Demonstrating the influence of locus of control and self-efficacy on potential risk-taking behaviour:  
The case of Millennials at Kolomela mine

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*I dedicate my life’s accomplishments to my family, who inspire me every day.*
Plagiarism declaration

I know that plagiarism is wrong. Plagiarism is to use another’s work and pretend that it is one’s own.

I have used a recognised convention for citation and referencing. Each significant contribution and quotation from the works of other has been attributed, cited and referenced.

I certify that this submission is my own work.

I have not allowed and will not allow anyone to copy this research study with the intention of passing it off as his or her own work.

Miss Trisha Naicker
7 December 2016
Abstract

**Purpose** – the research study aimed to demonstrate the impact of locus of control and self-efficacy on the potential risk-taking behaviour of the Millennial workforce at Kolomela mine. Kolomela mine is an iron ore mine located in the Northern Cape province of South Africa. The mine employs at least 1300 people, of which, 253 employees represent South African Millennials. The mine is estimated to be in operation until the year 2040 and the workforce is committed to ensuring a safe working environment throughout the life-of-mine.

**Design/methodology/approach** – the research study reviewed quantitative data gathered from administering the Safety Locus of Control and New General Self-Efficacy psychological scales, while controlling for generational cohort (Millennials). These results were compared to the findings of past literature to deduce the potential implications on risk-taking behaviour. A fifty-one percent response rate was achieved from the research study population (N=100).

**Findings** – most of the Millennial employees at Kolomela mine demonstrated an external locus of control (55% of the sample) and low sense of self-efficacy (53% of the sample). The researcher argues that highly externalised locus of control employees attribute negative outcomes to external sources and do not hold themselves responsible. Furthermore, the evidence demonstrates that employees with a low sense of self-efficacy portray a pessimistic outcome expectancy and experience self-impeding behaviours in high-stress situations.

**Practical implications/recommendations** – Millennials at Kolomela mine were found to be more risk prone and their potential risk-taking behaviour is influenced by the constructs of locus of control and self-efficacy. Their risk-taking behaviour is characterised by: attributing outcomes of an event to external elements such as chance/fate or luck; becoming immobilised during high stress situations that can cause an underutilisation of cognitive problem solving skills; a lack of perceived controllability of the situation; a pessimistic outlook on events; and an inability to regulate feelings of anxiety and stress. Managers should expect a higher demand on the organisation to provide support to minimise the effects of the potential risk-taking behaviour of the Millennial employees. In addition, organisations can respond to these challenges by assisting employees to: increase their level of self-awareness and expectancy of risk; alter their locus of control to believe that their behaviour change will mitigate the risk; and further develop their sense of self-efficacy.
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1. Introduction

In 2014, the mining industry was reported to employ at least 495,568 people, with every employee considered to have up to nine dependents (Chamber of Mines, 2016). Each year, hundreds of people are injured at mining operations, despite significant efforts to attain zero harm. During 2015, seventy-seven people lost their lives while working in the mining sector. This implies that nearly 700 dependents were negatively affected by these fatalities.

While evidence from the South African Department of Mineral Resources demonstrated a downward trend in frequency of deaths reported in the mining industry (Figure 1), an increased pattern of repeat incidents and accidents was observed. A noteworthy consequence of repeated accidents is the growing likelihood of potential fatalities.

![MINING FATALITIES PER COMMODITY 1993 - 2014](Image)

**Figure 1** - Mining fatalities per commodity (Source: Chamber of Mines, 2016)

Furthermore, the categorisation of mining-related accidents indicated that the most significant contributors to fatalities are general accidents, transportation incidents, and fall of ground incidents (Figure 2). The total number of general accidents is reported to have increased year-on-year, thereby implying a greater level of risk exposure to a wider proportion of employees on a mine.
1.1 Research area and problem

Risk management in the mining industry has received growing focus in an attempt to reduce mining related safety incidents and fatalities. A critical component of managing risk in the mining sector was demonstrated by Schein (2004, as cited in Eeckelaert, Starren, van Scheppingen, Fox, & Bruck, 2011). Schein’s (2004) onion model highlighted three key constructs which affect an organisation’s safety culture, namely the underlying convictions (core of the onion), espoused values and attitudes of the employees and organisation (second layer of the onion), guiding principles and policies of the organisation (outer layer of the onion). Robust policies, procedures and leadership behaviour were seen to promote a safety culture in mining operations. However, employee perception towards risk (second layer of the onion) tends to be underplayed in its relevance to managing overall risk (Boholm, 1998).

Scholars argued that the decision-making process involved in assessing a high-risk situation is influenced significantly by one’s perception of the situation, controllability of the actions necessary to attain the expected outcome and a myriad of other factors (Robbins & Judge, 2013). These factors include psychological, social, cultural and institutional factors (Sjöberg, Moen, & Rundmo, 2004). Recent work in the field of behavioural theory was conducted by Smith et al. (2003, as cited by...
Moller & Rothmann, 2006). Smith et al. (2003) whom explained the three types of behaviours that may influence safety and mine-related incidents. Each behaviour type encompasses the decision-making process which informs the actions taken by an individual to achieve a specific outcome: (1) Conscious behaviour – occurs when a person’s decision-making process is based on the judgement and perception of the individual; he/she may choose to comply with or violate the organisation’s safety protocol. (2) Habitual behaviour – the individual’s behaviour and actions are carried out automatically. This is typically influenced by conditioning of working in the environment for a significant period. (3) Unintentional behaviour occurs when the individual is not equipped (low level of competence) or is unaware of a safe way to carry out the task. In sum, their research suggested that behavioural types affect one’s perception of causal attributions and subsequent actions.

There has been much discussion about attributional theory and the value it holds in understanding and predicting human behaviour. Harvey, Madison, Martinko, Crook, & Crook, (2014) argued that attribution theory can help organisations better understand their workforce, and vice versa; leading to improved organisational effectiveness and performance. Pivotal to attribution theory are the behavioural traits - locus of control and self-efficacy. These constructs have been extensively researched and their influence on an individual’s behaviour is pertinent. Therefore, the research study focused on investigating the impact of these behavioural traits on individual perception and subsequent actions in high-risk situations.
1.2 Research questions

Given the growing imperative to reduce mine related injuries and the associated advantages with understanding the behavioural traits of employees in high-risk environments, the researcher found it appropriate to demonstrate the impact of locus of control and self-efficacy on the potential risk-taking behaviour of the Millennial workforce at Kolomela mine (Figure 3).

![Figure 3 - Research Objective](image)

The research objective which is explanatory in nature was investigated through the following paths:

1. Using a survey questionnaire, the researcher empirically tested the locus of control characteristics of Millennial employees in a mining context and determined the self-efficacy traits of these Millennials to:
   
   a. Determine if Millennial employees at Kolomela mine are predominantly external or internal in their safety locus of control belief
   
   b. Identify the prominent type of self-efficacy (high vs. low) of the Kolomela mine Millennial workforce

2. Deduce the implications of locus of control and self-efficacy on the potential risk-taking behaviour of the Millennial employees at Kolomela mine.
1.3 Scope and justification of the research study

The research study was conducted at Kolomela mine and the sample was limited to Millennial generation employees. Kolomela mine is an iron ore mining operation located outside the town of Postmasburg in the Northern Cape province of South Africa (Kumba Iron Ore Limited, 2015). The mine employs at least 1300 people and this workforce includes 253 South African Millennials. The mine is estimated to be in operation until the year 2040 and the organisation is committed to ensuring a safe working environment throughout the life-of-mine. Safety at Kolomela mine is the organisation’s core value and significant effort is in place to minimise risk. A zero-tolerance risk-culture, various administrative processes, in-depth policies, safety guidelines and training programmes are the foundation to the risk management practices at Kolomela mine.

The researcher argues that Kolomela mine can benefit from understanding the potential risk-taking behaviour of its Millennial workforce. This argument is supported by Harvey et al. (2014) who demonstrated that a better understanding of one’s causal attributions can positively influence an individual’s self-awareness and help organisations understand their employee’s perspectives and behaviour. Moreover, the research study suggests that the management team at Kolomela mine may be able to leverage the findings from the research study to improve the current practices and safety culture at an operations level. In addition, the management team at Kolomela mine could possibly tailor the mine training programmes to include research findings which emerged through the understanding how Millennials perceive risk, and the influence of their behavioural traits on risk-taking actions.

The Millennial generation cohort was selected for the research study because of their unique characteristics and growing footprint as a large proportion of the country’s potential workforce. South African Millennials account for thirty-six percent of the population, which is at least 20 million people (Statistics South Africa, 2015). The complexity regarding South African Millennials is related to their birth cohort and the influence of historical events on their childhood. For example, researchers
infer that generalisations cannot be made about South African Millennials from different racial groups because socio-political factors had unique influences on their personality and behavioural characteristics (Smith, 2011; Chang, 2011 as cited in Martins & Martins, 2012; Mattes, 2011, as cited in Deal et al., 2012). The research study aims to determine the locus of control and self-efficacy beliefs of South African Millennials in a mining context. The evidence reported can be used to improve the level of comprehensive research reported on South African Millennials (Deal et al., 2012). In addition, Martins and Martins (2012) argue that further research in the understanding of South African Millennials would enable better collaboration between generational cohorts in organisations thereby promoting organisational effectiveness and leadership performance.

1.1 Research assumptions

A valid assumption in the Safety Locus of Control scale is the shared belief that internalised individuals are “personally responsible for their safety and can take preventative steps to avoid accidents and injuries” and externalised individuals “have little or no personal control in accident prevention” (Jones & Wuebker, 1985, p.152).

A second assumption is that highly self-efficacious individuals (in a wide variety of achievement situations) believe that they perform better, regulate emotional states, and make maximum use of their problem-solving capabilities (Bandura, 1977, 1978; Chen, Gully, & Eden, 2001; Judge, Erez, & Bono, 1998).

A final assumption relating to the administration of self-administered, internet-based questionnaires is that survey respondents will answer honestly. Sweet (2001, as cited in Saunders et al., 2009) and Dillman (2007, as cited in Saunders et al., 2009) argued that the anonymity offered by online survey questionnaires facilitates more open and honest feedback, as opposed to respondents adapting their responses to confirm with that which is perceived to be socially acceptable.
2. Literature Review

2.1 Introduction

The researcher followed the literature review guideline developed by Saunders, Lewis, and Thornhill, (2009) so as to best understand existing research which has been published in the area of interest. The authors assert that through conducting a critical review of the literature, the researcher is able to develop and refine the research study to a specific focus area. In addition, the benefit of a thorough literature review enabled the researcher to build upon theories and validate the outcomes of the research study against the relevant theories. In this chapter, six main areas of focus were discussed:

- Characteristics of the Millennial generation
- Attribution theory
- Locus of control
- Self-efficacy
- Perception of risk
- Risk-taking behaviour

The structure of the literature is shown in Figure 4.

![Figure 4 - Structure of the literature review (Saunders et al., 2009)](image-url)
An in-depth exploration of the existing literature has been conducted within each section and necessary sub-sections have been developed to support the research argument. Each section has specific goals as outlined in Table 1.

Table 1 - Objectives of the literature review

<table>
<thead>
<tr>
<th>Literature review section</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millennial generation</td>
<td>Explain what factors affect the categorisation of this generational cohort; determine the characteristics of Millennials and show how these elements effect organisations.</td>
</tr>
<tr>
<td></td>
<td>Explain the concept of attribution theory and why it is important to organisations; determine the factors that affect causal attribution, including behavioural biases and demonstrate the link to locus of control and self-efficacy beliefs.</td>
</tr>
<tr>
<td>Attribution theory</td>
<td>Provide an overview of locus of control and its holistic application; determine how locus of control influences decision-making processes in high-risk situations; demonstrate the locus of control beliefs of Millennials</td>
</tr>
<tr>
<td>Locus of control</td>
<td>Provide an overview of self-efficacy beliefs and its impact on outcome expectancies; demonstrate the influence of coping efficacy in high risk situations; identify the prominent state of self-efficacy beliefs in Millennials</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Provide a definition of risk, an overview risk perception and the impact it has on decision-making processes; detail the constructs which influence risk perception; identify how behavioural traits impact risk-taking behaviour.</td>
</tr>
<tr>
<td>Risk perception and risk-taking behaviour</td>
<td></td>
</tr>
</tbody>
</table>
2.2 The Millennial generation

The research study is focused on gaining insight into the Millennial generation, synonymously considered as “Generation Me” “Generation Y” (Sandars & Morrison, 2007) or “digital natives” (Shaw & Fairhurst, 2008). Popular scholarly work showed fair agreement on the characteristics of Millennials. However, there remains dissonance with respect to the timeline that bounds the Millennial generation. While, Mannheim (1952) argued that people cannot be grouped into the same category (generation) purely based on time of birth, he did assert that location in social structure is a more rigorous grouping. Nonetheless, time of birth serves as necessary categorisation for the purpose of this research study.

The inconsistencies around the definition for the upper and lower limit of the period in which Millennials where born include for example, that of, Smola and Sutton, (2002) who asserted that Millennials are born between 1979 and 1994, Twenge (2014) who referred to Millennials as individuals born in the 1980s and 1990s, and, Howe and Strauss (2000) who argued that the Millennial generation are those individuals born in or after 1982, up until the year 2000. In addition to time of birth, the socio-cultural experiences of a generation impact the values, attitudes and behaviour of Millennials (Twenge & Campbell, 2008), referred to as consistent linear change, as opposed to a sudden generational shift.

In the South African context, researchers argued that South African generational cohorts are more complex than others because white and non-white populations were affected differently by the same socio-political events (Deal et al., 2012). Furthermore, it was postulated that the transition from Apartheid to democracy had a significant influence on personality traits, expectations and behaviours of Millennials in South Africa (Smith, 2011; Chang, 2011 as cited in Martins & Martins, 2012; Mattes, 2011, as cited in Deal et al., 2012). The present research study has considered the implication of socio-cultural experiences on a generational cohort and for the purpose of consistency, the Millennial generation classification of Twenge (2014) is used throughout this research study, thus Millennials will be considered as individuals born in or after 1980 until the year 1999 (inclusive).
2.2.1 Why focus on Millennials?

