety reasons. This often increases the difficulty factor of the work and complicates the process that needs to be followed before a blast can take place. Ground conditions influence the performance of teams in the same way, as certain geological structures make it extra difficult to mine a specific area, and complicate the mining process.

In this context 'night shift preparations' is also a factor unique to the mining industry, and is important because of the cyclical nature of underground gold mining. Certain tasks are performed by a night shift crew (cleaning of the workplace) and preparation of the workplace for the day shift crew to perform their tasks. If the work of the night shift crew was not done to standard, it has a negative impact on the output of the day shift team and often results in a lost blast for the day.

The expectation was formed from the literature review that incentive schemes are extremely important in the success of self-directed work teams in the mining industry in South Africa, with one study concluding that incentives are the most important of contributing factors. Studies concluded that poverty and high levels of unemployment in South Africa contribute to monetary needs being very important to employees. The fact that less than half of the respondents rated incentives as a significant factor affecting the success of self-directed work teams is, however, surprising as one would expect a bigger percentage.

Strydom<sup>5</sup> explains that, in the South African (third world) situation, money is a huge motivator—workers desperately require physical and safety needs to be satisfied. The result is that any production-based incentive scheme will lead to a respective increase in productivity. The self-directed work team concept in its pure form is focused on higher-order needs, such as self-actualization, interacting with fellow-workers, and job improvement. But, unless the lower level needs are met first by monetary gain, the concept will not reach its full potential. The comments made by participants point out that employees are often unaware of the method and process of bonus calculation, which causes uncertainty and suspicion.

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