



# **World Safety Journal**





- In This Edition
- ROV Safety
- Offshore Voice of the Workplace
- New Employees in the Workplace
- Behavior Based Safety to Improve Safety Performance
- The Downfalls of Workers' Compensation and Return to Work Systems
- Fly-in-Fly-Out Work Practices in the Australian Mining Industry

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### Article Submission

Articles for inclusion in this journal will be accepted at any time; however, there can be no guarantee that the article will appear in the following journal issue.

All articles shall be written in concise English and typed with a minimum font size of 11 point. Articles should have an abstract of not more than 200 words. Articles shall be submitted as Times New Roman print and presented in the form the writer wants published. On a separate page, the author should supply the author's name, contact details, professional qualifications, current employment position, a brief bio, and a photo of the author. This should be submitted with the article.

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### References

Articles should be referenced according to the <u>Publication Manual</u> of the <u>American Psychological Association 2017</u>.

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Articles, wherever possible, must be up-to-date and relevant to the Safety Industry. *All articles are Blind Peer Reviewed by at least two referees before being accepted for publication* 

### The Offshore Voice of Workplace Safety: A Review of Australian Oil and Gas Health and Safety Representatives and Committees

By David Baird, currently studying a Bsc in Health, Safety and Environment at Curtin University, Western Australia.

### Abstract

Little is known about the role of health and safety representatives and committees in the Australian offshore oil and gas industry. This includes how effective health and safety representatives and committees are or the barriers and challenges that they face in carrying out their roles. This review concludes that the key to achieving a workplace that is health and safety conscious needs to have a positive safety culture which is embraced by the whole workforce but particularly the management. Health and safety representatives and committees are governed by legislation and must be trained, resourced and supported to be able to achieve the intended outcomes. Barriers that representatives face must be identified and worked though by the representatives, management and occupational health and safety professionals to allow for continuous health and safety improvement.

**Key words**: Health and safety representatives. Health and safety committees. Offshore, oil and gas. Workplace safety, barriers.

### Introduction

Advancement in technology has come a long way since the industrial revolution of the seventeen and eighteen hundred's, and so to have practices in occupational health and safety (Eddington, 2006). During the early years of the industrial revolution, no laws existed to protect working conditions or hours until 1833 when the British government passed the first Factory Act, primarily to protect child workers (1833 Factory Act, 2018). Over subsequent years more legislation was introduced to protect all workers and working conditions including enforcement of non-compliance with current British Regulations originating from the early Factory Acts (Wadsworth & Walters, 2014).

In Australia, the States adopted many provisions of the British Health and Safety Legislation, particularly the 1878 Factories Act and subsequently the 1901 Act (Australian National University, 2017). To create a more unified and integrated system better suited to Australian workplaces and conditions, the States over time enacted new health and safety statutes that included provisions for elected workplace health and safety representatives and committees (Australian National University, 2017).

Although there were similarities in health and safety statutes between the Australian States and Territories, there were also some inconsistencies. To address this, harmonized model Workplace Health and Safety Laws were developed (Safe Work Australia, 2018) of which most of the States and Territories adopted except as of 2018 Victoria and Western Australia (Safe Work Australia, 2018). This paper discusses how workplace health and safety legislation evolved to include the offshore oil and gas industry in Australia and more specifically the roll out of workplace health and safety representatives and committees in this environment. It looks at the effectiveness of health and safety representatives and committees, areas that work well and areas where challenges or barriers may exist for health and safety representatives.

### Methodology

An initial review of various databases available via the Curtin Library website was carried out. Databases searched included Pubmed, Informit, ProQuest and ScienceDirect. ProQuest was selected as the preferred database due to having the most relevant search results returned, ease of use and the advanced search functions. A search in ProQuest using the keywords 'Health and Safety Representatives' was conducted. Using the advanced search function, the results were limited to peer reviewed full text articles published within the past ten years which returned 101,054 article results. Additional keywords including 'offshore' were added using the advanced AND function to further refine the search results to obtain 1,551 publications. In total, twenty-one articles are included in this literature review; six research and fifteen systematic literature reviews.

Further searches for more specific information were conducted using the search engine Google. For example, when searching for Australian legislation, historical information such as early occupational laws and major offshore accidents. Information sourced was vetted for authenticity and consists of four Australian Legislation publications, five government on-line publications, one educational publication and one oil and gas organization publication.

### Australian Offshore Legislation

In July 1988, the Piper Alpha facility in the North Sea had a massive gas leak, subsequent explosion and fire which resulted in total loss of the platform and 167 fatalities (Oil & Gas UK, 2008; Rasmussen, Hasle & Andersen, 2014). This incident was investigated by Lord Cullen and released as the Cullen Report which identified that offshore facilities have unique hazards that require special considerations (Griffiths, 1993; Oil & Gas UK, 2008). Recommendations from The Cullen Report included the creation of specific safety legislation for the offshore industry including the requirement for offshore installations to have an approved safety case and to include employee participation in the form of safety representatives (Griffiths, 1993; Oil & Gas UK, 2008).

As specific offshore legislation was being introduced in the United Kingdom, around the same time workplace health and safety harmonization laws were being developed in Australia. A review into the adequacy of Australian offshore safety regulations was undertaken by the Australian Government (NOPSEMA, 2018). The National Offshore Petroleum Safety Authority (NOPSA) was formed in 2005 to regulate health and safety of offshore workers in Australian Commonwealth waters under the Petroleum (Submerged Lands) Amendment Act (2003) (NOPSEMA, 2018). The events of the 2009 Montara incident in Australian waters where an oil leak and wellhead platform fire occurred (Lamont, 2012) and nine months later, the Deepwater Horizon blowout in the Gulf of Mexico which resulted in 11 deaths, a massive oil leak and total loss of the platform (Cohen, Gottlieb, Linn, & Richardson, 2011; Splicer, 2014; Tabibzadeh & Meshkati, 2014) led to a review of NOPSA. NOPSA's authority was increased to include well integrity and environmental approvals. There was a subsequent name change in 2012 to the National Offshore Petroleum Safety and Environmental Authority (NOPSEMA) as Regulator

of the Offshore Petroleum Greenhouse Gas Storage Act 2006 (NOPSEMA, 2018). In 2014, NOPSEMA became the Regulator of the Environment Protection and Biodiversity Conservation Act 1999 which gave NOPSEMA combined regulatory authority of safety, well integrity and environmental management (NOPSEMA, 2018).

### Discussion

The offshore oil and gas industry is an industry where safety is paramount as workers are often exposed to hazardous, demanding, stressful and high risk activities (Mette, Marcial, Harth, Preisser, & Mache, 2018; Rasmussen et al., 2014). Whilst safety is paramount, research has suggested that there are barriers that restrict the safety representatives from either carrying out their duties (Rasmussen et al., 2014) such as a lack of commitment by management to safety (Jarvis, Virovere, & Tint, 2016), lack of training (Harris, Kirsten, & Walker, 2012) and unrealistic expectations from peers and or managers (Rasmussen et al., 2014).

### Workplace culture:

The effectiveness of safety representatives is dependent on the organization's safety culture which Jarvis et al. (2016 p. 269) defines as the product of individual and group values, attitudes, beliefs, risk- perceptions, competencies, norms, principles, and patterns of behavior that determine the commitment of employees to health and safety. In addition, Jin & Chen (2013) suggest that an organizations culture will influence the employees' attitudes towards risk. An example of this is that an organization may display health and safety policies in public areas that conform to legislative requirements, but this may not indicate a practical commitment to safety (Wadsworth & Walters, 2014). The company's mission statement alone cannot create a good safety culture (Jarvis et al., 2016), it requires commitment from management in the form of not only a good safety culture, but overall good corporate culture (Wadsworth & Smith, 2009; Lawson, 2015) and engagement from individual employees including the willingness to become safety representatives (Seixas, Crollard, Neitzel, Stover, & Dominguez, 2013).

Organizations need to be aware of employee's perception of management's commitment to safety and the effects of safety culture on the workforce (Morten, Glaso, Stig, Eid, & Einarsen, 2013). Having a good corporate safety culture promotes improved employee safety behavior which in turn results in increased job satisfaction (Nielsen, Tvedt, & Matthiesen, 2013). Zwetsloot, Leka, & Kines, (2017 p. 96) discusses the transition from 'We must work safely' to 'We want to work safely' and of organizational behavior interventions to improve safety awareness. One such intervention is to encourage employee participation in health and safety, including becoming a health and safety representative and committee member (Harris et al., 2012).