Significant research has been conducted on the Millennial generation in the workplace, ranging from individual characteristics to leadership traits (for example, Chou, 2012). South African Millennials account for 36% (at least 20 million people) of the South African population (Statistics South Africa, 2015) and represent a large proportion of the potential workforce. Martins and Martins (2012) argued that further research in the understanding of South African Millennials would enable better collaboration between generational cohorts thereby promoting organisational effectiveness and leadership performance.

Furthermore, the tech-savvy nature, innovative ideas and valuable knowledge of South African Millennials can be vital for a company’s success (Chang, 2011 as cited in Martins & Martins, 2012). With specific reference to the research study, Kolomela mine has a significant proportion of employees (19%) who reside within the category of the South African Millennials (Kumba Iron Ore Limited, 2015). Given the large Millennial workforce at Kolomela mine, the findings of the research study will be imperative for understanding how Millennials perceive risk and the affect this has on their potential risk-taking behaviour.

2.2.2 Characteristics of Millennials

The Millennial generation is considered to espouse characteristics which include high self-esteem, independence, and self-motivation (e.g. Al-Asfour & Lettau, 2014, Twenge, 2014, Williams & Page, 2011). Millennials were also found to be incredibly self-reliant, as well as self-absorbed. Scholars argued that Millennials with higher level of self-esteem are driven to exceed expectations, are typically high performers and aspire to maintain these standards (Robbins & Judge, 2013). A consequence of which, is that they are prone to attach the negative outcomes of situations in the external environment to factors beyond their control. In the South African context, research by Smith (2011, as cited in Martins & Martins) demonstrated that Millennials are entrepreneurial, self-assured, individualistic, ambitious, goal driven, community-spirited and focused on a balanced lifestyle.
In the workplace, Millennials are considered to develop strong social relationships with colleagues and are highly collaborative in their work process (Chou, 2012). The collaborative nature is based on a communication method that has a strong focus on technology platforms including emails, social media platforms, instant messaging and video conferencing (Shaw & Fairhurst, 2008). Research has shown that this generation displays a good level of commitment, accountability and altruism (Elam, Stratton, & Gibson, 2007; Gloeckler, 2008). Furthermore, Millennials place a high emphasis on a conducive work environment and they strive for achievement in work goals that are aligned to personal values.

In short, Millennials reflect a complex and diverse generational cohort, characterised by traits of narcissism, self-confidence, individualism and high-achievement. The present research study aimed to understand how locus of control and self-efficacy in Millennial employees affect their potential risk-taking behaviour in high-risk situations at Kolomela mine. Therefore, the researcher investigated the following behavioural traits to better support and validate the research findings.

**2.3 Attribution theory**

Attribution theory examines how and why we explain the causes to an event or outcome (Heider, 1958) and is the foundation to the research study. Robbins and Judge (2013) defined attribution theory as a construct that aims to identify if an individual’s behaviour is internally or externally caused. The internal attribution process is consistent with Rotter’s definition (1966), in that internal causes are attributed to the individual and typically controlled by the individual. In contrast, the external attribution process assigns the behaviour of an individual to outside factors that are typically not controllable by the individual. There has been much discussion about attributional theory and the value it holds in understanding and predicting human behaviour. Harvey et al. (2014) found attribution theory to be important for organisational research. The authors argued that attribution theory has a dual-relevance to organisations: firstly, it can help employees better understand their own perspectives and behaviour; secondly, it can provide management with a foundation to better understand some of the causes of employee behaviour.
In their research, Robbins and Judge (2013) showed that an individual’s behaviour or attribution of cause, is directly impacted by the individual’s perception of the current situation, which in turn is affected by the perceiver, the environment and the situation (Figure 5). The process of perception occurs each time an individual analyses a situation and assimilates their impressions to provide meaning to that environment. Notably, the behaviour, decisions and actions that follow from one’s perception can be considered reliant upon an individual’s interpretation of reality, which may not be reflective of an objective reality. Harvey et al. (2014) postulate that an employee’s subjective perception of the causes of his/her behaviour may affect his/her judgment and subsequently the actions taken by the employee.

![Factors that influence perception](image)

**Figure 5** - Factors that influence perception (Source: Robbins & Judge, 2013)

Robbins and Judge (2013) further elaborated upon past research regarding the four biases that affect perception, namely selective perception, halo effect, contrast effect and stereotyping. Selective perception is the ability of an individual to selectively interpret a situation based on one’s attitude, interests, background, and experience. This leads to a level of bias, which may cause inconsistent decision-making and outcomes. The halo effect is the propensity of an individual to espouse a specific perception about a situation based on a specific characteristic (Bechger, Maris, & Hsiao, 2010;
Dennis, 2007; Naquin & Tynan, 2003). The contrast effect refers to a level of perception distortion which occurs when an individual compares a previous encounter to the current situation, thereby affecting how the current situation is interpreted. Stereotyping is a behaviour wherein an individual applies generalisations to a specific situation to better understand the context (Hilton & von Hippel, 1996).

From this overview of perception, it can be understood that perception is unique to each individual and is reliant upon a myriad of behavioural and environmental considerations. Perception is also complex in that it is affected by at least four biases. Research has shown that perception affects how one interprets and evaluates information. This interpretation can be seen to affect the decision-making process of the individual and finally resulting in how one reacts to a situation. Building upon this, Robbins and Judge (2013) alluded to three specific determining factors that affect attribution of cause, namely, distinctiveness, consensus and consistency (Figure 6).

![Figure 6 - Application of Attribution Theory](Source: Robbins & Judge, 2013)

Distinctiveness is explained as a process where an individual alters their behaviour in different environments. For example, if an individual exhibits behaviour that is determined to be out of character, then it will be considered as likely to have an external cause. Consensus refers to everyone reacting to a similar situation in the same way, with the same outcome. If consensus is high, an
external attribution will be applied. However, if an individual is placed in the same situation as the consensus, but chooses to respond differently, resulting in a dissimilar outcome, then an internal cause will be applied. Consistency refers to repeated behaviour and actions in a specific context. In situations where an individual displays consistent behaviour, the cause is considered internal. Therefore, by considering the factors that impact how an individual attributes behaviour to outcomes, one is able to garner a better understanding of himself/herself and other people in an organisation.

Two chief factors were considered by the researcher. These include the behavioural traits - locus of control beliefs and self-efficacy beliefs. An in-depth discussion on these pertinent constructs is discussed in the following sections.


2.4 Locus of control

Rotter (1966) defined locus of control as an individual’s belief about one’s control over their actions which leads to the subsequent outcome. The argument therefore recognises the direct causal relationship between behaviour and outcomes. Findley and Cooper (1983) elaborated upon the original theory by reflecting upon Rotter’s (1966) two discrete loci of control rudiments – internal and external locus of control beliefs. A person who holds a strong internal locus of control is shown to who holds himself/herself as accountable for and in control of their life outcomes. In contrast, an individual with a preference towards a more external locus of control perceives negative consequences as being a chance of fate or luck, rather than strictly controlled by himself/herself (Findley & Cooper, 1983). While Rotter (1966) originally presented two ends of the locus of control continuum, Wong and Sproule (1984) developed the term “bilocals”, which refers to individuals who transition between both an internal and external locus of control (Rotter, Seeman, & Liverant, 1962, as cited in Neal, Weeks, & DeBattista, 2014).

Research by Anderson and Schneier (1978) elaborated on the leadership qualities of internalised and externalised individuals. The authors showed that individuals with stronger internal locus of control are more accountable for their performance; subsequently, they enable a culture of high performance in an organisation. In addition, their research argued that highly internalised individuals have a higher likelihood of becoming successful leaders. Conversely, April et al. (2012) provided evidence that individuals with a highly internalised locus of control adopt far more responsibility than others. As a result, they may experience heightened stress, feelings of low self-esteem and guilt, unhealthy feelings of isolation and a negative psyche. These internalised individuals may also set unrealistically high expectations for their subordinates leading to questioning the worth ethic which may cause an unhealthy work environment.

From the above, it is clear that locus of control has a significant role to play with respect to how an individual behaves and the outcomes of one’s actions on the environment thereof. In addition, one’s locus of control can be seen to affect the cognitive processing, emotional state and social awareness of
an individual. Therefore, it has been determined that an appropriate investigation should be conducted on locus of control, moreover, to analyse how and if it affects the ability of an individual to perceive, and subsequently, manage risk.

### 2.4.1 Safety locus of control

With respect to understanding the relationship between unsafe behaviour and locus of control, past research indicated that internally oriented individuals display a sense of personal accountability for accidents; in contrast, individuals with an external locus of control, opted to blame external factors, for example, chance and fate, for the negative consequences (Loo, 1978, Phares & Wilson, 1972, Shenck & Rauschb, 1979 as cited in Jones & Wuebker, 1985).

In their safety locus of control research, Jones and Wuebker (1985) investigated the safety behaviour and historical accidents of 158 students. Their findings showed that individuals who had more severe accidents were more external in their safety locus of control beliefs. Moreover, Jones (1983) and Jones and Wuebker (1985) illustrated that externally orientated employees are prone to a higher frequency of accidents than employees with a more internalised locus of control. In 1993, Jones and Wuebker investigated the safety locus of control preference of 283 hospital employees and their personal on-the-job injury reports. Their research found that individuals with a highly external locus of control exhibited a low level of safety awareness, alongside a higher number of accidents. In contrast, employees displaying a higher level of safety awareness and subsequently lower rate of accident occurrence were identified as having a highly internalised locus of control (Jones & Wuebker, 1993).

Furthermore, research by Christian, Bradley, Wallace, and Burke (2009) made several interesting points regarding individuals with a high controllability perception. The authors asserted that individuals who perceive themselves as in control, tend to be more curious about learning and engaging in safe practices, as compared to others (external locus of control individuals). In addition, internal locus of control individuals appear to have heightened levels of motivation to educate
themselves about safe learning practices, thereby reinforcing the findings of Jones and Wuebker, (1985) who asserted that highly internalised individuals are more safety conscious.

2.4.2 Locus of control beliefs among Millennials

The following review presents an understanding of the Millennial generation under the construct of Rotter’s (1966) locus of control. In 2004, Twenge, Zhang, and Im examined the time period differences in locus of control over the past 40 years. In short, their findings showed that college students became increasingly external in their locus of control beliefs, over time (1960s – 2000s). The scholars referenced two competing models about change over time in locus of control, namely the independence model and the alienation model.

The independence model predicted that over time, there have been considerable increases in individualism, and expected locus of control to become more internal. However, past research found that the use of self-serving bias, which occurs when an individual attributes good outcomes to their own actions and conversely bad outcomes to external environments, was much stronger in individuals with an external belief (Campbell & Sedikides, 1999, cited in Twenge et al., 2004). In contrast, the alienation model predicted that locus of control beliefs have become more external over the 40-year period because of historical trends of a victim mentality, particularly in the American culture and an increase in negative social indicators. The basis of the alienation model is supported by earlier research that prescribed a negative societal environment as a channel for externality (Lefcourt, 1982, cited in Twenge et al., 2004).

Twenge et al. (2004) conducted two studies to test the theory of the predicted models – in the first, 18,310 samples were analysed from 97 studies conducted on American college students who completed the Rotter locus of control scale (I-E scale) between 1960 and 2002. The results showed a clear indication of increasing externality, for example, the I-E scores continued to grow more external throughout the 1980s and 1990s and the average student in 2002 was 80% more external than the average student in 1960. In the second study, Twenge et al., (2004), used the Child Nowicki-Strickland Internal-External Scale (CNSIE) to analyse 41 samples from 6,554 children (aged 9-14
years). The results showed that children’s CNSIE scores became more external from the 1970s to the 1990s. The findings from both studies show significant support for the alienation model and the authors allude to the American culture of being unable to change the larger world, being less in control of their own future and the prevalence of individualism, as key contributors.

Interesting to note is the research conducted by Trzesniewski and Donnellan (2010), who postulated that the sampling method used by Twenge (2006) in the Generation Me profile is questionable thereby nullifying the substantial generational differences with respect to personality traits and attitude. In particular, the authors argued that the conclusion that individuals born in or after the 1970s have higher I-E scores than earlier birth cohorts, thereby implying stronger external beliefs, is limited because of sampling errors. Trzesniewski and Donnellan (2010) made use of the Monitoring the Future project (MTF; Johnston, Bachman, & O’Malley, 2003, cited in Trzesniewski & Donnellan, 2010) and found little difference in the psychological profiles between the Millennial generation and other cohorts. In particular, the authors’ research demonstrated a commonality across behavioural traits such as including egoism, self-esteem and level of happiness. However, their research also indicated that Millennials are more pessimistic and distrusting than earlier generational cohorts.
2.5 Self-efficacy

Self-efficacy is defined as an individual’s perception of one’s capabilities to engender motivation, personal capacity and actions that are necessary to perform in the given situation (Bandura, 1977)(Wood & Bandura, 1989). Bandura's (1992) later work illustrated the importance of self-efficacy on self-imposed challenges; in the case where an individual is more confident about his/her capabilities, then that individual is more optimistic about the challenges that lie ahead. In contrast, where an individual displays a lower sense of confidence in his/her personal-capability, then he/she is found to be more pessimistic about the outcomes of the event. It can therefore be inferred that individuals with a higher degree of self-efficacy perceive a greater level of success in completing a task and people with a lower degree of self-efficacy perceive a higher chance of failure in completing a task.

Wood and Bandura (1989) further explained that self-efficacy affects the “challenges that are undertaken, the amount of effort expended in an endeavour, the level of perseverance in the face of difficulties, whether thinking patterns take self-aiding or self-impeding forms, and vulnerability to stress and depression” (p.408). Their research agreed with Bandura and Dweck, (1987) who presented the idea that individuals who consider themselves as less-capable (low self-efficacy) tend to emphasize their personal shortfalls and perceive challenging tasks (or environmental demands) as being significantly more daunting than they actually are. Not only does this cause the individual to perceive a less-than-successful outcome of an event, but it also creates feelings of anxiety, helplessness and depression. These feelings in-turn affects an individual’s cognitive reasoning in how to resolve challenge ahead (Lazarus & Launier, 1978; Meichenbaum, 1977; Sarason, 1975, as cited in Wood & Bandura, 1989). One’s concept of self can therefore significantly influence how an individual approaches tasks, goals, and challenges. This associated behaviour can impede/promote the likelihood of a successful outcome.

In addition to concept of self, Bandura, (1977) proposed the concept of reciprocal determinism, in which one’s behaviour, cognitive processes and environment influence each other. Specifically, the
author asserted that one’s behaviour is affected by the social environment, and similarly, the environment is impacted by one’s behaviour. A key finding from the research is that reciprocal determinism illustrated the possibility for individual behaviour to be transformed through cognitive processing and social stimulus events. Moreover, an individual’s outcome expectancy can influence how one behaves and therefore impact the subsequent actions taken by the individual. As a result, the individual can be expected to once more alter their expectations, to the newly changed environment (Bandura, 1978).

Bandura (1977) also considered that self-efficacy impacts the emotional state of a person and how he/she thinks and acts. The author argued that negative emotions are typical of low self-efficacy and emerges in forms of depression, helplessness and stress. A combination of low self-efficacy and negative emotions leads to a pessimistic outlook about an individual’s accomplishments and personal development. The consequence of this combination may cause an individual to feel inadequate in a high-performance environment or in the face of a challenging task. In contrast, individuals with a high degree of self-efficacy tend to display feelings of elevated motivation. These positive feelings can result in higher-achievement goal-setting behaviours and the individual can be seen to challenge events with greater rigour and ambition for success.

Bandura (1977) asserted that highly efficacious individuals are optimistic in their actions and invest a higher degree of effort and persistence in ensuring that the task is completed. Similarly, when an individual with a high sense of self-efficacy is faced with a setback, he/she is able to recover faster and restore their commitment to achieving their goals. This characteristics of a heightened level of perseverance in difficult situations, positive outcome expectation, self-regulated emotional state and lower susceptibility to stress, indicates that individuals with a high self-efficacy are able to cope better and strive for excellence in performance (Bandura, 2012).

Further research by Bandura (2012) found that self-efficacy can be developed in four ways: (1) mastery experiences, (2) social modelling, (4) improving physical and emotional states, (3) verbal persuasion. The process of mastery experience encompasses helping individuals experience a variety
of simple to complex tasks thereby improving their skills and level of perseverance (even when faced with failure). Social modelling involves a higher degree of collaboration with successful people. By seeing another person succeed, the observer is able to elevate their aspirations and confidence in their own abilities. Verbal persuasion requires people to be encouraged to complete a task thus improving their resolve to achieve a successful outcome. The last method refers to creating an environment which is conducive to positive physical and emotional states.

Various literature has found that self-efficacy is a contributor to employee performance and can be considered pivotal in task/event outcomes, social integration and attainment of goals. This holds importance for an organisational setting that is prone to high-risk situations, where individual performance has been shown to be measured by how well people are able to handle themselves and others (Goleman, 1998). Given the influence of self-efficacy on organisational performance, the following section in the literature review aimed to investigate the link between self-efficacy and high-risk situations.

### 2.5.1 Risk and self-efficacy

Bandura, (1992) elaborated on self-efficacy through the lens of perceived coping efficacy. He defined coping efficacy as an individual’s ability to regulate negative emotions experienced during high-stress situations. Furthermore, the author argued that an individual with a high sense of self-efficacy should display a high sense of perceived coping efficacy, as he/she is able to regulate their emotions and act with perseverance when facing a task. A highly efficacious person would typically be more adventurous in behaviour, as he/she would base their actions on their level of mastery, outcomes expectations, self-efficacy and state of emotional stability (Bandura, 1988, as cited in Bandura 1992). Remarkably, these individuals are also observed to display adaptive actions and recover quickly from setbacks. In addition, individuals with a heightened coping efficacy approach situations more confidently and are able to maximise the utility of their available skills.

Bandura (1992) further argued that low self-efficacy people, on the contrary, are considered to have lower levels of perceived coping ability. When faced with a high-risk situation, these individuals (low
self-efficacy and low perceived coping efficacy) experience heightened levels of anxiety and stress; he/she believes that they are ill-equipped to cope successfully. In turn, they choose to take actions that are presumed to provide protection (e.g. risk aversion), despite feeling a sense of lack-of-control over the situation. The fear and perceived deficiency in capability manifests into the magnification of the severity and possibility of threats. This impairs the level of cognitive functioning (Beck, Emery, & Greenberg, 1985; Lazarus & Folkman, 1984; Meichenbaum, 1977; Sarason, 1975, as cited in Bandura, 1992). Given the impact of coping capability on risk perception and outcomes expectancy, the researcher sought to better understand the prominent type of self-efficacy belief in Millennials.

2.5.2 Self-efficacy beliefs among Millennials

Although Millennials are reported to display characteristics of high self-esteem (e.g. Twenge & Campbell, 2001 as cited in Dannar, 2013), Bandura (1997, as cited in Bandura, 2012) argued that self-efficacy and self-esteem are distinct concepts. The author’s research demonstrated that self-esteem is a perception of self-worth, whereas self-efficacy is a perception of capability. While most literature refers to Millennials as displaying high self-esteem, Palmer’s (2015) study argued that people from this generation lack self-efficacy. The author showed that Millennial law students are not accustomed to criticism and are not mindful of their failures, and are therefore characterised by a lack of self-efficacy. Palmer (2015) asserts that Millennials are not cognisant of their failures and are unable to learn from past mistakes, thereby leading to an inflated level of confidence in one’s self-worth. Furthermore, he strongly suggested that this pattern of unconscious-failure events causes a negative effect on the development of a deeper level of self-efficacy and human agency, leading to a low sense of self-efficacy.
2.6 Locus of control and self-efficacy

Several studies (Bandura, 1994, 2000, 2012) showed an association between locus of control and behavioural conduct through theories of self-efficacy and human agency, wherein an individual has the belief that one has the ability to generate a desired affect/goal by completing a specific action. Furthermore, various meta-analysis studies completed by Judge et al., (2002) indicate that locus of control, self-esteem, self-efficacy and neuroticism should be integrated. Their research argued that a pattern of dependency between locus of control, self-esteem and self-efficacy is observed in their review of various literature.

In their first study, Judge et al. (2002) selected 75 relevant articles from an original 258 articles, and determined the relationship between the four measures. Their meta-analytic findings revealed 127 correlations among the personality measures indicating that these measures are strongly related. The average correlation among measures of these traits was .60 making the relationship suggestive. Further studies were conducted to validate their hypothesis. Study 2 showed that self-efficacy, locus of control, neuroticism and self-esteem are indicators of a higher order construct. The third study was undertaken to better investigate the issue of the discriminant validity of the four measures. In study 3a, “the following pattern of correlations generally emerged from highest to lowest: generalised self-efficacy–self-esteem, self-esteem–emotional stability, emotional stability–generalized self-efficacy, generalized self-efficacy–locus of control, self-esteem–locus of control, and emotional stability–locus of control” (Judge et al., 2002, p 706). This shows consistency and support for the discriminant validity of the measures. In their closing arguments, the authors do caution against blindly confounding the four traits, especially locus of control. Whilst their research did suggest that the four personality measures are strongly related, the correlation results for locus of control with the other measures, was the weakest. The authors liken this result to problems associated with the measurement of the trait and stand firm by the outcomes of their meta-analysis study.

Further discussion on the locus of control – self-efficacy link is presented by Bradley and Cole (2002) who argued that the two concepts are mutually exclusive. The authors posit that self-efficacy focuses
on the motivational elements of one’s self-concept, whereas locus of control is based on an individual’s perception of the cause of an event. It is therefore plausible that locus of control and self-efficacy independently influence human behaviour and the actions one takes to shape the events and courses of their lives. This is supported by Schwarzer and Fuchs, (1995) who argued that behavioural change is directly affected by a person’s self-concept and sense of control of events/outcomes.

In particular, the authors showed that if individuals believe that they are capable of the required actions to solve a problem (high self-efficacy), then that person becomes more inclined to accomplish the task and maintain a commitment to their decisions (irrespective of one’s locus of control). This could potentially have implications for understanding the factors that affect one’s behaviour and choices in high-risk mining environments. For example, should a highly self-efficacious individual be faced with a dangerous challenge, then it can be expected that he/she believes in his/her capability to overcome the challenge to achieve a successful outcome. However, this implication needs to be further explored to be fully validated.
2.7 An overview of risk

In addition to the perception of control and self-efficacy, Trimpop (1994) cites poor values-based systems, errors in risk consequence estimation, lack of training (poor mastery), misjudgement and emotional instability as factors that may lead to an unsafe event. Furthermore, an unsafe event can be seen to evolve from a person’s interpretation of risk. Risk is defined as the likelihood that an individual will experience a negative event and that event has a specific magnitude of consequences (Short Jr, 1984; Rayner & Cantor, 1987, as cited in Sjöberg, Moen, & Rundmo, 2004). In contrast, Rosa (2003) defined risk as “a situation or an event where something of human value (including humans themselves) is at stake and where the outcome is uncertain” (p.56). It is on this premise that Sjöberg et al., (2004) highlighted the relationship between behaviour and uncertainty; “uncertainty is assumed to be an important mediator of human responses in situations with unknown outcome” (p.7).

A more holistic view of risk is provided by Yates and Stone, (1992) who ascribe the elements of potential losses, significance of losses and uncertainty of losses to risk. It is evident that risk is considered to hold different meanings for individuals, depending on their cognitive understanding, environment and possible consequences of the outcome. The effect of individual perception on how one interprets risk prone situations is critical to minimising accidents and injuries. Therefore it is necessary to further understand the implications of perception of risk.

2.7.1 Perception of risk

Research has shown that one’s risk perception and willingness to engage in risky behaviour is affected by an individual’s decision making process (Maner et al., 2007). A more cautious employee will weigh the available information and length of time on hand before making a decision. In contrast an employee with a higher risk propensity will leverage different behaviours in decision-making. These findings among others serve to support the theory that risk perception involves a subjective interpretation of the likelihood of the risk occurring, the consequences of the negative outcome, and the decision-making process (informed by individualistic traits, such as self-efficacy and locus of
control) that eventually guides the actions taken by the individual in the at-risk situation (Sjöberg et al., 2004).

Earlier research by Yates and Stone (1992) indicated that individualistic biases are found to influence one’s perception of risk. In particular, the authors identified six biases (1) Contingency judgement deficiencies (2) Value biases (3) Personal role biases (4) Perceptually-based biases (5) Mood and individual difference effects (6) Level effects. Contingency judgement deficiencies occur when a person ascribes success to luck. The following descriptions are representations of instances where these six biases may occur. Value biases indicate a case of overestimating one’s chance of success as a result of heightened desirability for the outcome. Personal role biases can occur when an individual underestimates the threat of one’s actions due to the illusion of being in control. Perceptual biases occur when an individual uses one’s judgement to determine the factors that affect the outcome of a dangerous situation (e.g. motorcycles are perceived as more dangerous than cars). Mood and individual difference effects describe instances where a depressed or anxious (emotionally unstable) person determines the likelihood of failure to be higher than it really is. Level effects can refer to human-errors that occur in interpreting information which leads to variance in risk estimates.

While it has been argued that the consequence of the negative outcome affects one’s risk aversion (Robbins & Judge, 2013), Starr (1969, cited in Sjoberg, 2000) showed that a level of risk acceptance prevailed when the inherent risk was associated with benefits. Findings show that consequences of voluntarily taking risks can be a positive experience for an individual, if the desired goal was accomplished (Trimpop, 1994). This level of voluntary behaviour further sparked interest in the situational and individual characteristics that affect one’s risk perception, and ultimately inform the decisions that are taken by the individual. Starr (1969) argued that individuals are willing to tolerate and expose themselves to greater risk in situations that are perceived as voluntary. This tolerance of risk is associated with a sense of controllability of the outcomes thereof, even more so in a situation where an individual perceives himself/herself as in control of the situation (internalised locus of control belief). While one would expect a higher tolerance for risk to be associated with a higher frequency of accidents, it has been determined that this is not the case (e.g. Jones & Wuebker, 1985).


2.7.2 Risk-taking behaviour

According to Yates and Stone (1992) a person chooses to participate in risk-taking behaviour following their consideration of the environmental (contextual) factors, various consequence scenarios, estimated losses/gains (outcomes), current status, self-concept, personal capability and perception of actions necessary to achieve desired outcomes. This is not dissimilar to the earliest records of risk estimation and subsequent action, as postulated by Oppenheim (1977, as cited in Trimpop, 1994) who reference the Asipu in Mesopotamia in 3200 B.C. Oppenheim (1977) found that the Asipu assessed risks by identifying relevant factors of the problem, determined alternative actions, and theorised possible outcomes and the consequences thereof. Whereas, Fuller (1988) argued that it is not only conscious decision-making that attributes to risk-taking behaviour, but also the past experience of an individual and conditioning history that influences the process. Given his extensive review of the psychology of risk-taking, Trimpop (1994) presented the following definition for risk-taking behaviour:

“Risk-taking is any consciously, or non-consciously controlled behaviour with a perceived uncertainty about its outcome, and/or about its possible benefits or costs for the physical, economic or psycho-social well-being of oneself or others. The definition refers to conscious and non-conscious behaviour, outcome and consequence uncertainty, benefits and losses, intrinsic and extrinsic rewards, individual and societal risks, and the subjective experience of risk.” (p. 9)

So as to better understand how to change risk-taking behaviour, the researcher sought to investigate social cognitive theory, which argued that an individual’s actions are affected by the environment, intrapersonal traits and behavioural determinants, all of which are regulated by forethought (Bandura, 2012; Schwarzer & Fuchs, 1995). In addition to providing an understanding of human behaviour, social cognitive theory also provides knowledge for the models of learning and change.