### **Employee representation:**

When compared to onshore workers, offshore workers have a higher workload, higher anxiety and increased sleep problems (Mette et al., 2018; Morten et al., 2013) and are subject to a range of psychological stressors including, but not limited to, longer working hours, difficult working and living conditions, and separation from family (Mette et al., 2018; Nielsen et al., 2013, 2018).

Considering these additional stressors, health and safety representatives need to not only look after their own safety, but also take some responsibility for their fellow

workers' safety (Jin, Chen, 2013). This front-line employee participation in safety covers the gaps with management who do not necessarily understand, or have firsthand information in enough detail, to be able to abate all the hazards in the workplace (Harris et al., 2012).

The Offshore Petroleum and Greenhouse Gas Storage Act (2006, volume 3, schedule 3) outlines the requirements for employee representation as health and safety representatives in Australian Commonwealth waters. This is the minimum legislative requirements for operators in Australian waters; but to achieve 'safety excellence' (Zwetsloot et al., 2017) operators need to support, and continue to raise the profile, of health and safety representatives (Wadsworth & Smith, 2009) as according to research by Walters, Johnstone, Quinlan, & Wadsworth, (2016), effective health and safety representatives have an over-all positive effect on occupational health and safety of employ-ees.

### Health and safety training:

Although **NOPSMA** stipulates that all health and safety representatives are to receive training from accredited training organizations (NOPSEMA, 2016), many health and safety representatives believe that their training was inadequate and felt that they lacked confidence in carrying out their duties (Rasmussen, Hasle, & Andersen, 2014). In situations where there is insufficient or poor training and knowledge, this may lead to a misunderstanding of the requirements of the health and safety role and compromise its effectiveness (Hicks, Buttigieg, & De Cieri, 2016).

To ensure the health and safety representatives have a uniform approach to how they represent the workforce and participate in hazard management (Harris et al., 2012), organizations must employ the constant exchange of information as part of a continuous learning process (Jarvis et al., 2016). A good safety culture presumes effective communication (Jarvis et al., 2016). Health and safety committees:

Results from studies carried out by Walters et al., (2016 p. 435) showed that to be successful as a health and safety representative, getting 'the knowledge' was essential and there are various means of safety communications from informal toolbox discussions to planned and minuted health and safety meetings (Jin and Chen, 2013). A well-functioning health and safety committee permits employees to work more safely and to stay healthier (Seixas at al., 2013) as employees' impression of safety resources, such as committees, reflect on the organization's safety culture (Nielsen et al., 2013).

For a health and safety committee to be successful, the full support of the upper management is required, including providing all the necessary support and resources (Seixas at al., 2013). Such resources include occupational health and safety professionals which can meet with, and share information with, elected health and safety representatives (Lawson, 2015) and assist with establishing the workplace health and safety terms of reference (Seixas at al., 2013). With the assistance of health and safety professionals and management, the opportunity exists to reinvent the traditional and less inspiring safety committee to a more appealing 'Safety Solutions Team' or similar (Lawson, 2015).

Challenges and barriers to health and safety representatives and committees: Health and safety representatives and committees may face a variety of challenges and barriers in carrying out their roles, including understanding legislation (Rasmussen et al., 2014), dealing with complicated procedures and inflexible policies (Almond & Esbester, 2016). This is a problem that can be solved if senior managers participate in health and safety committee meetings (Jarvis et al., 2016) and adequate guidance from occupational health and safety professionals is provided (Lawson, 2015).

As health and safety representatives attend meetings where managers may be present, are invited to attend incident investigations and reviews and are visible to the workforce (NOPSEMA, 2016), there can also be a perception that health and safety representatives are quasi-managers (Rasmussen et al., 2014). This may give the impression that health and safety representatives are not performing as the workers' representatives (Harris et al., 2012) but solving problems for management (Rasmussen) and may draw negative criticism (Almond and Esbester, 2016).

Another challenge facing health and safety representatives is undertaking duel roles at the workplace, their own employed role, and that of health and safety representative, which may at times have incompatible demands (Rasmussen et al., 2014). This can be a fine line for representatives as although the Offshore Petroleum and Greenhouse Gas Storage Act (2006) stipulates that representatives must be given time and resources to carry out their roles, operational and production demands may compete (Jarvis et al., 2016).

### Limitations

The research for this review was primarily done using ProQuest, a single data base search tool which may have resulted in limitations of available material. Another limitation was the amount of credible information on the review topic, particularly in regard to the offshore industry in Australia as some inferences have been made from similar industries including overseas research.

### Conclusions

The offshore oil and gas industry is not only physically and psychologically demanding for workers, but is also a very hazardous and dangerous work environment. There have been several examples of incidents that have ended in multiple fatalities and resulted in reviews of, and changes in, legislation to improve health, safety and environmental standards.

A review of available material has found that there are several key factors that affect the health and safety performance of organizations with one of the biggest factors being workplace, or company, safety culture. Meeting the requirements of safety legislation or posting policies on noticeboards alone is not sufficient to provide a safe working environment. There needs to be commitment from all levels of the workforce, but not least by management, to embrace workplace safety and to provide the required resources to health and safety representatives. The establishment of well supported health and safety representatives and committees has been found to improve overall workplace safety and resulting in fewer accidents, incidents and less employee ill health. Conversely, organizations where management lack commitment to safety, do not undertake adequate training or do not give representatives the time and resources to carry out their roles, result in a poor safety culture. Health and safety representatives if supported can function well but if not, can face challenges and barriers that may prevent them from representing the workforce to achieve positive safety and health outcomes. Barriers and challenges may be from lack of support from management and occupational health and safety professionals, inadequate training, lack of communications, lack of knowledge of legislation and procedures, perceived conflicts of interest regarding representing workers and management, and conflicts with conflicting job rolls. Overall, it appears that the oil and gas industry has learnt from previous incidents and has put in place robust legislation to ensure that health and safety representatives can perform their duties. However, continuous review and improvement is required to ensure ongoing workplace health and safety standards remain high. ■

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David Baird is a Production Technician with over twenty years' operational experience in the Australian oil & gas sector in both up and downstream refining and LNG processing including a three-year expatriate assignment in South Korea. David has a strong safety focus and has been an elected Health & Safety Representa-

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### ROV Safety: Epidemiology, Risks, Hazards, Interventions, and Trends

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### Abstract

Recreational off-road vehicles (ROVs) include all-terrain vehicles (ATVs) and utility terrain vehicles (UTVs). The ROVs are used by an estimated 35 million Americans for recreational and occupational applications. The majority of riders (78%) use these vehicles for blazing trails, camping, hunting and other recreation activities. The occupational uses are expanding from the farm and ranch to land management, search and rescue, police and fire, military, public administration, mining, retail, education services and more. These versatile vehicles are not without risks and adverse health outcomes. An estimated 400,000 users are injured annually with nearly 100,000 seeking medical care in emergency rooms across the country. Since 1982 the Consumer Product Safety Commission has investigated over 15,000 fatalities associated with ROV use. The major interventions to improve safety have included rider/driver training and education, design and engineering changes and legal strategies. The Specialty Vehicle Institute of America (SVIA) offers safety training through the ATV Safety Institute (ASI) to purchasers of ATVs and the Recreational Off- Highway Vehicle Association (ROHVA) for UTV buyers; unfortunately, only 10% of new owners engage the active learning opportunity. Consumers are more recently buying UTVs at twice the rate of ATVs for the design enhancements, added features and improved safety.

**Key Words**: ATV, ROV, OHV, UTV, Side- by-Side ROV Safety: Epidemiology, Risks, Hazards, Interventions and Trends

### **Introduction and Background**

All-Terrain Vehicles (ATVs) arrived in the US during the early 1970s (GAO, 2010). The three-wheeled vehicles were quickly adapted for occupational uses in agriculture and became very popular with recreational riders. The original vehicles were uniquely designed with large, low pressure tires, straddle seats and equipped with motorcycle like handle bar steering and hand controls (GAO, 2010). Sales skyrocketed by the early 1980s accompanied by increasing injury and fatality among riders. The Consumer Product Safety Commission (CPSC) actively investigated the fatalities beginning in 1982 and brought pressure to bear on the manufacturers for improved safety designs. In 1988 the industry signed a settlement decree with the CPSC to stop sales of the three-wheeled vehicles in the US favoring the more stable four-wheeled vehicles used today (GAO, 2010). In addition to shifting sales to the safer four-wheeled vehicles, the SVIA created the ATV Safety Institute (ASI) to develop and provide safety materials and rider-active training for consumers. The ASI developed the five-hour, hands-on RiderCourse <sup>™</sup> provided free of charge to all new vehicle purchasers.