In their health-based study, Schwarzer and Fuchs (1995) showed that despite the obvious risk exposure, people find it challenging to change their behaviour if they do not believe in their
capabilities and the potential to control the outcome of events. Furthermore, maintaining a new set of change behaviours and carrying out actions in line with this commitment can be difficult. The authors found that three factors affect the likelihood of changing detrimental behaviours (in this instance, risk-taking behaviours); the first being the expectancy of risk, secondly the perception that one’s behaviour change will mitigate the risk, and finally the required self-efficacy to ensure that one discontinues their risk-taking behaviours. From the literature review, it is evident that self-efficacy and outcome expectancies significantly influence the probability of changing risk-taking behaviours. The process to change one’s behaviour requires an individual to decide to change, mobilise the change and execute the necessary actions. Whilst the environmental circumstances cannot be ignored, it is also pivotal to consider the importance of holding oneself responsible for the change outcomes and ensuring self-regulation of emotions for stability (Bandura, 2012; Schwarzer & Fuchs, 1995; Trimpop, 1994). This viewpoint therefore highlighted the importance of one’s beliefs, behavioural traits, emotional state, outcomes expectations and human agency in coping with and successfully managing high risk events.
2.8 Conclusion

The literature reinforces the theory that personality traits affect perception, which in turn impacts decision making processes and the outcome of situations. It is evident that an individual with an external locus of control is likely to blame outside elements for negative consequences, while, an individual with an internal belief is more likely to hold themselves responsible for the outcomes thereof (e.g. Jones & Wuebker, 1985). The victim mentality associated with an external locus of control aligns well with the findings of the safety locus of control theory.

Research conducted on the safety locus of control construct showed that individuals with a more external belief exhibit a low level of safety awareness are more likely to be involved in a higher number of safety incidents, compared to individuals with a more internal locus of control (e.g. Jones & Wuebker, 1993; Christian et al., 2009. In addition to the safety locus of control scale, there are numerous other aspects that influence risk perception, which ultimately impacts the outcome of a situation. According to attribution theory, these range from factors in the perceiver, factors in the situation and factors in the target (Robbins & Judge, 2013). In addition, the constructs of selective perception, halo effect, contrast effect and stereotyping, introduce an intangible level of bias in the process of perception (Robbins & Judge, 2013).

While the causal attribution and the decision-making process is affected by perception, it is also affected by the likelihood of an event occurring and the consequence of the situation (Sjöberg et al., 2004). The review showed that individuals are influenced by both the perceived benefits of an outcome and the controllability of the situation (Trimpop, 1994). However, this varies based on the individual’s cognitive bias and the environment (Yates & Stone, 1992). Furthermore, it has been found that self-efficacy and human agency imply expectancies of outcomes, which in-turn affects an individual’s motivation, cognitive problem solving and regulation of emotions - all of which directly impacts the outcome of an event or task (e.g. Bandura, 1977; 1988; 2012). The effect of self-efficacy traits on risk-taking behaviour are significant in that even in the face of danger; people find it challenging to alter their risk behaviour if they do not believe in their capabilities and the potential to
control the outcome of events (Schwarzer & Fuchs, 1995). The review has further illustrated the probability for individuals with a lower sense of self-efficacy to become immobilised and plagued with negative emotions during situations of high-risk, thereby affecting their abilities to solve the problem (Bandura, 1992). Notably, research has also highlighted the propensity for individuals with a high sense of self-efficacy to engage in more risk-taking behaviour due to their confidence in capabilities to accomplish a successful outcome and their ability to regulate emotional stability in the face of adversity (Bandura, 1992).

In sum, the researcher has identified the Millennial generation as the sample group for the research study. Scholars argue that the characteristics of Millennials position the birth cohort as more external in belief (Twenge et al., 2004) and low in self-efficacy (Palmer, 2015). This implies that Millennials can be considered as more risk prone, however, it is clear that risk-taking behaviour varies between individuals and is dependent on not only the specific situation at hand or one’s understanding of risk, but also the psychological, social, cultural and institutional factors that influence the individual. It is therefore the goal of the researcher to investigate the constructs of locus of control and general self-efficacy in Millennials and determine the effect of these traits on the potential risk-taking behaviour among this generational cohort at Kolomela mine.
3. Research Methodology

The initiation of any research requires one to consider the philosophical perceptions of the researcher, as these views have significant influence over the research scope, research question and research methodology (Saunders et al., 2009). In particular, these authors argue that one’s philosophical commitment affects how one understands and investigates the research study; intrinsic to this, is how we reflect upon our research choices and how well we are able to defend these against other alternatives. It is therefore necessary to explain the research methodology that will be utilised for the research study. In particular the data collection methods, measurements and techniques to be used to analyse the data will be discussed.

3.1 Research approach

It was determined that the research study adopts a positivist approach (Saunders et al., 2009). In the research study, the paradigm of positivism seeks to utilise existing measurement tools for locus of control and self-efficacy to identify how these specific constructs influence potential risk-taking behaviour. It is therefore reasonable to assert that only quantifiable and apparent responses from the data gathering processes will be considered as acceptable knowledge and an independent, impartial interpretation will be conducted (Collis & Hussey, 2003).

The research study applied the deductive approach, which is in alignment with the positivist paradigm and begins with developing hypotheses from existing theories, and subsequently testing these (Flick, 2015). In addition, the use of quantitative reasoning was deemed appropriate when conducting hypothesis testing, moreover when a causality relationship is being investigated (Flick, 2015).

The deductive research objective was to demonstrate the influence of locus of control and self-efficacy on the potential risk-taking behaviour of Millennial generation employees at Kolomela mine. This objective was investigated through the following paths:
1. Using a survey questionnaire, the researcher empirically tested the locus of control characteristics of Millennial employees in a mining context and determined the self-efficacy traits of these Millennials to:

   a. Determine if Millennial employees are predominantly external or internal in their safety locus of control belief

   b. Identify the main leader (high vs. low) in the self-efficacy construct of Millennial employees

2. Deduced the implications of locus of control and self-efficacy on the potential risk-taking behaviour of Millennial employees’

From the above it can be determined that the research study is explanatory in nature (Cooper & Schindler, 2011). The explanatory research study determined the dominant state of locus of control in Millennials at Kolomela mine and determined their sense of self-efficacy. These results were used to identify and correlate how an individual’s potential risk-taking behaviour is influenced by these behavioural constructs. Thus, the research study sought to enable a deeper understanding of locus of control, self-efficacy and risk-taking behaviours, aiming to build upon existing literature and advance knowledge in this paradigm.

In order to determine causality between variables (locus of control, self-efficacy and risk-taking behaviour), a quantitative methodology was adopted through the use of surveys in a cross-sectional analysis. In a cross-sectional analysis, the survey responses were gathered at one point in time, and the researcher classified the information simultaneously according to the various categories for interpretation (Adams, Khan, & Raeside, 2014). The findings thereof have implications for predictive research, wherein the researcher may be in a position to predict future behaviour in risk management (Adams et al., 2014). Furthermore, quantitative methods were deemed appropriate after due consideration of the scope of study and limitations of time and resources (Flick, 2015).
3.2 Research question

The research study aimed to demonstrate the influence of locus of control and self-efficacy on the potential risk-taking behaviour of Millennial generation employees at Kolomela mine. This was investigated through the following paths (Figure 7).
Figure 7 - Diagrammatic representation of the research pathway

Safety Locus of Control
- External – blames external elements for outcome of events
- Internal – holds self accountable for consequences

External
- Lower sense of safety awareness
- Prone to higher frequency of accidents

Internal
- Actively engaged in mitigating risk to avoid injury
- Lower probability of being victim to a risk event

Generalised Self-Efficacy
- High – belief in personal capabilities to achieve goals
- Low – doubtful of personal capabilities to achieve goals

High
- Optimistic of overcoming adversity
- Heightened motivation levels
- Self-enabling behaviour
- Regulates emotional state

Low
- Lacks motivation & is pessimistic
- Self-impeding behaviour
- Plagued by stress, depression and helplessness in threatening situation

Implication on potential risk taking behaviour
3.3 Research design

The research study made use of the observational, retrospective design with cross-sectional focus. Accordingly, the researcher collected information from participants using a survey questionnaire technique. A cross-sectional design was employed as data was grouped into more than two fields (for example, demographic information, locus of control and self-efficacy). Bryman and Bell (2011) demonstrated that the research approach adopted in the present study has the potential advantages of being replicable and can show significant external validity when random sampling is done. A further advantage of survey questionnaires is that the tool requires a lower degree of competence to administer compared to interviews and ensures the confidentiality of participants (Jankowicz, 2005, cited in Saunders et al., 2009).

The research of Adams et al., (2014) demonstrated that survey questionnaires are one of the most widely used tools for collecting data but are limited by poor survey response rates (~20 percent). This poor response rate is considered barely representative of a population (Adams et al., 2014). Furthermore, scholars argued that survey questionnaires are only as good as their design, as well as the sample selection and administration of the survey (Cooper & Schindler, 2011); they can however, be useful in situations where time and financial constraints exist. With regards to the design of the survey questionnaires, Saunders et al., (2009) have shown that the data collection instrument will affect the response rate and the reliability and validity of the data you collect. Their research found the effectiveness of the survey questionnaires to be improved by:

- a clear introduction
- careful thought and positioning of individual questions
- succinct and unambiguous phrasing of questions
- the seamless layout of the questions
- pilot testing
- user-friendly data collection medium/tool
In the present study, the researcher applied the aforementioned techniques expressed by Saunders et al. (2009). The researcher made use of a clear introduction by introducing herself, the purpose of the research and by providing a description of the survey format. The introductory paragraph was accompanied by instructions on how to complete the survey, as well as a consent section affirming confidentiality of responses. Furthermore, the researcher made use of a Likert-type scale throughout the questionnaire, so as to avoid any possibility of confusion. Pilot testing was administered to validate the survey layout, phrasing of questions and data collection instrument. To mitigate risk associated with survey questionnaires, the researcher has chosen to conduct a two-part survey questionnaire on a very specific sample (Millennials). Part A of the survey questionnaire is a carefully chosen scale – the Safety Locus of Control scale and part B is the New General Self-efficacy scale, aiming to identify how participants may react in future high-risk situations.

3.4 Data collection methods

The data collection path involved: broad scope literature review → gaining consent to administer the survey at Kolomela mine → acquisition of Kolomela mine employee database → agreement of the accessible sample population and method of survey administration with HR Manager → refining of literature review → development of the survey questionnaire → piloting of the survey → revision of survey → first wave of administration of survey via agreed upon methods → reminder email for second wave of survey administration → integration of all results into a single database.

3.4.1 Literature review

The researcher conducted an extensive review literature review prior to developing the research study objectives. Pertinent themes regarding Millennials, attribution theory, locus of control, self-efficacy and risk-taking behaviours served to guide the research epistemology process. Furthermore, a second-stage literature review was conducted. This revised literature review was more focused and aided the researcher in establishing the investigative methods, relevant research instruments and provided guidance on the evaluation and interpretation of findings.
3.4.2 Organisation consent

The research study scope is restricted to Kolomela mine and the researcher acquired support from Kolomela mine Mining Manager, Neil Rossouw and Human Resources Manager, Craig Malander, to conduct the research study at the mine. Furthermore, an on-site champion (Bonolo Maruping) was engaged for survey support and administration to minimise the low response rates associated with survey research (Adams et al., 2014). As per the agreement with the HR Manager, the sample population was determined by the organisation and was influenced by accessibility to employees and their access to computers. The participants were contacted via work email addresses and the survey was administered via online platforms, with a secondary hard copy made available on request of participants.

3.4.3 Sampling method and sample size

The purpose of sampling is to ensure a representative conclusion can be drawn in the research study. Adams et al. (2014) defined the sampling technique as one that involves the selection of specific group of participants to best determine the attributes of the whole population. In the research study, the non-probability sampling technique was applied to employees at Kolomela mine. Furthermore, purposive quota sampling was rendered so as to confine the sample unit of analysis to permanent employees born between 1980 and 1999. This method of sampling will be conducted so as to improve the accuracy of the research study.

At Kolomela mine, at least 19% of the workforce (253 employees) are included within the Millennial generation cohort; however, this includes employees who work at multiple sites and on different work rosters. The sample population for the research study was determined by the organisation (Kolomela mine) and was influenced by accessibility to employees and their access to computers and the internet. A final research study population of N = 100 was established. According to Wright (2009), the required sample size for a research study population of N = 100 is at least n = 49 (at 95% confidence level and ± 10% sampling error). Following the administration of the survey, a fifty-one
percent response rate was recorded ($n = 51$), which is considered acceptable for the study as it exceeds Wright’s (2009) sample size validity criteria.

### 3.4.4 Pilot study

The researcher considered the benefits of conducting a pilot study, which includes the proactive opportunity to validate the research instrument and administration platforms, as well as, verify the phrasing of questions and sequence of questions (Adams et al., 2014). Furthermore, the pilot study helped eliminate problems associated with participants misunderstanding any of the questions.

Students from the MBA full-time student cohort were the sample for testing the survey questionnaire. The researcher achieved a response rate of 40 per cent. Enquiries were made to determine if the pilot study respondents found any of the instructions and/or questions confusing or misleading. The feedback from the pilot study group was largely positive with a minor request to reword the scale anchors to ensure that any perceived ambiguity was removed. The responses were then captured into MS Excel for testing of data interpretation methods, which also assisted the researcher in developing a rigorous database template for the actual research study results. Following due consideration of the pilot study feedback, the survey questionnaire was finalised and administered to Kolomela mine employees.

### 3.4.5 Data collection instrument

The final survey was administered via internet-mediated platforms (Google Forms) and a hardcopy delivery and collection of questionnaires. As per Saunders et al. (2009), a carefully worded introductory paragraph explaining the purpose of the survey questionnaire, as well as a comprehensive set of instructions was included in the questionnaire. In addition, a separate consent section, which is aligned with the requirements of the University of Cape Town’s Graduate School of Business was attached to the questionnaire.

Google Forms was selected as the data collection instrument for ease of use by the researcher and respondent. The platform offers multiple options for setting-up survey items including Likert-scale...
type settings and field text-boxes for longer responses. From a respondent’s perspective, he/she is able to input their item responses directly by clicking on the option that is best suited to the individual. The direct input and output of survey responses reduced the possibility of data capturing errors that may occur when compiling a large amount of data. In addition, through the *required response* function on Google Forms, it allowed the researcher to ensure that all survey items are completed by the respondent before submission. This eliminated the possibility of incomplete survey responses being received and reduced the data collection error associated with the online administration of the survey (Bryman & Bell, 2011).

Limited accessibility to internet facilities at Kolomela mine was taken into consideration by the researcher and as such, a dual-purpose administration was selected to ensure maximum reach and promote an effective response rate. The hardcopy survey template was a direct printout of the Google Forms online survey to ensure maximum consistency in administration and survey results. A benefit to this type of hardcopy survey administration was the on-site champion, who assisted with the dissemination of hardcopy questionnaires, collection and submission of scanned copies to the researcher.
3.5 Research instruments

The survey questionnaire consisted of two sections - part A: the Safety Locus of Control scale and part B: the New General Self-efficacy scale.

3.5.1 Part A – Safety Locus of Control Scale

Rotter’s (1966) locus of control scale was developed for determining a generalised orientation of an individual and is limited in its application to a specific situation. Later research resulted in the development of situation-specific locus of control scales – these include the Health locus of control scale for the prediction of health-related behaviour (Wallston, Wallston, Kaplan, and Maides, 1977, cited in Jones & Wuebker, 1985) and the Drinking-related locus of control scale to determine alcohol consumption patterns (Donovan & O’leary, 1978, cited in Jones & Wuebker, 1985). Jones (1983) subsequently developed the Safety Locus of Control scale, based on the principles of Rotter’s (1966) locus of control scale (Appendix 1). The Safety Locus of Control scale aims to predict the occurrence of accidents and injuries in the workplace and the degree to which an individual perceives their behaviour as responsible for said occurrence (Jones, 1983). A key assumption of the safety locus of control scale is the shared belief that internalised individuals are “personally responsible for their safety and can take preventative steps to avoid accidents and injuries” and externalised individuals “have little or no personal control in accident prevention” (Jones & Wuebker, 1985, p.152).

The Safety Locus of Control scale encompasses seventeen face-valid themes, ten of which are externally orientated and the remaining seven being internally oriented. Of the seventeen items, both industrial accidents and generalised accidents are made reference to (Jones, 1983). The validity of the Safety locus of control scale was approved by five expert safety professionals and by two licensed psychologists who specialise in industrial loss control (Jones & Wuebker, 1985). Jones (1983) made use of a 6-point Likert-type scale across the seventeen items, with the options ranging from agree very much to disagree very much. In the present research study, the researcher adopted the original anchors to improve clarity in meaning. The anchors ranged from strongly agree to strongly disagree.
The Safety locus of control scale is applied using a quantitative approach, with a final score of +1 or -1 applied to each item, dependent upon the individual items original median split score across the population (Jones & Wuebker, 1985). Where an individual item original score was found to be less than the median split, a final score of -1 is applied; and vice versa. In the case of an item score being at the median, a final score of 0 is applied. Safety scale final scores can therefore range from -17 (external locus of control scorers) to +17 (internal locus of control scorers).

Initially, Jones and Wuebker (1985) applied the Safety locus of control scale by investigating the effect of safety behaviour partialities and an associated historical review of accidents. In their study, the safety scores of 158 university students were compared with a recount of personal accident reports. The findings show that individual cases that had more severe accident injuries were representative of students who held more externalised safety beliefs ($r_{phi} = .54$) (Jones & Wuebker, 1985). This is consistent with the findings of Jones (1983), and Jones and Foreman (1985). In addition, a study by Wuebker, Jones, and Dubois, (1985) tested 283 hospital employees using the Safety locus of control scale, alongside a checklist that assesses the degree of injury over a twelve-month period. Their findings show a higher level of severity per injury is associated with more externally orientated individuals, thus confirming the validity of the assumptions made in the Safety locus of control scale.

In 1993, Jones and Wuebker further validated the Safety locus of control scale by applying it to 283 hospital employees alongside on-the-job injury reports and the associated medical costs. Their assessment found individuals with a highly external locus of control to exhibit a low level of safety awareness, alongside a higher number of accidents. In contrast, employees displaying a higher level of safety awareness and subsequently lower rate of accident occurrence were identified as having a highly internalised locus of control (Jones & Wuebker, 1993).

The Safety locus of control scale was later adapted by Hunter (2002) to develop an Aviation safety locus of control scale that was used to understand the locus of control belief among pilots. The author concluded that the scale was a useful tool for pilots to improve their understanding of one’s
personality and how this could inadvertently lead to a greater chance of accident involvement. It is therefore deemed reasonable to consider the Safety locus of control scale as an acceptable and standardised measurement of an individual’s propensity towards safety behaviour and subsequent outcomes.

3.5.2 Part B – New General Self-efficacy scale

Much research has been conducted into the measurement of self-efficacy, with two main themes emerging – the measurement of specific self-efficacy and general self-efficacy. Bandura (1997) argues for the use of a specific self-efficacy metric because it is significant to the context wherein it is applied. In contrast, Sherer and Maddux (1982) illustrated the applicability of a measure for generalised self-efficacy, which measures a person’s belief in their capability to successfully achieve their goals in a variety of situations. In particular, general self-efficacy sought to determine “generalised self-efficacy expectations dependent on past experiences and on tendencies to attribute success to skill as opposed to chance” (Sherer & Maddux, 1982, p. 671). Eden (1988, as cited in Chen, Gully, & Eden, 2001) asserts that general self-efficacy has a positive effect of specific-self-efficacy across various contexts therefore finding that highly self-efficacious individuals have a higher expectancy of successful outcomes. Sherer and Maddux (1982) went on to develop a more trait-like generality measurement of self-efficacy through their 17-item scale that is rated on a 5-point Likert-type scale; the anchors for which, range from strongly agree to strongly disagree. Their General Self-efficacy scale found higher scores to be indicative of higher levels of self-efficacy.

However, the General Self-efficacy Scale has received disparagement for its lack of specificity (e.g. Bandura, 1997; Lockie & Latham, 1990) and measurement criticism (Chen et al., 2001). The reliability of the responses is cited as questionable and the subsequent impact on construct validity is impacted. Various researchers have made use of the General Self-efficacy Scale and have shown contradictory results. For example, Scherbaum, Yochi, and Kern, (2006) made use of classical statistical analysis and item response theory to determine the psychometric properties of the General Self-efficacy scale and compared these results to existing measures. Their study that was administered
to 606 students, found the item responses of the General Self-efficacy scale acceptable (Cronbach’s $\alpha = 0.85$). Chen et al., (2001) reviewed multiple studies that used Sherer et al.’s (1982) General Self-efficacy scale. Their review reported Cronbach’s $\alpha$ values that ranged between .70 and .90. This is of concern as some of the studies reviewed fall below the accepted internal consistency coefficient cut-off of .80 (Henson, 2001; Nunnally & Bernstein, 1994). Furthermore, multifactor solutions where found for the General Self-efficacy scale, which was originally purported to have a single factor solution (Imam, 2007).

From the above evidence, it seemed plausible to investigate an adapted measurement tool for self-efficacy. Chen et al. (2001) improved Sherer et al.’s (1982) General Self-efficacy scale to develop the New General Self-efficacy scale (NGSE) (Appendix 2). The NGSE measures a person’s belief in their capability to successfully achieve their goals in a variety of situations. It comprises eight items on a 5-point Likert type scale; the anchors for which, range from strongly disagree (score of 1) to strongly agree (score of 6).

Participants are told that general self-efficacy relates to “one’s estimate of one’s over-all ability to perform successfully in a wide variety of achievement situations, or to how confident one is that she or he can perform effectively across different tasks and situations” (Chen et al., 2001, p. 79). Following which, they review eight different statements and rate how applicable each statement is to oneself. A few examples of the eight item scale include I am confident that I can perform effectively on many different tasks, I believe I can succeed at most any endeavour to which I set my mind, and even when things are tough, I can perform quite well.

Similar to the original GSE scale, a higher score indicates a higher sense of self-efficacy. All item scores are summed, with the median split being determined. Respondent scores that are lower than the median are considered as high self-efficacious, and those scores that lie below the median are found to be low in self-efficacy. The internal consistency coefficient for the NGSE ranged from .80 to .90 representing a good to very high internal consistency in the scale (Henson, 2001; Nunnally & Bernstein, 1994).
Chen et al. (2001) validated their scale through empirical studies that were administered to 316 and 323 university students respectively. Their first study made use of seven of the original items from the General Self-efficacy scale, to which, Chen et al. (2001) added seven more items. Based on their item face validity testing, initial Cronnbach’s α report and factor loadings, the authors eliminated six of the items. The test-retest internal reliability coefficients for the revised 8-item NGSE scale were acceptable, $r_{t1-t2} = .65$, $r_{t2-t3} = .66$, $r_{t1-t3} = .62$. Thus, the final 8-item NGSE scale was considered psychometrically sound, unidimensional, internally consistent, and unchanging over time. Their second study also showed high internal consistency results of $α = .86$ and confirmation of unidimensionality (eigenvalues=4.17 and 4.76, rationalising the 52% and 59% total item variance). In addition, their construct validity results found that the NGSE scale is distinct from self-esteem (although highly related) and the NGSE scale related strongly with motivational concepts. The third and final study sought to replicate findings from the previous two studies albeit in a different context. The NGSE scale was translated into Hebrew and administered to 54 executive MBA candidates studying at a university based in Israel. Cronbach’s α of .86 was recorded indicating a high level of internal consistency and a good stability coefficient of $r = .86$. These results confirmed that the NGSE was unidimensional.

The NGSE that is a shorter version of the original GSE is found to be preferable for organisational type settings and research. Chen et al. (2001) have convincingly developed a reliable NGSE scale to measure general self-efficacy, which can be considered helpful in understanding employee performance and motivation across various work situations. Given the validity and usefulness of the NGSE, the scale was administered in this research study to determine the level of participants’ self-efficacy.

### 3.5.3 Demographics and additional questions

In addition to the above-mentioned scales, the questionnaire asked respondents to select their age group, and indicate duration of work experience in the mining industry. These questions were
included to assist in confirming the required generational cohort (i.e. Millennials only) for the research study and to aid categorising of self-efficacy and locus of control data.
3.6 Data analysis methods

The research study applied the theories of locus of control and self-efficacy to determine the prominent behavioural trait among Millennial generation employees at Kolomela mine. The Safety Locus of Control scale was used to measure the state of locus of control beliefs in the sample and the New General Self-efficacy scale was used to identify each participant’s sense of self-belief. Google Forms was the medium used to administer the survey questionnaire. Following the cut-off date for responses, the researcher downloaded the results from the online host server. The first step of the data analysis process was to prepare the survey response data (Saunders et al., 2009). During the phase, the researcher checked the data for any potential errors and incomplete answers. Thereafter, the data was coded into a multi-worksheet MS Excel workbook, with the results of each scale separated for ease of processing. Demographic data was cross tabulated with the scale responses for meaningful categorisation of results at a later stage.

The second phase of the data analysis process involved the testing of the reliability of participant scores in both scales. Past research indicates that the constructs of locus of control and self-efficacy are independent variables. Therefore, each variable was analysed separately. The reliability of the Safety Locus of Control scale was verified through application of the Spearman-Brown split-half reliability coefficient method. This method is used to express reliability of a set of scores obtained from multi-item scales (Beckstead, 2013) and the method is consistent with previous research that administered the Safety Locus of Control scale (e.g. Jones & Wuebker, 1985). Furthermore, Cronbach’s coefficient of reliability ($\alpha$) was used to determine the internal consistency of the New General Self-efficacy scale. Cronbach’s alpha test measures the participant response scores for all items in the scale and reports the measure of variation within the scale (Beckstead, 2013). An alpha score that is closer to 1 is favourable as it represents strong internal consistency within the scale.

The third phase of the data analysis process involved obtaining descriptive statistics for the dataset. Descriptive statistics provides the researcher with the opportunity to organise, summarise and present the survey questionnaire data in an insightful way (Weiers, 2008). The demographic information
collected from participants was also used to identify patterns or meaningful trends in the survey responses for each scale.

The ANOVA test was conducted for each scale in the fourth phase of the data analysis process. The range in mean scores, standard deviation and variances were recorded. The evidence assisted the researcher in determining the spread of the data and helped identify any irregularities in the dataset.

Once the data was validated and verified, the researcher applied weightings to each participant’s item scores recorded in the Safety Locus of Control scale. Where a participant’s item score was found to be less than the median split of the sample, a weighting of -1 was applied; and if the item score was more than the median split of the sample, a weighting of +1 was applied. In the case of an item score being at the median, a final weighting of 0 was applied. In the present study, the Safety Locus of Control scale weightings ranged from -9 to +9, with higher scores indicating an internal locus of control belief. Thus, the researcher was able to determine the locus of control belief for each participant in the sample.

The final stage of the data analysis process saw the researcher calculating the total scores for each participant’s responses in the New General Self-efficacy scale. Final scale outcomes were determined by comparing the participant scores to the median-split. Higher scores indicated a high sense of self-efficacy and lower scores indicated a low sense of self-efficacy.