In Australia, New Zealand, Sweden and other areas of the world, the four-wheeled vehicles were called quadbikes and have found significant popularity among agricultural industries as well as with recreational riders (Grzebieta, Rechnitzer, McIntosh, Mitchell, Patton, and Simmons, 2015). In more recent times global sales have continued to rise exceeding an estimated \$7 billion US in 2017 with expectations to double by 2025 (Allied Market Research, 2019). The ASI estimated that 35 million Americans used approximately 11 million ROVs (ASI, 2018). While sales have been strongest in the US market, global regions with active sales also include Latin American, Europe and Asia Pacific.

Recreational off-road vehicle uses have continued to expand serving a wide range of consumer needs and applications. The ROVs are used in agriculture, construction, manufacturing, police, search and rescue, utilities, mining, land management and more (Lagerstrom, Gilkey, Elenbaas, and Rosecrance, 2015). An

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estimated 22% of riders use ROVs for occupational purposes while 78% are seeking recreational enjoyment (ASI, 2018) such as exploring, trail riding, hunting, fishing, camping, racing and more (Finley, 2019; GAO, 2010). In recent years UTV style ROVs are being used and sold to both recreational and occupational users on a more frequent basis than the quadbike or ATV (Hartfiel, 2016).

The growing UTV popularity suggested that purchasers preferred the safer design and new features by a two to one margin (Allied Market Research, 2019; Hartfiel, 2016). The UTV, commonly called the side-by- side, may weigh up to 2,000 lbs (907 kg) with most ranging between 1200 - 1600 lbs (544 - 725 kg) (Huntley, 2019). The UTV is wider by design than the ATV with common width dimensions of 48 - 60 inches (121 - 152 cm) and may be up to 160 inches (406 cm) long. These vehicles have greater stability with distinctive design differences from ATVs that include bench or bucket seating, passenger seating, steering wheel, foot levers and controls as well as safety system features including seatbelts, roll cage and speed limits if the seat belt(s) is/are not fastened (Jepsen and Henwood, 2010). The SVIA through the ROHVA offers a five-hour, hands-on interactive course called DriverCourseTM similar to the ASI RiderCourseTM.

### Selected ROV Research Epidemiology

The literature is rich with data on ROV related injury and fatality. The CPSC had investigated 15,250 ATV related deaths by December 2017 (CPSC, 2019). Fatalities peaked between 2005 through 2007 with more than 800 deaths per year. States with the greatest number of deaths included Texas, Pennsylvania, West Virginia, California and Kentucky (CPSC, 2019). Riders 16 years of age and older comprised the largest user group (83%) accounting for 69% of the injuries (Richards and Loder, 2018) and fatalities (CPSC, 2019). Children under 16 years make up approximately 17% of the riders but account for 31% of the injuries (Richards and Loder, 2018).

The CPSC estimated that more than 400,000 nonfatal injuries occurred annually resulting in approximately 100,000 emergency room visits (GAO, 2010). Major causes of fatal injuries included riding on paved roads, having a passenger, not wearing a helmet,

vehicle rollover, collision, and alcohol use (Langstrom, Magzamen, Stallones, Gilkey and Rosecrance, 2016). Non-fatal injuries seen in emergency rooms included contusion and abrasion, fractures, lacerations, internal organ injury, sprains and strains (CSPC, 2019). Richards and Loder (2018) examined injury data from the National Electronic Injury Surveillance System (NEISS) between 2002 and 2015 and found that 1,862,342 emergency room visits had been reported associated with ROVs, with more than 25% diagnosed with fractures. The data also revealed that nearly 60% were un-helmeted and 75% male. Fractures were most common in the upper extremity followed by the lower extremity, spine, skull and face, with ribs and sternum least common. Fractures of the femur, hip or pelvis were most likely to be admitted to the hospital (Richards and Loder, 2018).

Canadian researchers reported that ROV related injury rates had increased 85.7% between 1990 and 2010 (Vanlaar, McAteer, Brown, Crain, McFaull and Hing, 2015). Alcohol was implicated in more than 50% of the injury events. Males were over represented at 89% and age groups 16-25 year and greater than 46 years were at higher risk for ROV related injury.

There exists particular interest for the safety of children under 16 years of age by many groups. That concern has caught the focus of research scientists and clinicians (Vanlaar, McAteer, Brown, Crain, McFaull and Hing, 2015). The GAO (2010) reported that 22% of fatalities were young riders <16 years of age during the years 1999 through 2008.

The CPSC fatality data 1985 through 2009 were examined for details associated with ATV related pediatric fatality cases (Denning, Harland and Jennissen, 2014). The research team investigated 3,240 youth fatality cases and found significant related factors. Risk factors associated with fatal injuries among youth included being male, operating the ATV, no passenger, age less than six years, and lack of helmet use.

### **Risks and Hazards**

The CPSC has established that some inherent dangers are associated with ROVs (GAO, 2010). The major risks and hazards for loss of control events (LOCs) are associated with higher speeds, sharp turns, riding up hills, down hills or cross hills (Carman, Gillespie, Jones, Mackay, Wallis and Milosavljevic, 2010) carrying passengers (Jennissen, Harland, Wetjen, and Denning, 2016), altering the design of the vehicle (GAO, 2010), as well as using ROVs on paved roads (Denning, G., Harland, Ellis, and Jennissen, 2012). Using the incorrectly matched unit to the rider is also known risk factor. The majority of youth related injury and fatality are associated with adult sized ROVs (CPSC, 2019; Richards and Loder, 2018).

Lagerstrom, Magzamen, Stallones, Gilkey and Rosecrance (2016) examined over 1,200 fatality cases received from the CPSC and used the epidemiologic triad for their analysis. The agent, host and environment model was applied to evaluate major causes and variable interaction. Their analysis revealed the major agent factors were type of crash, diagnosis, and body part. The major type of crash was collision at 42.9% with ejection 37%, the leading diagnosis was internal injuries 65.1% and body part injured was the head at 59.9%. The major host factors included gender, being male 84.6 %, ages 16 to 64 years 73.8%, driver 91%, not wearing a helmet 88.2%, and presence of alcohol 84.3%. The major environmental factors were season, region and crash location type. The most significant season was summer 39.6%, region was in the south 46.4% and the location was paved street surfaces 58.3%. One rider was most frequently involved 79.7% of the time and no other vehicle involved 85.4% of the

time. Their analysis revealed the complex nature of ROV accidents and led to the conclusion that no single risk factor or hazard fully explained the fatality events (Lagerstrom, Magzamen, Stallones, Gilkey and Rosecrance, 2016).

Operators are more likely to have an optimal and safe experience when riding the ROV that is correctly matched to their size and abilities. The ATVs have been produced in three sizes 1) for child use equipped with small motors of 50 cc to 90 cc engines weighing up to 300 lbs (136 kg), 2) for youth 14 years to adult equipped with 150 cc motors and weigh up to 350 lbs (159 kg), and 3) adult models that are equipped with motors up to 1,000 cc and weight up to 800 lbs (363 kg) (GAO, 2010). The smallest ATVs designed for youth with 50 cc motors are 31.5 inches (80 cm) wide and 48 inches (121 cm) long (Huntley, 2018). While the largest adult sized units 1000 cc ranged from 84 to 95 inches (213 – 241 cm) long and 46 to 48 inches (116-121 cm) wide (Huntley, 2018) and may reach speeds of 80 mph (129 kph) (CPSC, 2019). The conclusion is that size does matter and youth should not ride adult sized vehicles (CPSC, 2019; GAO, 2010).

The newer UTVs are generally larger and heavier than their ATV or quadbike predecessors and most commonly range from 1200 to 2000 lbs (544 - 907 kg), are up to 60 inches (152 cm) in width and 160 inches (406 cm) long (Huntley, 2018). The added width and length gives the UTV design greater stability compared to the narrower ATV. The narrower ATVs with its elevated seat height plus the rider raises the center of gravity of the vehicle. The higher center of gravity makes the vehicle susceptible to roll over events caused by high lateral load transfer forces when turning sharply and/or operating on paved roads due to enhanced friction coefficient between the tire and road (Bouton, Roland, Benoit, and Berducat, 2008). The ROVs of both types were not designed for use on paved roads; yet, they have been allowed on many community roads in over 30 states (ASI, 2019; Consumer Federation of America (CFA), 2019; GAO, 2010).

The ROVs were and are designed for off road use (CFA, 2019; GAO, 2010). Rugged and irregular terrain presents a variety of hazards and risks that may include steep hills and valleys, changing elevation, restricted visibility, obstacles, gullies, sand, mud and water, as well as dynamic ranges of temperature from extreme cold to high heat. In addition to environmental factors the machines themselves are capable of creating high levels of noise that may cause noise induced hearing loss with extended and unprotected exposure (Milosavljevic, McBride, Bagheri, Vasiljev, Mani, Carman, and Rehn, 2011) as well as vibration related injuries (Milosavljevic, Bagheri, Vasiljev, McBride, and Rehn, 2012). In reality, very little is known about the dynamic interactive risk that is associated with ROVs (Neves, Brazile and Gilkey, 2018).

### Interventions

### **Rider/Driver Training**

The major approach to ROV safety has focused on enhancing rider knowledge, skills and abilities to reduce operator error. The ASI has traditionally provided the most popular training and educational model for ATV safety driven by the CSPC settlement decree (GAO, 2010). The ROHVA provides an equivalent basic DriverCourseTM for UTV safe operation. The five-hour, hands-on RiderCourse<sup>TM</sup> provides interactive, real experiential training for ATV users. The parallel course from ROHVA follows a similar curriculum for the UTV users. The training curriculums include instruction on appropriate clothing, personal protective equipment, pre-ride check, starting, stopping, climbing up hill, down hill and across hill, managing obstacles, respecting the environment and obeying laws (SVIA, 2010).

The ROHVA course includes additional skills such as backing up, safety tools, safety systems, unit dimensions, approach angle, departure angle, ramp angle, knowing your ROV drivetrain, rocky, muddy and/or sandy terrain, driving near trees and water crossings (ROVHA, 2017). Additional education and training are available from a variety of consumer and educational organizations. One such example is ATV Tip Sheets developed from collaboration between the High Plains Intermountain Center for Agricultural Health and Safety (HICAHS) and the Montana State University Extension system (Lagerstrom, Hibiske, Gilkey, and Rosecrance, 2015). In this case study, the investigators worked with three rural communities in eastern MT to develop educational materials aimed at increasing awareness of risks and hazards associated with ATV use in agriculture. The Tip Sheets focused on safe operations of ATVs while performing common ranch and farm tasks such as herding/mustering cattle, mending fences, spraying weeds and for general transportation. Another project resulted in online training made available through a partnership with HICAHS and the Mountain and Plains Education and Research Center (MAP ERC, n.d.). Most recently the HICAHS supported the training and certification of six MT Weed Control Association members so that they could train their pesticide applicators on the ROHVA BasicDriverTM course as well as offering training to other UTV users. Additional training is planned for the fall of 2019.

### Engineering

Engineering modifications for increased safety stalled in 2014 with failure of proposed CPSC standards intended to further protect drivers and occupants of UTVs (CPSC, 2014). This new standard included enhanced lateral stability and vehicle handling requirements that specified a minimum level of rollover resistance and required that the units exhibit sublimit understeer characteristics. In addition, the rule required occupant retention requirements that would limit ejection of driver and passengers. The ROV would be required to have a passive anti ejection system such as netting to prevent occupants from being thrown out of the ROV in the event of a rollover. The CPSC also proposed a lower maximum speed of 15 mph (24 kph) without seat belts fastened. In addition, the rule required that all decals, placards and safety information be clearly visible to users.

There was fierce opposition to the proposed 2014 rule from manufacturers, distributors and select user groups. The transition of ATVs from their original three-wheel design to four wheels and then to UTV has been entirely through engineering evolution (CPSC, 2014; GAO, 2010). The most significant advances were made in the creation of roll cages to ensure a survival space in the event of vehicle rollovers. The new UTVs are equipped with safety systems including seat belt restraints, passenger handholds and speed interlock if the seatbelts are not fastened (25 mph or 40 kph) in addition to rollover protection cage (ROHVA, 2017).

After market rollover protection devices (RPDs) or crush protection devices (CPDs) are available for ATVs such as the quadbarTM that may reduce fatality as much as 50% (Myers, 2016). Testing demonstrated the effectiveness of the CPDs through the creation of a survival space in the event of an ATV rollover (Myers, 2016). The quadbar and other CPDs are very popular in Australia and New Zealand and more recently have caught on in Canada (Neves, Brazile and Gilkey, 2018).

Advocates for safety support the retrofitting of ATVs in the US through a rebate program similar to that offered in Australia (Meyer, 2016). In 2019, the Worksafe New Zealand Agency issued a policy clarification that clearly stated the expectation for

ATV/quadbikes to be outfitted with CPDs (Worksafe NZ, 2019a). The implication being was that CPDs are required and that injury or fatality associated with quadbikes that had no devices opened employer/owner to resulting liability from accident (Worksafe NZ, 2019b).

### Laws

State laws may vary greatly between states, counties and cities (ASI, 2016). In 2017, 23 states allowed ROVs significant access to community roads (Friedman, 2017) and another 12 allow limited access (CFA, 2019). Some states required licensing of ROVs but did not allow them to be used on community roads (SVIA, 2016). Other states license them similar to cars and trucks, allow limited or full access to community roads, and require a driver's license and/or safety certificate for operators (CFA, 2019; Huntley, 2019). Access privileges may be controlled at county or municipal levels. Many communities have allowed access based upon citizen requests despite the warnings from experts and safety coalitions (Weintraub and Best, 2014; Freidman, 2017).

Some states required helmet use for youth but not adults, restrict night use, required age limits for operators, prohibited passenger transport, ROV classification based upon size, weight and/ or motor displacement and other parameters (ASI, 2016). For example, Wyoming had minimal regulation pertaining to ROVs limiting operation on community roads but allowed exception for the agricultural sector (ASI, 2016). Whereas, California had requirements for registration with the Department of Motor Vehicles, operator age limit of greater than 14 years unless supervised by an adult or rider holds a safety certificate and is restricted from night use, limited noise levels, helmet requirements on public lands, no passenger transport unless the unit is designed for more than one rider, and prohibits operation on paved roads riding unless crossing the roadway. Montana law required that ROVs are registered and licensed similar to automobiles and trucks and may share the roadways in most communities. Noise levels must be reduced to below 96 dBA and vehicles must be equipped with spark arrestors (Huntley, 2019). Operators may include children ages 12 to 16 years that possess a safety certificate. Between 2004 and 2014 the number of states allowed some access to roads increased by 26% from 22 to 35 states. The trend for increasing access to paved roads continues and is predominately delegated to local communities (Weintraub and Best, 2014).

### **Discussion and Conclusion**

The retail market trends suggest that ROVs are expanding in popularity both nationally and internationally (Allied Market Research, 2019). Both types of ROVs have found increased uses for occupational purposes due to their cost efficient applications (Lagerstrom, Gilkey, Elenbaas, and Rosecrance, 2015). When conducting research in Montana with ranchers, they were quick to state, the ATV was less expensive than a pickup truck and less hassle than a horse and, thus were overtaking activities commonly performed on horseback (Lagerstrom, Hibeske, Gilkey and Rosecrance, 2015). Recreational use continues to be the major application for many users with 78% of riders and drivers seeking a fun time blazing trails, exploring countryside, camping, racing and more (ASI, 2018).

The major approach to ROV safety continues to be training and education of the rider and/or driver (Neves, Brazile and Gilkey, 2018). The industry sponsored basic Rider Course and Driver Course are the current models believed to make a difference in reducing risks through enhanced rider and driver knowledge, skills and abilities. The hands-on nature of both courses provides interactive and kinesthetic learning. Vehicle operators quickly learn that their decisions and actions may significantly increase or decrease their risk for loss of control events and related injury. Further research is needed to determine effectiveness of training and education Neves, Brazile and Gilkey, 2018).

While engineering advances brought the once three-wheeled vehicle to four, the newest UTV design resembles the jeep or auto with bench or bucket seats, steering wheel, foot controls and integrated safety systems. The UTV style ROV is out selling the quadbikes/ATVs by a two to one margin (Allied Market Research, 2019; Hartfiel, 2016). Users are demonstrating their preference for the wider, more stable vehicles with roll cage protection and complete safety systems that are built into the vehicle. Data are being gathered from many sources that appear to validate the added safety of UTVs over ATVS with an estimated fatality ratio of approximately 1:4 (CFA, 2019; CPSC, 2019). One might conclude the UTVs are four times safer than ATVs or quadbikes but, the data are yet to provide the convincing evidence. Investigations to evaluate vehicle crashworthiness supports this assertion (Grzebieta, Rechnitzer, McIntosh, Mitchell, Patton, Simmons, 2015) and continues.