The sample results for the Safety Locus of Control scale and the New General Self-efficacy scale were then used to draw inferences about the population. The researcher investigated the potential impact of the dependant variables (locus of control and self-efficacy) on the risk-taking behaviour of employees.
3.7 Research criteria

The research study made use of a survey questionnaire containing existing instruments (the Safety Locus of Control scale and the New General Self-efficacy scale) to collect relevant information about the behavioural traits of Millennials at Kolomela mine. Therefore, two main research criteria areas were considered (1) validity in quantitative research and (2) reliability of scales. Creswell (2014) argued that there are three main forms of validity in quantitative research. The first being content validity, which verifies if the items of a scale measure the constructs that they were intended to measure. The second type is predictive validity that determines if the scores predict a criterion measure or correlate with other results. The third form of validity is construct validity that tests whether the items measure hypothetical concepts. Furthermore, establishing the validity of the scores in a survey helps to identify if the instrument is useful. Both scales used in the present research study were found to be valid (refer to chapter 3.5 for further information). Reliability of scales can be determined by investigating the internal reliability of past scores (Creswell, 2014). Once again, both scales used in the present research study were found to be statistically valid; the Spearman-Brown half-split internal reliability coefficient was calculated for the Safety Locus of Control scale and was found to show good internal consistency (r = .83); Cronbach’s α = .84 was determined for the New General Self-efficacy scale and also showed good internal consistency.
3.8 Research limitations

The following limitations are considered relevant to the research study:

- Surveys are well known to have a poor response rates (~20 percent) (Adams et al., 2014). This will undoubtedly have an effect on the representativeness of the population in the research study. A combination of online and hardcopy mediums for administration of the survey questionnaires, and an on-site champion were key measures that the researcher leveraged in order to improve the response rate.

- Due to the limited time and resources made available for the research study, the subjective realities of the participants were not explored. For example, Robbins & Judge, (2013) showed the significance of understanding cultural heuristics and its impact on individual perception, however, this construct is beyond the scope of investigation for the research study. The risk of analysing the correlation between variables (locus of control, self-efficacy and risk-taking behaviour), without fully exploring the subjective realities can lead to a static assessment of the participants’ experiences (Bryman, 2012). The researcher made use of extensive literature and validated survey questionnaire scales to reduce the effect of the subjective reality limitation.
3.9 Ethical considerations

The following ethical considerations were deemed relevant to the research study:

- The researcher approached Kolomela mine in the early stages of the research study and explained the goals of study and potential implications on the organisation. This communication strategy was employed to gain support and permission to conduct the study at Kolomela mine. Organisational consent was received in letter confirming engagement and support. This informed consent eliminated ethical concerns regarding use of the company’s name in the research report and allowed the researcher to access to the research study sample.

- The research study made use of self-administered internet based survey questionnaires in the data collection process. These survey questionnaires were administered via an online platform (Google Forms) and the participant link was emailed directly to employees included in the approved database provided by the organisation. The second area that has ethical implications for the research study was participant consent and confidentiality of participant responses. Informed consent was gained via the compulsory consent approval/disapproval question included in the introductory section of the survey questionnaire. Moreover, the researcher did not request any personal information that could potentially identify the respondent therefore assuring anonymity. The only requested information that was specific to the participant was his/her date-of-birth and number of years of work experience in the mining industry. To further ensure confidentiality during analysis and interpretation of results, the researcher provided date ranges and duration ranges as options to these demographic questions in the survey questionnaire. In addition, the researcher has committed to not sharing the raw data collected through the survey questions.

- A third ethical implication in academic research is the potential for interpretive bias (Saunders et al., 2009). The researcher has retained objectivity throughout the research study and has not been selective about reporting data that confirms with expectations. In addition, the data represented in the research study is illustrated honestly and is not distorted in any way.
A final ethical consideration was the University of Cape Town’s Commerce Faculty Ethics in Research Policy. The code on research ethics helped guide the researcher in the design and conduct of the research study. In addition, the university’s ‘ethical clearance’ for the research study was obtained from the University of Cape Town’s Graduate School of Business Ethics in Research committee.
4. Findings and Discussion of Results

A two-part survey questionnaire was administered with participants completing a total of 17-items in part A (Safety Locus of Control scale) and additional 8-items in part B (New General Self-efficacy scale). A six-point Likert-type scale was used for each measurement instrument to ensure consistency in responses. The scale anchors ranged from strongly agree to strongly disagree with scores of one to six being awarded, respectively. The explanatory research study sought to determine the dominant state of locus of control and identify the sense of self-efficacy in participants who are Millennials and work at Kolomela mine.

4.1 Demographics

The information contained within this section aims to familiarise the reader with the organisation at which the research study was conducted. In addition, the results showcase Millennial generation employees according to their work experience and birth cohort classes.

Fifty-one Kolomela mine employees were surveyed from a total sample of N = 100 employees. The purposive quota sampling technique was rendered so as to meet the sample unit of analysis of permanent employees, born between the years 1980-1999 (i.e. Millennials). A favourable response rate was concluded, at 51%, much higher than the expected response rates for surveys (Adams et al., 2014).

Survey participants were grouped according to date-of-birth categories (Figure 8), indicating the highest number of responses being received from respondents aged 26-30 years’ old (n = 28), followed by respondents aged 31-36 (n = 19), and finally respondents aged 21-25 (n = 4).
In addition, survey participants were grouped according to their total number of years of experience within the mining industry (Table 2). The results indicate a small number of responses from employees with more than ten years of experience (n = 3), whereas the largest number of responses were received from employees with at least 1-5 years of experience (n = 26). It can be determined that the results are skewed towards employees with less experience in the mining industry (Figure 9) and therefore, the research study results do not presume to be wholly representative of all Millennial employees in the mining industry.

Table 2. Number of respondents per demographic information

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 years</td>
<td>8</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>5-10 years</td>
<td>8</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>10-15 years</td>
<td>3</td>
<td>-</td>
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</tr>
<tr>
<td>Grand Total</td>
<td>19</td>
<td>28</td>
<td>4</td>
</tr>
</tbody>
</table>
4.2 Survey results

Contained within the sections below are the findings from the survey questionnaire that was completed by fifty-one Kolomela mine employees (n = 51). Each respondent confirmed their date of birth range and indicated their willingness to freely participate in the study, thereby validating the research study ethical clearance and generational confines.

4.2.1 Safety locus of control

The purpose of the Safety locus of control scale was to determine the predominant locus of control trait within the survey sample. Research by Jones and Wuebker (1985) found that individuals with a more externalised locus of control demonstrate a lower level of safety awareness, and were more likely to be involved in a higher number of safety incidents. The opposite finding was shown for individuals with a more internally focused locus of control, whom in contrast, display a sense of personal accountability for accidents and are capable of taking preventative actions to avoid accidents and injuries.
The first step in the analysis was to determine the internal consistency of the responses received through the questionnaire. A total of 866 raw scores (from 51 responses) were tested using the Spearman-Brown split-half reliability coefficient method (Beckstead, 2013). The reliability was calculated on the odd versus the even test items and is consistent with Jones and Wuebker (1985). Their original results showed $r = .85$, and the results of this research study found a Spearman-Brown split-half reliability coefficient of .83 confirming the reliability of the scale and validity of results.

In addition, descriptive statistics were performed to understand the variance in the dataset. With the application of a Likert-type scale, raw scores ranging from one to six were applied to all responses. The raw score totals for the 866 responses varied from 46 to 71, with a mean of 55. Of meaningful interest was the mean ranges and standard deviation per scale item (Table 3). The standard deviations ranged from 0.78 to 1.29, whilst the lowest mean was 1.84 and the highest mean was 5. The variance was found to range from 0.6 to 1.65.
Table 3. Descriptive statistics results – Safety Locus of Control scale

<table>
<thead>
<tr>
<th>Scale Item</th>
<th>Count</th>
<th>Sum</th>
<th>Mean</th>
<th>Variance</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>51</td>
<td>109</td>
<td>2.14</td>
<td>0.80</td>
<td>0.89</td>
</tr>
<tr>
<td>Item 2</td>
<td>51</td>
<td>173</td>
<td>3.39</td>
<td>1.36</td>
<td>1.17</td>
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<td>Item 3</td>
<td>51</td>
<td>135</td>
<td>2.65</td>
<td>1.15</td>
<td>1.07</td>
</tr>
<tr>
<td>Item 4</td>
<td>51</td>
<td>255</td>
<td>5.00</td>
<td>1.08</td>
<td>1.04</td>
</tr>
<tr>
<td>Item 5</td>
<td>51</td>
<td>251</td>
<td>4.92</td>
<td>1.43</td>
<td>1.20</td>
</tr>
<tr>
<td>Item 6</td>
<td>51</td>
<td>231</td>
<td>4.53</td>
<td>1.25</td>
<td>1.12</td>
</tr>
<tr>
<td>Item 7</td>
<td>51</td>
<td>153</td>
<td>3.00</td>
<td>1.36</td>
<td>1.17</td>
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<tr>
<td>Item 8</td>
<td>51</td>
<td>136</td>
<td>2.67</td>
<td>0.83</td>
<td>0.91</td>
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<tr>
<td>Item 9</td>
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<td>Item 10</td>
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<td>1.14</td>
</tr>
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<td>Item 12</td>
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<td>1.01</td>
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<td>Item 13</td>
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<td>0.95</td>
<td>0.98</td>
</tr>
<tr>
<td>Item 14</td>
<td>51</td>
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<td>3.92</td>
<td>0.91</td>
<td>0.96</td>
</tr>
<tr>
<td>Item 15</td>
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<td>97</td>
<td>1.90</td>
<td>0.73</td>
<td>0.85</td>
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<td>111</td>
<td>2.18</td>
<td>0.79</td>
<td>0.89</td>
</tr>
<tr>
<td>Item 17</td>
<td>51</td>
<td>94</td>
<td>1.84</td>
<td>0.61</td>
<td>0.78</td>
</tr>
</tbody>
</table>

The medians were calculated for each scale item and a range of 2 to 5 was determined. Each participant’s raw score per scale item was then weighted -1, 0, or +1 dependent on the median-split for the respective line item. In the instance where a participant’s item score fell below the median-split, the score was weighted -1, whereas if a participant’s item score was recorded to be above the median-split, then that score was weighted +1. If any scores were found at the median, then a weighting of 0 was applied. The weighted scores in the research study were determined to range between -9 and +9, with the higher scores indicating greater internality.
From the research study sample of n = 51, a total of twenty-three (n = 23) participants were found to have an internalised locus of control and a total of twenty-eight (n = 28) participants were found to have an externalised locus of control. The findings indicate that the sample was more internal in their locus of control belief (Figure 10).

![Figure 10 - Safety Locus of Control Results (by percentage-split)](image_url)

Furthermore, the researcher sought to understand the safety locus of control results by categorising the locus of control outcome by participant date-of-birth grouping (Figure 11).

![Figure 11 - Safety locus of control results per date-of-birth category](image_url)
The findings demonstrate that participants between the ages of 26 and 30 years old had the greatest number of externalised locus of control outcomes, as opposed to other participants. Ten participants in the 1980 to 1985 date-of-birth category were found to demonstrate an external locus of control, whereas nine participants were found to be internal in their locus of control belief, in the same category; seventeen participants in the 1986 to 1990 date-of-birth category were found to demonstrate an external locus of control and eleven participants were found to be internal in their locus of control belief, in the same category; in the 1991-1995 date of birth category, one participant demonstrated an external locus of control belief and two participants showed an internal locus of control belief.

4.2.1.1 Conclusion

In summary, the safety locus of control results were statistically validated ($r = .83$) and showed a greater proportion of survey respondents as being external in their locus of control. The findings suggest that at least fifty-five percent of the sample ($n = 28$) display a more external locus of control belief. The research study also found forty-five percent of the sample ($n = 23$) to hold a highly internalised locus of control. A final determination was that participants between the ages of 26-30 had a greater number of externalised locus of control outcomes ($n = 17$), as opposed to older participants (31-36 years old with external responses of $n = 10$); whereas the youngest participants, aged 21-25 years old were prominently internal in their locus of control preference ($n = 3$).


4.2.2 Self-efficacy

In the latter half of the questionnaire (part B), the researcher examined the self-efficacy construct of the Kolomela mine sample. The New General Self-efficacy scale was administered to determine the participants’ sense of self-efficacy across a variety of tasks. Past research has postulated the significance of determining general self-efficacy to organisational models and practice (Chen et al., 2001). People with low self-efficacy experience low coping efficacy which leads to exaggeration of the severity of the threats. This impairs one’s problem solving skills and causes people to feel helpless. In contrast, people with a higher state of self-efficacy adapt well in high-risk situations, due to their confidence in capabilities, perseverance and optimistic outlook about the challenge ahead.

The initial steps of the survey response analysis involved validating the survey results by determining the internal consistency reliability of the scale. Chen et al. (2001) recorded test-retest reliability coefficients ranging from .62 to .65. Consistent with Chen et al.’s study, the researcher applied a Likert-type scale to the eight New General Self-efficacy scale items. All the items measured the same underlying construct (i.e. state of self-efficacy) and participant responses could be reasonably expected to attain similar scores on each item (Beckstead, 2013). The present study yielded a Cronbach internal reliability coefficient of $\alpha = .84$ confirming a good level of internal consistency with the sample.