A great deal of high quality research on ROV safety has been performed in Australia and New Zealand leading to a novel system for vehicle rating ROVs based upon their intended use (Grzebieta, Rechnitzer, McIntosh, Mitchell, Patton, Simmons, 2015). The ATV or quadbike and UTV or side-by-side, "Vehicle Star Rating" (VSR) system, was developed by scientists and engineers working in the Transport And Road Safety (TARS) research center at the University of New South Wales. The research team crash tested ROVs under various conditions to assess the probability for operator survival. The team reported that, "The Star Rating system is intended to provide 'a safety rating' in that vehicles with higher star ratings will represent a lower risk of rollover and subsequent potential injury in the event of a rollover incident in the workplace environment based on the best currently available information" (Grzebieta, Rechnitzer, McIntosh, Mitchell, Patton, and Simmons, 2015, page 3). The VSR assigned 0-5 stars based upon the following criteria (Grzebieta, Rechnitzer, McIntosh, Mitchell, Patton, and Simmons, 2015, page 5-26):

- Zero Stars: No survival space, high impact forces in rollover tests, high static load and difficult to displace vehicle manually. Score based on an initial static measurement of survival space and decision regarding laboratory rollover tests based on available survival space and vehicle mass.
- **One Star**: A defined survival space, reduced impact forces in rollover tests compared to zero star, static load that can be tolerated for longer period and ability of specified proportion of population to displace vehicle manually. Score based on measurement of survival space and dynamic impact forces no Anthropomorphic Test Device (ATD).
- **Two Stars**: More improvement in measures of survival space, impact forces, static load and manual displacement of vehicle. This might represent the limit for quadbikes in their current form. A quadbike with some form of 'crush or operator protection device (CPD/OPD)' might achieve a two star rating.
- **Three Stars**: For vehicles with a CPDs meeting an agreed standard (which assesses strength) plus three point seat belts and a suitable internal survival space may be awarded three stars through inspection and static measurements. This would most likely apply to a side-by-side vehicle with CPDs.

- **Four Stars**: A three star vehicle could be submitted for rating to four or five stars. Additional star rating would be achieved through a specified performance with respect to ATD parameters and ATD containment in frontal and side sled tests.
- **Five Stars**: The five star vehicle offers superior performance in sled tests with respect to four stars and might include an inversion test".

Creators of the VSR strived to reduce ROV related injury and fatality by properly classifying vehicle safety based upon intended use. The VSR applies to both the workplace and recreational environments thus increasing the number of informed consumer choices in the selection of appropriate vehicles for a user's job or recreational needs. The TARS team also believes that the VSR will create competition among vehicle manufacturers to improve safety design and seek higher ratings through enhanced design and technological changes and reduce the training and education burden currently on the operator. The VSR system may impact policy makers internationally and in the US to strengthen the 'fit for use' concept with laws that dictate vehicle selection based on matching riders/drivers, safety features with intended use.

The ROV legal landscape has been changing in favor of increased access to public lands, private property and community roadways (CFA, 2019; Weintraub and Best, 2014). The US allows states, counties and municipalities the right to decide if ROVs are welcome on roadways. Laws vary greatly between and even within states and must be evaluated frequently for change. Living in MT, this author has observed ROVs on community roads daily in contrast to most California cities that restrict ROV use to off-highway use only.

The SPVIA is a strong industry and user group supported organization that fights to preserve and expand the rights of ROV owners and users at all costs. While epidemiologists, injury specialists, clinicians, academics and survivor groups fight to strengthen restrictions on use, the battle seems to show little success in blocking expansion to roadways. The most effective laws have been aimed at protecting youth < 16 years of age. The future is certain to reveal more data on injury and fatality experience and market reaction to choices and applications. The potential impact of the VSR has many excited for a universal system that may enhance safety for all ROV users. ■

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# New Employees in the Workplace: a Review Highlighting the Effectiveness of the Social Cognitive Theory and Old Employees in Enhancing Organizational Culture

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### Abstract

All organizations have a certain culture that is unique to their industry or business. The type of culture it is depends on the organization's values, social norms and beliefs of the employees that are already make up the organization (Thakur, Deepak, 2010. The purpose of this article is to highlight how organizations can make the most use of their older employees by culture delivery and how they can use the social cognitive theory to their advantage when

### Keywords

New employees, Organizational learning, social cognitive theory, Social cognitive theory on new employees, Organizational culture, Role of experienced employees in organizational culture, New employee positive orientation

### Introduction

All organizations have a certain culture that is unique to their industry or business (Thakur, 2010). The type of culture it is depends on the values, social norms and beliefs of the employees that already make up the organization (Thakur, 2010). For new employees this culture can be widely different to previous organizations that they have worked for in the past which makes the first day of any job a daunting process (O'Kelley, 2019). Organizations make use of this culture by employing a tactic called Organizational learning, where most of the learning actually comes from peers and work colleagues instead of formally by the organization (Thakur, 2010). This makes new employees feel welcome in the process and builds rapport with fellow peers (Thakur, 2010). Organizations try to enforce this particular workplace behavior and culture to maximize safety and efficiency which can make an organization more profitable and have less injuries (Raz et al, 2006). This article will be exploring the relationship between positive employee orientation and the social cognitive theory on new employees in the workplace.

### Methodology

This article's resources were found primarily through the Curtin University Library website on a database called ProQuest. The searches were conducted by using the basic search function on Proquest and selecting the "Peer review" button to highlight only articles from quality sources using the keywords listed above. The data was refined to only include scholarly journals from the years 1998 to 2019.

A search that was made on ProQuest using the keywords "Positives of organizational learning" highlighted 156,523 results. Not all these results were relevant however so a further search was conducted adding "new employees" onto the end of my previous search. This returned 74,084 results and were much more relevant to my chosen topic. This process was repeated for all my other keywords in ProQuest. As a result of this search I have accrued, In total 20 scholarly journals for my literature based review. It was difficult to find high quality literature that was applicable to new employees in the workplace. Most of the scholarly journals found were more focused on management than actual employees, and to find articles that relate specifically to 'new' employees was a very difficult task due to the lack of information and studies available.

### Positives of Organizational learning

Organizational learning has been defined as "Organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is free, and where people are continually learning how to learn together" (Meenu, 2013). Many studies have linked that having a strong workplace culture is correlated with having greater organizational performance among employees, and having cultural compatibility was just as important in situations where two organizations merged (Fortado et al, 2012). Organizational learning effectiveness is dependent on the three main factors, cognitive, behavioral and social (Turi, Jamshid, et al, 2019). These factors are independent and are constantly changing from the introduction of new employees and experienced older employees which have the biggest influence on workplace culture (Turi, Jamshid Ali, et al, 2019). Organizational learning is present in every workplace, whether developed or developing, it can have a very large influence on workplace performance and employee content within the organization (Meenu, 2013). Organizational learning is an organization's construct and may have been created willingly or unwillingly by the organization through the employees they have hired and the policies and core values they have enacted (Teare, & Dealtry, 1998). The main benefactor of organizational learning is the alignment of goals within all levels of employees to achieve the organization's mission (Simons, et al, 2003). This makes it easier for Organizations to try to get a competitive edge in today's modern world, if an organization wants to keep pace with other businesses in an environment where they are constantly exposed to new challenges and opportunities then adaptation is key (Meenu, 2013).

New employees are very similar to that of a new organization, in both scenarios there is productivity, efficiency, reliability and quality of work produced (Popper. & Lipshitz, R, 1998). At the start of a new employees work life there is going to be very little in each of these areas as the worker has no experience yet in the field just like an organization (Argote, et al, 2011). A learning curve is used to describe this change and adaptation from an employee who knows very little, and produces very little to an employee who is high performing and experienced (Parent, & Lovelace, K, J, 2018). If an organization is already developed and has experienced people in their employment then they will positively impact the learning curve of the new employees by allowing them to get up- to speed more quickly (Argote, et al, 2011). In new organizations it is often a struggle to attain good performance for the first few years due to the lack of organizational learning and experienced employees as the employees are often seen as a mechanism for knowledge transfer among ranks (Argote et al, 2011).