The data processing step involved in applying raw score weightings to the participant item responses based on the Likert-type scale, ranging from a score of 1 for strongly agree to a score of 6 for strongly disagree. The weighted scores were summed for the participants’ responses. These responses varied from a minimum of 8 to maximum of 21, with a mean of 15. In addition, descriptive statistics for all responses for each scale item was conducted (Table 4). The sample standard deviations ranged from 0.51 to 0.84, whilst the lowest mean was 1.61 and the highest mean was 2. There was a minor variance ranging from 0.26 to 0.70. A median score for the participant totals was calculated to be 15.
**Table 4.** Descriptive statistics results – New General Self-efficacy scale

<table>
<thead>
<tr>
<th>Scale Item</th>
<th>Count</th>
<th>Sum</th>
<th>Mean</th>
<th>Variance</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>51</td>
<td>92</td>
<td>1.80</td>
<td>0.64</td>
<td>0.80</td>
</tr>
<tr>
<td>Item 2</td>
<td>51</td>
<td>87</td>
<td>1.71</td>
<td>0.33</td>
<td>0.58</td>
</tr>
<tr>
<td>Item 3</td>
<td>51</td>
<td>87</td>
<td>1.71</td>
<td>0.37</td>
<td>0.61</td>
</tr>
<tr>
<td>Item 4</td>
<td>51</td>
<td>87</td>
<td>1.71</td>
<td>0.33</td>
<td>0.58</td>
</tr>
<tr>
<td>Item 5</td>
<td>51</td>
<td>86</td>
<td>1.69</td>
<td>0.26</td>
<td>0.51</td>
</tr>
<tr>
<td>Item 6</td>
<td>51</td>
<td>82</td>
<td>1.61</td>
<td>0.32</td>
<td>0.57</td>
</tr>
<tr>
<td>Item 7</td>
<td>51</td>
<td>103</td>
<td>2.02</td>
<td>0.70</td>
<td>0.84</td>
</tr>
<tr>
<td>Item 8</td>
<td>51</td>
<td>100</td>
<td>1.96</td>
<td>0.48</td>
<td>0.69</td>
</tr>
</tbody>
</table>

Thereafter, each participant’s total score (sum of scores for all eight items) was compared to the median. High self-efficacy was concluded where scores fell higher than the median-split and a low self-efficacy outcome was recorded where scores fell lower than the median-split. In the research study sample of n = 51, the researcher observed a total of twenty-seven (n = 27) participants with a low sense of self-efficacy and a total of twenty-four (n = 24) participants with a high sense of self-efficacy. This indicates that the dominant state of self-efficacy in the sample is low self-efficacy (*Figure 12*).
Furthermore, the self-efficacy results for all participants were grouped according to their respective number of years of work experience as a category (Figure 13).

The purpose of the aforementioned analysis was to determine if an increase in work experience was associated with a strengthening of the employees’ beliefs in their own capabilities (Bandura, 2012).
Participants with at least 5-10 years of work experience was found to predominantly hold a low self-efficacy belief (n = 14), whereas participants with 1-5 years of work experience showed an even split between low and high self-efficacy beliefs, respectively. These findings illustrate that all participants’ who possess between 10-15 years of work experience in the mining industry are highly self-efficacious individuals. However, due to the limited number of participant responses (n=3) in the 10-15 years of work experience category, this outcome cannot be considered representative of the Kolomela mine Millennial workforce and is not considered to have a significant implication on the research study.

4.2.2.1 Conclusion

The New General Self-efficacy survey results showed good internal consistency (α = .84) and the research study findings determined that most of the Millennial employees at Kolomela mine were predominantly low in their sense of self-efficacy (53% of the sample; n = 27). In addition, the researcher observed twenty-four participants to portray a high self-efficacy belief. A final outcome of the study observed that participants with at least 5-10 years of work experience were found to predominantly hold a low self-efficacy belief (n = 14), whereas participants with 1-5 years of work experience showed an even split between low and high self-efficacy beliefs. A much smaller number of participants (n = 3) with 10-15 years of work experience in the mining industry were identified as highly self-efficacious individuals.
4.3 Discussion

The research study aimed to demonstrate the impact of locus of control and self-efficacy on the potential risk-taking behaviour of the Millennial workforce at Kolomela mine. A good survey response rate was achieved for the research study (51%). The framework in Figure 14 summarises the main findings presented in the results chapter.
Figure 14 - Summary of research study results

Safety Locus of Control
- Spearman-Brown half-split coefficient = .83

Internal
- observed sample n = 23
- recorded participants across all age group categories (21-36 years old)

External
- dominant trait
- observed sample n = 28
- mostly participants aged 30-36 years old (n = 27)

Generalised Self-Efficacy
- Cronbach’s α = .84

High
- dominant self-belief
- observed sample n = 27
- mostly participants with 5-10 years’ experience in mining (n=14)

Low
- observed sample n = 24
- includes all participants with 10-15 years’ experience in mining (n= 3)

Implication on potential risk taking behaviour
4.3.1 Safety locus of control

The research study found the Safety locus of control results to be valid ($r = .83$) and showed a greater proportion of survey respondents to be external in their locus of control belief. In total, twenty-eight participants confirmed their externalised safety beliefs. These twenty-eight participants represented 55 percent of the total sample ($N = 100$), suggesting that most of the Millennial workforce at Kolomela mine are external. The findings of the present study are consistent with expectations and previous research by Twenge et al. (2004), who similarly found Millennials to be more external in their locus of control.

Twenge et al. (2004) postulated that locus of control beliefs have become more external over a 40-year period because of historical trends of a victim mentality and the prevalence of individualism, particularly in the American culture. In addition, the authors found that Millennials are self-absorbed, confident and attribute negative events to outside sources. The research findings of Smith (2011, as cited in Martins & Martins, 2014) are consistent with Twenge et al.’s (2004) research. Smith (2011) reported that South African Millennials are self-assured and individualistic. Furthermore, recent work in the field has also found that South African Millennials focus on their immediate families, individual initiative, personal achievement and sense of entitlement (Alexander, 2011; Smith 2011, as cited in Martins & Martins, 2014). A later study by Twenge and Campbell (2008) confirmed that externally orientated locus of control individuals require greater organisational support and hold the organisation responsible for the outcome of events.

In addition, the findings of Jones and Wuebker (1985) addressed the locus of control construct in regard to work-related safety. As in Twenge et al. (2004), Jones and Wuebker’s (1985) research confirmed that highly externalised locus of control individuals blame outside factors for negative consequences and display a victim mentality for the consequences of negative outcomes (Jones & Wuebker, 1985). Moreover, the authors asserted that people with an external locus of control are prone to a higher frequency of accidents and injuries. This assertion holds significant meaning for
more than half of the Millennial generation employees at Kolomela mine, who were found to be external in their locus of control belief.

The implications of the findings of Twenge et al., (2004), Smith (2011) and Jones and Wuebker (1985) on the present study are pertinent. An external locus of control in Millennial employees at Kolomela mine may lead to more injuries and accidents, as well as a higher degree of blame being placed on the organisation for the outcomes of negative events. Therefore, it can be argued that these employees will tend to hold the organisation responsible for creating a safer working environment, ensuring risk-mitigation measures are in place and providing adequate training to safeguard against occupational injuries. Another concern is the perceived narcissistic characteristic associated with Millennials that may cause the Kolomela workforce to under-estimate the risk associated with a task. This underestimation of risk creates the potential for Kolomela mine’s Millennial employees to become more susceptible to a higher severity of threats, in the risk-prone mining environment.

In short, the research study asserts that most of the Millennial generation employees at Kolomela mine view themselves as unable to influence outcome expectancies and they are prone to require greater organisational support. Of significance to organisational support and engaging with Millennials are the research findings of Debard (2004, as cited in Reeves & Eunjung, 2008). The author points to several favourable work-domain characteristics of Millennials, that are relevant to the research study. Debard (2004) has found the Millennial generation to hold a high degree of respect towards authority, show a strong commitment towards the organisation where employee-organisation values are aligned, and they strive to achieve meaningful work goals. Moreover, the recent Deloitte Millennial Survey (Deloitte, 2016) revealed that Millennials strongly value inclusivity, training and development, accountability for one’s actions and transparent communication. Therefore, the researcher argues that a perceived advantage can be attained if Kolomela mine offers strong support in terms of safety training, user-friendly procedures and policies, and builds engaging social environments that promote collaboration. The research study suggests that by increasing employee commitment, heightening safety awareness and through creating a conducive work environment, one can expect reduced work-related accidents.
The research study also found 45 percent of the sample (n = 23) to hold a highly internalised locus of control. The implication thereof is that a smaller, yet significant proportion of the Millennial generation employees at Kolomela mine are likely to hold themselves accountable for the outcome of events and will take control of their actions to ensure work-related accidents are avoided (Jones and Wuebker, 1985). Notably the literature postulates that people with an internal locus of control are more inclined towards risk-avoidance behaviour and typically experience a lower frequency and lower severity of injuries (Jones and Wuebker, 1985).

Furthermore, Christian et al. (2009) assert that individuals with a high controllability perception are more curious about learning and engaging in safe practices, compared to individuals with an external locus of control. The authors show that internal locus of control individuals appear to have heightened levels of motivation to educate themselves about safe learning practices, thereby strengthening the arguments of Jones and Wuebker, (1985). Therefore, the research findings of the present study suggests that the behaviour, decisions and actions of highly internalised locus of control Millennials at Kolomela mine will be directly influenced by their interpretation of reality and control of events. This is a positive outcome for the highly internalised locus of control employees in the present study, which argues a preference for forty-five percent of the Kolomela Millennial generation workforce (n = 23) to be risk-averse in their actions and behaviour.

### 4.3.2 Self-efficacy

The results from the second survey scale (the New General Self-efficacy scale) showed good internal consistency (α = .84) and the research findings determined that the Kolomela Millennial workforce is predominantly low in their sense of self-efficacy. Twenty-seven participants who represented fifty-three percent of the total sample of N = 100, were reported to portray a low self-efficacy belief. The findings of the present study are in agreement with the assertion of Palmer (2015), who argued that Millennials lack a deeper level of self-efficacy. The author postulated that Millennial students failed to display sufficient effort and persistence in accomplishing a task, thereby affirming their lower sense of self-efficacy. Furthermore, he attributed their low sense of self-efficacy and inflated self-esteem to
their unawareness of failure and subsequent inability to learn from mistakes. In the South African context, research by Smith (2011, as cited in Martins & Martins, 2014) demonstrated that Millennials are self-assured, individualistic and goal driven.

While Millennials are reported to display characteristics of high self-esteem (e.g. Twenge & Campbell, 2001 as cited in Dannar, 2013; Smith, 2011, as cited in Martins & Martins, 2014), research by Bandura (1997, as cited in Bandura, 2012) argued that self-efficacy and self-esteem are distinct concepts. The author’s research demonstrated that self-esteem is a perception of self-worth, whereas self-efficacy is a perception of capability. Furthermore, Bandura (1997) suggested the empirical state of self-esteem is independent of the practical application and predictivity of self-efficacy. Therefore, it is possible for a person to appraise one’s self-image as highly valuable (high self-esteem) but in the same context be doubtful about one’s competence to succeed in a specific task (low self-efficacy).

Bandura (1977) argued that low self-efficacious individuals lack a belief in their capabilities to execute the necessary actions to accomplish a specific outcome; therefore, these low self-efficacious individuals hold a pessimistic outcome expectancy. A related example, which shows support for Bandura’s (1977; 1997) research and Palmer’s (2015) research, is the findings of Trzesniewski & Donnellan (2010) who demonstrated that the Millennial generation are more pessimistic and distrusting than earlier generational cohorts. Furthermore, a review of past research indicates that Millennials display heightened levels of anxiety (Kilpatrick, Dubin, & Marcotte, 1974; Morelli, Krotinger, & Moore, 1979, as cited in Twenge et al., 2004), poorly regulate their states of stress (Krause & Stryker, 1984; Sandler & Lakey, 1982, as cited in Twenge et al., 2004) and have a lower sense of well-being (Larson, 1989, as cited in Twenge et al., 2004). These psychological traits are also observed in people with low self-efficacy, whom similarly experience low coping efficacy. Low coping efficacy leads to an exaggeration in the severity threats, thereby causing people to feel anxious and helpless and impairing one’s problem solving skills (Bandura, 1977; Beck, Emery, & Greenberg, 1985; Lazarus & Folkman, 1984; Meichenbaum, 1977; Sarason, 1975, as cited in Bandura, 1992; Chen et al., 2001). Bandura (1992) also postulates that people with a low sense of self-efficacy and coping efficacy tend to avoid risky situations and challenging tasks.
The present research study reports a predominantly low state of self-efficacy in most of the Millennial employees at Kolomela mine (53%) and argues that these employees may not consistently hold a strong belief in their capabilities across all tasks and work domains. The researcher proposes that the potential impact of a low self-efficacy belief in Millennial employees’ at Kolomela mine is that their low sense of personal capability may lead to a rational that emphasises their personal shortfalls; possibly causing these individuals to hold a pessimistic outlook when faced with daunting tasks/events. Moreover, in challenging environments, the researcher argues that these low self-efficacious employees may observe a low state of coping efficacy, which can increase feelings of stress, anxiety and the occurrence of self-impeding behaviour. The researcher suggests that Kolomela Millennials with low self-efficacy beliefs, may avoid high-risk situations and challenging tasks so as to minimise feelings of anxiety, depression and helplessness. In sum, the research findings suggest that a sense of low sense of self-efficacy belief has a pertinent influence on how employees approach tasks, goals, and challenges. The research study finds it likely for one’s pessimistic outlook, low confidence in personal competence and negative mental and/or emotional state, can negatively affect work performance and cognitive processing.

A further finding of the research study is that twenty-four participants hold a high self-efficacy belief. The findings show that a proportion of Millennial employees at Kolomena mine (47%) are highly self-efficacious individuals indicating that they are confident in their capabilities and hold an optimistic outcome expectancy (Bandura, 1977; 1992; 1997; Chen, 2001). Furthermore, these employees in the high self-efficacy group can be considered to hold a strong sense of coping-efficacy allowing them to regulate their emotional states, adjust their problem-solving techniques in the face of adversity and display a higher level of perseverance to accomplish a successful outcome (Chen et al., 2001). The researcher suggests that these highly-efficacious Millennial employees may also be more adventurous in behaviour, as he/she would base their actions on their level of mastery, outcomes expectations, and past experience (Bandura, 1988, as cited by Bandura 1992), and therefore cannot be considered as completely risk-averse individuals.
4.3.3 Conclusion

From the research findings presented it can be seen that the Millennial generation of employees at Kolomela mine are predominantly external in their locus of control belief and demonstrate a lower sense of self-efficacy. In addition, the results infer that the majority of Millennial generation employees at Kolomela mine do not consider themselves to be in control of the outcome of an event and are doubtful of their capabilities to influence a successful outcome.