Social cognitive theory and its influence on New Employees The Social cognitive theory is built up on over 100,000 years of human evolution were humans would communicate to others by observation and behaviors, not just talking (O'Kelley, 2019). Humans when first meeting someone outside of their tribe for the first time would experience a language and cultural barrier as how they were raised and the people they observed would be vastly different to the other human (O'Kelley, 2019). This is the same for when a new employee enters a workplace that they are unfamiliar with, as there is a different cultural barrier and also many undisclosed formalities that were not discussed to them in the induction and interview process (O, Kelley, 2019). Firstly, the new employee will try their best to be accepted by other peers and colleagues, This will be done by trying to conform their behavior to that of employees who are more experienced (O, Kelley, 2019).

The social learning theory or cognitive theory is identified as one of the five adult learning theories and is used for organizational behavior management and learning for new employees (Gibson, 2004). The theory has been applied to various management functions such as training, job performance and employee selection that occur in an organization (Mulvaney, 2011). The social learning and social cognitive theory is built up by four main processes, Attention, Retention, Behavior production and Motivation which all work together to encompass a learning response in the new employee (Gibson, 2004). Attention is the most important component, where a new employee will notice an experienced employee and try to observe their behavior, this type of observation is usually focused on employees who are reputable and serve as a model to other employees, with observation being voluntary or involuntary (Gibson, 2004). While retention involves being able to remember the modelled behavior and behavior production is being able to reproduce that behavior that they observed from another employee (Gibson, 2004). Once these three components have been completed, the final factor, motivation can occur (Gibson, 2004). Motivation completes the cycle and lets other new employees observe your behavior which will then motivate them to undergo a behavior change (Gibson, 2004). Organizations make use of this social cognitive theory to benefit their own workplace culture with the means of hiring or promoting employees who can serve as a role model and motivate other employees to be more like them to achieve better work performance (Gibson, 2004). It can also be used to enhance safety culture, as promoting employees who wear their PPE and follow workplace procedures can make others follow suit (O, Kelley, 2019). This is why it is important to have employees in an organization that have been there for a while and can reflect their own behavior onto the new employees, This also makes the employee feel more comfortable as well due to working alongside someone who is experienced (Allard, 2010).

### Benefits of a positive employee orientation

It is an often-overseen aspect of any new employee introduction into a workplace, many organizations don't place as much emphasis on the orientation phase then they should (Wieland, & Flavel, 2015). A study of the relationship between a positive employee orientation and financial performance found that having a higher quality, positive employee orientation can lead to better financial performance in the long-run as it benefits various employee related factors (Ramsey,(1998) & (Wieland, & Flavel, 2015). Factors such as, increased trust, loyalty, motivation, lower absenteeism and employee turnovers (Wieland, & Flavel, 2015). These factors are shown to be very beneficial to financial performance as shown in multiple studies conducted by (Berrone et al, 2007) & (Bussy and suprawan 2012). Benefits have also been shown in market value, with the top "100 best companies to work for in America," having a high degree of positive employee orientation (Wieland, & Flavel, 2015).

An employee entering a new workplace that is unfamiliar to them is a stressful process for both the employer and the employee (Wallace, 2009). Designing an effective program for employee orientation can ease the stress on both parties and can also make the employee a more effective member of the team (Wallace, 2009). One way to make an effective employee orientation program is to immerse the new employees into the organization's culture and by encouraging group meetings, one on one conversations and group activities (Wallace, 2009). Other methods include having a tour of the building where the employee will be working and inviting them to lunch (Wallace, 2009). All these scenarios can provide the employee with a sense of belonging and make them feel part of the team (Wallace, 2009). It also helps boost attention in social cognitive learning and let the employee see who may make a good role model for the employee to base their behavior on (Gibson, 2004). But having a successful development of a new employee into a high performing asset to the team requires more than just good program design (Friedman, 2006). Multiple elements are needed for an employee to be an effective team member, such as organizational learning and the creation of core values that employees are to follow (O'Kelley, 2019).

### Role of old employees in culture delivery

(As discussed before in this article) Each organisation has its own unique culture and that culture is primarily based around its own employees (Thakur, 2010). Old employees are employees that have worked in the organization for long enough to understand certain aspects about the company that newcomers would have to learn on the job (Thakur, 2010). Old employees are the bread and butter of any organization and serve as knowledge and cultural transfer points for new employees and are beneficial to the organization to help promote positive social cognitive learning and organizational learning (Thakur, 2010). With new Employees, management attempts to assert their own culture through orientation programs, policies, goals and their rules (Wallace, 2009). These formal channels of communicating organizational culture to newcomers is positive and beneficial but the best approach is the informal approach through employees who aren't in management and have been in the organization for so long that they can give advice and personal opinions (Thakur, 2010). This method of organizational culture delivery is the most effective method but workplace culture can not just be delivered by a single source but by a framework that all works together to deliver one message to the new employee (Thakur, 2010).

During the early stages of employee employment, old employees serve as a hub for organizational awareness and culture (Thakur, 2010). Old employees try to reflect their own organizations values onto new employees and filtering out stuff that may be confusing that upper management may have said in the induction while still retaining the organization's core values (Thakur, 2010). This is very beneficial as upper management of organizations have moderate to very little knowledge of what actually occurs in the workplace since they are responsible for other areas, older employees in this regard can serve as a sort of informal trainer to new employees and can educate them as they've been in their situation before (Thakur, 2010).

### Conclusion

Overall, there are many factors for an employer to take into account when trying to introduce a new employee to their organization. With positive employee orientation, formal and informal introductions and promoting good workplace behavior an effective and high performing organizational culture can be created to increase workplace performance and employee satisfaction. It is important for any forward thinking organization that has the intention of improving with the modern world that they remember the key concepts of organizational learning and enact those concepts in their own culture. All these elements are what makes a successful employee integration into an organization a smooth process, with the new employee being able to adapt more quickly and the employer not having to put as much effort into training since your culture and old employees do most of the work for you.

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### Study of Behavior Based Safety to Improve Safety Performance. A Case study in MontD'Or Oil Tungkal Ltd Indonesia

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### Abstract

The main objectives of this study were to look at a behavioral based safety program, safe behavior and safety performance. Research was conducted on all MontDor Oil Tungkal Ltd employees located in Tebo, Jambi. The number of respondents in this study were 200 people composed of staff, non-staff and contractor employees engaged in oil well maintenance and drilling of new oil wells. The data collection was done by distributing questionnaires. Completed questionnaires were analyzed using SEM AMOS analysis. Study results showed that the behavioral based safety program interrelated with employee behavior and that employees' safe behavior significantly affected the company's safety performance.

**Keywords**: Behavior Based Safety. Safe Behavior. Company's Safety Performance.

### 1. Introduction

Safe behavior is a concept to be implemented as an effort to prevent accidents at the workplace. The concept of safe behavior has help the companies to reduce the occurrence of work related accidents significantly. Published research results on research that had been carried out during the past decade identified that implementing behavior based safety programs improved workplace safety in several industries as the rate of accidents at the workplace decreased around 40-75% in the first 6 (six) to 12 (twelve) months, (Cooter & Luckin, 1997; Anderson, 2005). The key to successful behavior based safety programs at workplaces has been identified as a commitment to take Occupational Health and Safety (K3) actions compulsively (continuously) while the activity is still running, as stated by Ramli (2013) that Occupational Health and Safety (K3) research must be carried out holistically for all activities at the workplace and must be planned according to a conceptual approach.

Generally accidents occurred due to unsafe behavior. Unsafe behavior at a workplace is a determinant factor that causes about 80- 95% of work related accidents (Cooper, 2009). The results of research conducted by DuPont in 2002, research by Ericsson, and Mathewson in 1995 had similar findings to Cooper (2009). DuPont's (2002) research, conducted in Mexico, identified that 96% of accidents were triggered by unsafe behavior. The accident ratio theory is that for every serious accident there are previously 29 minor injuries and 300 incidents that were either unsafe acts or near misses (Heinrich, 1931 cited by Radvanska, 2010). A near miss accident is classified as unsafe behavior or risky behavior (Bird & Germain, 1990). In 1969 Frank Bird analyzed 1,753.498 work related accidents from 21 different industrial groups and this analysis identified that for each 600 incidents, there were 30 accidents, 10 serious accidents and one fatality (Radvanska, 2010). Khasanah, Kholil and Sugiarto (2019) stated that leadership and culture significantly affect safety performance.

A report released by the International Labor Organization (ILO) in 2013 stated that every year there were no less than 250 million accidents that caused 160 million worker illnesses and that

1.2 million workers died due to work related accidents and illness. In 2019 the ILO reported that there were more than 2.78 million work related deaths and 374 million non-fatal work related injuries each year. The number of accidents in Indonesia reached 40 fatality / 100,000 workers. Based on ILO (2013) statistics the losses to be borne due to accidents in the developing countries are high, reaching 4% of the country's Gross National Product. Data and facts released by the relevant authorities in Indonesia (Kurniawan, Kholil and Sugiarto, 2019) show that number of work accidents in Indonesia is still relatively high. Data released by BPJS Employment (2016) shows that the number of work accident cases in Indonesia, each year, tends to decrease. In 2015 there were 110.285 cases of accidents, while 105.182 cases were recorded in 2016 (Khasanah, Kholil & Sugiarto, 2019). Based on this data, for 2015-2016 accident rates decreased by 4.6%. Between the 1st of January 2017 and August 2017 there were 80,392 accidents in Indonesia (Ramli, 2019).

Behavior Based Safety (BBS) is used as a proactive work accident prevention effort in which the emphasis is on prevention, doing whatever is required to make or ensure an accident will never occur in the workplace. Proactive responses to work safety and health occur before an accident occurs and this response anticipates and prevents work accidents (Ramli, 2013). By emphasizing accident prevention, management sends a message of concern to all employees (Astuti, 2010). While Ramli (2013) stated that proactive strategies are always cheaper than reactive strategies because companies make investments that will produce high returns and be profitable, and a reactive safety program always costs more than a proactive program because the program will not be implemented until the injury or illness occurs. When management emphasizes a reactive approach to safety and health, there are two negative messages aimed at employees; first the company doesn't care about workers, and secondly it's all about money (what we care about is money), not for your safety (OSHA 3132, 2000).

MontD'Or Oil Tungkal Ltd is one of the contractors under control by SKKMigas as an oil and gas production operator in Indonesia. This company has operated from December 2010 to the present. The company head office is located at Tungkal Block in Indonesia. At present there are two field locations with production status. The first location is at Mengoepeh Village, Tengah Ilir District, Tebo Regency, Jambi Province with 33 (thirty three) wells being drilled. The second location is at the Pematang Lantih Field with 6 (six ) wells that have been drilled. The production average of both locations is  $\pm$  1200 BOPD (Barrel Oil per day). Company's operational activities are finding, managing, processing and distributing highly flammable Crude Oil. If a few errors occur it will cause enormous losses for company therefore, an effective comprehensive handling of occupational safety and health is needed, from exploration (Drilling), collection, production and up to distribution.

At the beginning company's operations for several years the number of accidents were quite high and several accidents had occurred that highly affected employees and the company's operational costs. Transportation accidents (motor vehicle incidents), large oil spills exceeding 15 Bbls and several accident cases impacted of company's safety performance. Following these events the company developed a commitment to reducing the number of accidents to zero incidents during the company's operations. Various programs for raising awareness about safety were continuously improved and evaluated, including programs that were focused on creating safe work related behavior in workers. It was expected that by focusing on increasing awareness of workers' safe behavior, accidents and even incidents can be prevented. One program that focuses on creating safe behavior in employees is the Behavior Based Safety (BBS) program with implementation of SOC card program (safety observation card), where each employee required to conducted observation of safe and unsafe conditions or behavior and documented into SOC cards. This program will be continuously evaluated and implemented so that what is expected by the company through this program can be achieved.

### 2. Literature Review

Safety culture is an evolution effect related to the safety management system and understanding about the causes of accidents (Kurniawan, Kholil and Sugiarto, 2019; Ramli, 2013). The theory of accident causes has developed through several stages with the aim of identifying root causes of system failure. The first stage occurred between 1940 and 1960. It focused on repairing machinery and hardware. Because of the rapid development of new machines, most accidents were caused by mechanical malfunctions (Cooter & Luckin, 1997). The second stage; occurred between 1960 and 1980 with a focus on human factors, because employees were seen as the weakest link in the work system (Gordon, Flin, Mearns, & Fleming, 1996). The third stage considered the interaction of human and technical factors (Cooter & Luckin, 1997). The latest stage considers organizational culture as an influential factor, (Anderson, 2005; Cooter & Luckin, 1997).

By improving the safety culture consistently and continuously, integrated safety management that has been established by the organization will be carried out effectively, because attitudes and safety behaviors of each individual at all levels have been built to create a strong safety culture (Ramli, 2013). To make improvements, efforts to self-awareness of safety habits are needed by all employees, including top management. Safety habits begin to be planted by socializing as learning about safety values, which are expected to form the desired safe behavior (Heni, 2011).

A simple sequential accident model represents presumption that accidents are culmination of a series of events that occur specific and recognizable and currently represent the most common and earliest accident research model that describes the temporal sequence which accident is a whole description of series of events decisions and situations that culminate injury or damage. The first sequential accident model was the Domino Effect developed by Heinrich (Heinrich, 1931). This model was based on the assumption that the occurrence of preventable injuries was the natural peak of series of events or circumstances, which always occur in a fixed or logical sequence. Based on the domino model, accidents can be prevented by removing one of factors and disrupting the knockdown effect. Unsafe actions and mechanical or physical hazards were identified by Heinrich as the main factors in the accidents sequence. Removing these factors was presumed to make previous factors ineffective. Heinrich called accidents man failure, as man was identified to cause most of the accidents. Based on his analysis of 75,000 insurance claims, all submitted by employers who generally took no responsibility for accident causes and blamed their employees for causing the accidents, about 88% of accidents were caused by unsafe acts, 10% were caused by unsafe mechanical or physical conditions and the last 2% were documented by employers as being due to other causes. This was the first accident sequence theory published and became the basis from which other accident theories were developed.

A further of sequential domino representation was developed by Frank E. Bird, Jr. & George L. Germain (1990). In the book entitled Practical Loss Control Leadership, Bird & Germain (1990) confirmed that Heinrich's Domino sequence had supported safety thinking for more than 30 years. They recognized the need for management to prevent and control accidents due to technological advances and the fact that management had control of the workplace, work processes and organizational matters. Bird & Germain (1990) developed another domino model which included the relationship between management, accident causes and the existence of multiple linear interactions from the cause and effect sequence.

Safe behavior has become one of the things that has been of concern to many global companies since 1980 (Anderson, 2005; Cooper, 2009). The concept of safe behavior is the systematic application of psychological research on human behavior in terms of safety at workplace. Safe behavior puts emphasizes on aspects of human behavior towards accidents at work (Cooper, 2009) According to Heinrich et al (1980, p.34) safe behavior is a symptom of good management policies, good control of work, sufficient knowledge of work, proper assessment of existing hazards, or other personal factors. According Pratiwi and Hidayat (2014), safe behavior is behavior that cannot cause accidents or incidents. Zhou and Jiang (2015, p.5015) in their research report explained employees' safe behavior is feedback from employees to management of the safety efforts made by the company. Safe behavior is determined by the knowledge and abilities of correct behavior and the motivation of individuals to perform these behaviors (Neal et al, 2000, p.101). Safe behavior can be divided into 2 (two) types. (1) Compliance with safety and (2) participation in safety.

Compliance with safety includes the behavior of following safety procedures and carrying out work in a safe manner. Whereas participation in safety includes helping coworkers, promoting safety programs at their workplace and trying to improve workplace safety (Neal et al, 2000, p.101).

Geller (2001), in his book The Psychology of Safety Handbook, describes the importance of the behavioral based safety approach at the workplace, both from a reactive and proactive perspective and grouping behavior into risk behavior and safe behavior. Loss can be traced and seen by the existence of a risk behavior. The achievement of work success, can be done with a proactive approach built by safe behavior (Geller, 2001). Risk behavior needs reduced and safe behavior needs increased so that losses at workplace due to accidents can be avoided and work safety efforts can run optimally. The key to success in behavioral safety process is presence of good cooperation in planning of program implementation and participation of each worker as part of the team. (Cooper, 2007)

In the industrial world, varied programs can be implemented or modified to improve safety and safe behavior change efforts. One of programs that can be implemented is SOC (Safety Observations Card) program. **Figure 1** shows the basic principle chart in behavior change, and implementation. Quoted and translated based on sources: The Keil Center, Offshore Technology Report (2001).