According to Yates and Stone (1992) a person chooses to participate in risk-taking behaviour following their consideration of the contextual factors, various consequence scenarios, expectancy of losses/gains, belief in personal capability and perception of ability to execute the actions necessary to achieve desired outcomes. From this definition and the outcomes in the present research study, the researcher argues that a combination of low self-efficacy and externalised locus of control suggests that the most of the Millennial generation employees at Kolomela mine are prone to injury and have an increased chance of a work-related accident. Furthermore, their risk-taking behaviour is characterised by attributing outcomes of an event to:

- external elements, chance/fate or luck and help and/or impediments from others or the environment
- low level of safety awareness
- lack of controllability of the situation
- low expectancy of a successful outcome
- poor sense of individual motivation
- inability to regulate feelings of anxiety, stress and victim mentality
- becoming immobilised during high stress situations leading to a failure to utilise all available cognitive problem solving skills

The findings of the present research study places a higher demand on the organisation to provide training and support to minimise the effects of the risk-taking behaviour of these employees and/or change the risk-taking behaviour of these employees. However, Schwarzer and Fuchs (1995) argue
that for a change in risk-taking behaviour to occur, employees need to increase their level of self-
awareness and expectancy of risk, alter their locus of control towards believing that their behaviour
change will mitigate the risk, and improve their state of self-efficacy. Bandura (2012) found that self-
efficacy can be developed in four ways: (1) mastery experiences, (2) social modelling, (4) improving
physical and emotional states, (3) verbal persuasion. Fortunately, all four elements are within the
scope of Kolomela mine.
5. Research Conclusion

The South African mining industry is considered a major driving-force behind the country’s economic and social landscape; employing nearly 500,000 people, contributing significantly to the GDP (from 21% in 1970 to 8% in 2015), developing infrastructure and enabling economic growth across the country (Smit, 2015; Statistics South Africa, 2016). However, mine-related injuries and deaths are reported every year, with each incident affecting nearly nine other dependents of the employee. A reduction in mine-related injuries and accidents is therefore of paramount importance to the sector.

Past research showed that risk is considered to hold different meanings for individuals, depending on their cognitive understanding, contextual factors and possible outcome expectancies. Furthermore, the effect of individual perception on how one interprets risk-prone situations is critical to minimising accidents and injuries. Researchers have demonstrated the pertinence of attribution of cause to one’s decision-making process and subsequent reactions in a high-risk situation (e.g. Slovic, 1987; Yates & Stone, 1992; Trimpop, 1994; Sjöberg et al., 2004). Moreover, their studies showed that attribution of cause is directly impacted by behavioural traits, including locus of control and self-efficacy.

The research study aimed to demonstrate the impact of locus of control and self-efficacy on the potential risk-taking behaviour of the Millennial workforce at Kolomela mine. Kolomela mine is an iron ore producer and employs at least 1300 people, of which, 253 employees represent South African Millennials. Millennials were selected as the research study birth cohort because of their unique characteristics and growing footprint on the industry. Furthermore, an improved understanding of South African Millennials would enable better collaboration between generational cohorts in organisations.

Locus of control is a well-studied construct, originally postulated by Rotter (1966), and is defined as the personal belief that a person holds about the level of control that he/she has over their actions and the events in their lives. A review of past research has found that people with an external locus of control belief exhibit a victim mentality and blame external sources for negative outcomes. Furthermore, these people are likely to being involved in a higher frequency of accidents and injuries.
(Jones, 1983; Jones & Wuebker, 1985; Wuebker et al., 1985; Jones & Wuebker, 1993). Jones and Wuebker (1985; 1993) also demonstrated that people with an internal locus of control belief are more likely to engage in safety training, thereby improving their level of safety awareness. Moreover, highly internalised locus of control people were associated with risk-mitigating behaviours in high-risk situations. In the present study, locus of control beliefs were measured using the Safety Locus of Control scale, developed and by Jones (1983).

Bandura (1977) originally introduced the theory of self-efficacy. His research argued that self-efficacy is the belief a person holds regarding his/her personal capability to execute the necessary actions to accomplish a specific task. People with a higher sense of self-efficacy were found to portray successful outcome expectancies compared to people with a low sense of self-efficacy, whom held a more pessimistic outlook. Furthermore, Bandura (1992) related self-efficacy to coping efficacy which he defined as a person’s capability to regulate negative emotions in high-stress situations. He argued that an individual with a high sense of self-efficacy should display a high sense of perceived coping capability and therefore exhibit regulation of their feelings of stress and anxiety. In short, a highly efficacious individual would approach high-risk situations with confidence in their cognitive skills, a strong sense of perseverance, and adaptive behaviours to resolve the problem. In contrast, people who lack self-efficacy are doubtful of their capabilities to execute a successful outcome. They experience heightened levels of anxiety and stress and display self-impeding behaviour that impairs their level of cognitive functioning. The combination of a low sense of self-efficacy and a low coping capability belief causes people with these characteristics to react poorly in high-risk situations. The self-efficacy belief of Kolomela Millennials was measured using the New General Self-efficacy scale.

Following an extensive literature review the researcher refined the research goals. These research objectives were investigated through the following paths:

1. Using a survey questionnaire, the researcher empirically tested the locus of control characteristics of Millennial employees in a mining context and determined the self-efficacy traits of these Millennials to:
a. Determine if Millennial employees at Kolomela mine are predominantly external or internal in their safety locus of control belief

b. Identify the prominent type of self-efficacy belief (high vs. low) among the Kolomela mine Millennial workforce

2. Deduce the implications of locus of control and self-efficacy on the potential risk-taking behaviour of the Millennial employees at Kolomela mine.

The research survey questionnaire was administered to a sample of $N = 100$, and reported a 51% response rate, which is sufficient for a study of this nature (Wright, 2009). The survey results for the Safety Locus of Control scale were found to be valid and indicated a Spearman-Brown split-half reliability coefficient of .83. Moreover, evidence from the research results showed that Millennials at Kolomela mine were predominantly external in their locus of control beliefs (at least 55% of the sample). In addition, the findings demonstrated that participants between the ages of 26 and 30 years old the greatest number of externalised locus of control responses ($n = 17$). The researcher argues that highly externalised locus of control employees are likely to attribute negative outcomes to external sources and may not hold themselves responsible. In addition, Millennial employees with an external locus of control can potentially experience a higher frequency of mine-related injuries. The research study suggests that these employees will tend to hold the organisation responsible for creating a safer working environment, ensuring risk-mitigation measures are in place and providing adequate training to safeguard against occupational injuries. This, requires greater organisational support to reduce mine-related injuries.

The survey results for the New General Self-efficacy scale were valid and reported a good level of internal consistency ($\alpha = .84$). The survey results for the New General Self-efficacy scale reported a total of twenty-seven participants with a low sense of self-efficacy and a total of twenty-four participants with a high sense of self-efficacy. Therefore, much of the Millennial workforce at Kolomela mine were determined to portray a low self-efficacy belief. The research study postulates that employees with a low sense of self-efficacy depict a pessimistic outlook of events and may
experience heightened levels of doubt in one’s capabilities, especially in high-stress situations. Moreover, the researcher shares the sentiments of Bandura (1992), who argued that people with low self-efficacy may exaggerate the severity of a threat. This exaggeration may cause Millennial employees to feel anxious and helpless leading to an underutilisation of one’s skills to resolve the threatening situation.

The combination of perceived low controllability and a lack of self-efficacy in most of the Millennial workforce at Kolomela mine suggests that these Millennials are likely to experience a higher frequency of mine-related injuries and accidents. The research findings also show that locus of control beliefs and sense of self-efficacy influence the risk-taking behaviour of the Millennial employees. Their risk-taking behaviour is characterised by: self-serving bias, a perceived lack of control on the outcome of events; self-impeding behaviour; elevated levels of stress and anxiety; perceived inability to successfully accomplish goals; and a pessimistic outcome expectancy. Therefore, the potential risk-taking behaviour of Millennials at Kolomela mine is considered to hinder their decision-making process and subsequent actions in a high-risk situation.
6. Research Implications and Recommendations

The main findings of the research study suggested that Millennials at Kolomela mine are risk prone and that their potential risk-taking behaviour is influenced by the constructs of locus of control and self-efficacy. Their risk-taking behaviour is characterised by: attributing outcomes of an event to external elements such as chance/fate or luck; becoming immobilised during high stress situations that can cause an underutilisation of cognitive problem solving skills; a lack of perceived controllability of the situation; a pessimistic outlook on events; and an inability to regulate feelings of anxiety and stress. Whilst these results seem conclusive, the researcher stresses that risk-taking behaviour varies among individuals and is dependent on not only the dominant behavioural traits but also the situation at hand, one’s understanding of risk, as well as other psychological, social, cultural and institutional factors that influence the individual.

The research study argues that managers can expect a higher demand on the organisation to provide support to Millennial employees. The additional support will possibly minimise the effects of the potential risk-taking behaviour of the Millennial workforce. In addition, organisations can respond to the challenges associated with the risk-taking behaviours of Millennials by assisting employees in increasing their level of self-awareness and assessment of high-risk situations. The evidence from the research study supports the following recommendations made to Kolomela mine:

- Offer stronger support in terms of safety training and individual development tools
- Develop user-friendly procedures and policies
- Engage regularly with Millennials to enable alignment of organisation-employee goals
- Aspire to build more engaging social environments that promotes collaboration

These suggestions are likely to increase employee commitment, heighten safety awareness and improve employee performance. Through creating a conducive work environment, one can infer a reduction in mining-related injuries and accidents.
7. Future Research Directions

The aim of the research study was to demonstrate the impact of locus of control and self-efficacy on the potential risk-taking behaviour of the Millennial workforce at Kolomela mine. Several avenues for potential future research became apparent during the study are included below:

- Historic accident and incident rates at Kolomela mine could be reviewed to determine potential correlations with the findings of the present research study. Moreover, a comparative study of past accidents against the associated generational cohort could verify the risk propensity of Millennials at Kolomela mine.

- The present research study found Millennial participants aged 26-30 (born 1980-1990) to have a greater number of externalised locus of control outcomes, as opposed to other participants. Whilst, it was beyond the scope of this research study to understand how South African contextual changes associated with major historical events may have influenced the nature of an individual’s locus of control, it may reveal insightful findings and could be considered for future studies.

- The present findings of the present research study are restricted to South African Millennials. The mining industry employs some 500,000 people and could benefit from understanding the attribution causes that are holistically representative of the entire workforce. Therefore, the researcher suggests that there is scope to pursue attribution theory and causal analysis across generational cohorts in the mining sector.

- Past research on South African Millennials argues that people in this generational cohort are complex and diverse in their experiences (Deal et al., 2012); researchers infer that generalisations cannot be made about South African Millennials from different racial groups because socio-political factors had unique influences on their personality and behavioural characteristics (Smith, 2011; Chang, 2011 as cited in Martins & Martins, 2012; Mattes, 2011,
as cited in Deal et al., 2012). Furthermore, Deal et al. (2012) found that research on South African Millennials required greater depth and an improved level of comprehensiveness. The researcher suggests replication of the present study at other mines in South Africa to validate the findings contained in the report and improve our knowledge-base of the Millennial generation in the mining industry.
8. Reference List


Naquin, C. E., & Tynan, R. O. (2003). The team halo effect: Why teams are not blamed for their


http://doi.org/10.1177/1066480713515160


Retrieved from http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:No+Title#0


9. Appendices

9.1 Appendix 1 – Safety Locus of Control Scale

Using the following scale, please indicate, at the end of each statement, how much you agree/disagree with it. Where:

![Safety Locus of Control Scale]

1. If employees follow all company rules and regulations, they can avoid many on-the-job accidents.
2. Industrial accidents are usually caused by unsafe equipment and poor safety regulations.
3. Occupational accidents and injuries occur because employees do not take enough interest in safety.
4. Avoiding accidents is a matter of luck.
5. Most accidents and injuries at work cannot be avoided.
6. It is the company’s responsibility to prevent all accidents at work.
7. Most industrial accidents are due to employee carelessness.
8. There are so many dangers in this world that you never know how or when you might be in an accident.
9. Most accidents that result in employee injuries are largely preventable.
10. No matter how hard employees try to prevent them, there will always be on-the-job accidents.
11. Whether people get injured or not is a matter of fate, chance or luck.
12. Employees’ accidents and injuries result from the mistakes they make.
13. Most on-the-job accidents can be blamed on poor management.
14. Most injuries are caused by accidental injuries outside people’s control.
15. People can avoid getting injured if they are careful and aware of potential dangers.
16. There is a direct connection between how careful employees are and the number of on-the-job accidents they have.
17. Most accidents are avoidable.
9.2 Appendix 2 – New General Self-efficacy scale

Using the following scale, please indicate at the end of each statement, how much you agree/disagree with it:

- strongly disagree  •  disagree  •  disagree somewhat  •  agree somewhat  •  agree  •  strongly agree

1. I will be able to achieve most of the goals that I have set for myself.
2. When facing difficult tasks, I am certain that I will accomplish them.
3. In general, I think that I can obtain outcomes that are important to me.
4. I believe I can succeed at most any endeavor to which I set my mind.
5. I will be able to successfully overcome many challenges.
6. I am confident that I can perform effectively on many different tasks.
7. Compared to other people, I can do most tasks very well. 8. Even when things are tough, I can perform quite well.