An organization or company must have a systematic approach to regularly measuring and monitoring safety performance, as an integral part of management system. The company needs to monitor and measure the following to determine safety performance and evaluate the effectiveness:

- The extent the legal requirements and applicable laws are met by the company including all joint agreements, standards and other requirements.
- Characteristics of activities and operations related to identified hazards, risks and opportunities;
- Progress in achieving company objectives of safety;
- Operational effectiveness and other control management.

Determination of criteria of safety performance assessment, must use appropriate indicators, with these indicators can be used to determine the performance level of each existing criteria. For example, if the criteria are incident comparisons, company can choose to look at the existing some indicators such frequency, type, severity or number of incidents. Organizations or companies must choose right method for monitoring, measuring, analyzing and evaluating performance to ensure valid results, deciding when monitoring and measurement will be carried out and when the results of monitoring and measurement will be analyzed, evaluated and communicated.

Indicators, measurements and monitoring of safety performance can be broadly differentiated into two measurement indicators; they are reactive and proactive (positive) indicators. Measurement of proactive safety performance includes:

• Assessment of compliance with legal and other requirements



**Figure 1**: Chart of basic principles in changing safe behavior and implementation (Modification of The Keil Center, Offshore Technology Report, 2001: p.19)

- Evaluation of effectiveness of Occupational Health & Safety (OHS) training
- Use of worker surveys to evaluate OHS culture and related worker satisfaction
- Completion of mandatory inspection schedule at the workplace and reporting all findings
- The extent to which the safety program has been implemented

- Effectiveness of consultation process and participation of workers in safety
- Monitoring the health of employees
- Events and rates of reported accidents and hazardous events.
- The rate of events resulting in loss time incidents rate (LTIR)
- Monitoring of employees health level
- Following up all findings concerning safety at the workplace

Organizations or companies must keep well-documented all information about workplace safety as evidence that the results of monitoring, measurement, analysis and evaluation and maintenance have been measured and verified properly.

The implementation of a Behavior Based Safety programs using Safety Observation Cards is an effort to improve safe behavior of worker. There are nine main features that have indicators of implementing safety observation programs. They are ownership, definition of safe / unsafe, training, observation, establishing baselines, reinforcement, feedback, goal-setting & review. The success of this program will affect safe behavior of workers and company safety performance. To ensure that every company operational activity runs safely to achieve the goals of the expected targets, requires employees who aware of safety and who create safe behavior at their workplace.



Figure 2: Measurement model of relations between variables (ISO, 2018:30)

The safe behavior of employees greatly contributes to improving safety performance. Therefore a program to improve Behavior Based Safety must be applied as effort to improve company safety performance.

### 3. Methodology

A study of the effects of implementing a Behaviour Based Safety program at the MontD'Or Oil Tungkal Ltd were evaluated. This study used a quantitative method, and was conducted as explanatory, confirmatory and associative research. A Quantitative approach was used to analyze research results, processes and answer research hypotheses. This research was explanatory because it aimed to examine research hypotheses with the intention of justifying or rejecting the hypothesis and to determine the relationship between one or more dependent variables with one or more independent variables. It is also associative research because this study connected two or more variables (Ginting & Situmorang, 2008). Research field work was conducted. Conclusions were developed based on the data analysis findings.

This study examined three variables: (1) The BBS (Behavior Based Safety) program; (2) safe behavior; and (3) safety performance. The Behavior Based Safety program questions consisted of nine indicators: ownership, definition of safe / unsafe, training, observation, establishing baselines, reinforcement, feedback, goal- setting & review. The safe behavior questions consists of three indicators: management safety, personal factors (personnel factors) and environmental factors. The safety performance questions consisted of two indicators: proactive and reactive.

The population of study were all employees at MontD'Or Oil Tungkal Ltd which included the production, maintenance & construction, transportation, catering, administration, security and drilling departments. The total number of employee was 370 employees and consisted of 37 staff employees, 67 non-staff employees and 266 contractor employees. The sample size was determined using the Slovin formula. The Slovin formula is a formula for calculating the minimum number of samples if the behavior of a population is not known with certainty (Amirin, 2011). The total population of worker was 370 personnel. The number of questionnaires issued was 200 questionnaires.

Secondary data collection techniques and primary data used in this study were as follows:

A. Literature Study

Literature study is a technique of collecting data by studying, quoting, and entering information and theories needed to uncover problems that are used as research objects and to formulate research concepts. Literature study refers to books, documents, and written material that is relevant to the needs and objectives of the study. Library study is initial activity of research and includes preliminary research carried out to prepare the research proposal.

B. Questionnaire Technique

The research questionnaire technique is method of collecting primary data from the respondents selected to be research participants. The research questionnaire was prepared by submitting a closed statement and choice of answers to be submitted to the research participants. With a Likert scale the preparation of the research questionnaire consisted of nine latent variable statements X1, three latent variable statements X2 and two latent variable statements Y1. From the operational description of each composed 14 items variables of statements were submitted to the respondents who became the study sample. The questionnaire used a Likert scale for respondent to record their answers. The Likert scale is bipolar scale method that measures both positive and negative responses of a statement. The scale of choice sometimes forces people to choose one option because "neutral" is not available.

C. Observation

Observation is direct observation activity conducted at the research locations. The locations were Mengoepeh and Pematang Lantih Jambi field work area. Observations were done by paying attention, studying and recording various important and/or relevant things to be observed.

Observation is direct observation activity conducted at the research locations. The locations were Mengoepeh and Pematang Lantih Jambi field work area. Observations were done by paying attention, studying and recording various important and/or relevant things to be observed. Obersvations included collecting secondary data from various documents and conduting informal dialogues with employees to explore interesting things to be used as input when discussing research results.

### **Secondary Data**

Secondary data uses employee training records, Standard Operating Procedure (SOP), safety behavior statistic monitoring, SOC card report data and Safety Performance Report statistics.

Primary data processing obtained from respondents used SEM (Structural Equation Models) to determine the relationships between latent variables. About this latent variable, Wijanto (2007, p.10) explains: "SEM, the key variables of concern are latent variables or latent constructs. Latent variables are abstract concepts, for example: people's behavior, attitudes, feelings and motivations. This latent variable can only be observed indirectly and imperfectly through effects on observed variables. SEM has two types of latent variables: exogenous and endogenous. SEM differentiates these two types of variables based on their participation as dependent variable on model equations. Exogenous variables always appear as independent variables in all model equations.

Based on the identification of problems, there are several hypotheses:

- H1: Behavior Based Safety (BBS) program interrelated with Safe Behavior.
- H2: Behavior Based Safety (BBS) program affects company Safety Performance.
- H3: Safe Behavior affects company.

### 4. Safety Performance

The calculation results show that the three hypotheses were met or accepted, meaning that there is a significant effect of independent variable to dependent variable, evidenced by the significance value below p = 0.001. The estimate value is the value of the dependent variable for each one-unit increase of independent variable and can be used to determine the direction of positive influence. The direction of positive influence means that a more increasing independent variable will increase the dependent variable. The results of calculations of hypothesis testing can be analyzed as follows:

a. *BBS (Behavior Based Safety) programs interrelated with safe behavior.* Estimation parameters for testing interplay between BBS (Behavior Based Safety) program and safe behavior variable obtained CR value of 7.484, estimated value 0.494 has a positive direction with probability of p <0.001. This value is significant at 5% significance level, thus H1 is accepted. It means that higher Behavior Based Safety (BBS) program will higher safe behavior, and



Figure 3: Path diagram analyzes of research results SEM model using AMOS software

otherwise. So, hypothesis 1 which states "BBS (Behavior Based Safety) program interplay with safe behavior." Accepted.

Programs that focus on creating safety behaviors for workers are Behavior Based Safety (BBS) programs. The purpose of the Behavior Based Safety (BBS) program is to form workers' safe behavior by familiarizing themselves with observing safe and unsafe conditions and safe and unsafe behavior so that workers will be accustomed to observing and eventually creating their own safe behavior in each of their work.

b. *BBS (Behavior Based Safety) program affects company safety performance*. Estimation parameters for testing relationship between BBS (Behavior Based Safety) program and safety performance variable obtained CR value of 4.343, estimated value of 0.575 has a positive direction with a probability of p <0.001. This value is significant at 5% significance level, thus H2 is accepted. It means that the higher Behavior Based Safety (BBS) program will higher safety performance. So, hypothesis 2 which states "BBS (Behavior Based Safety) program affects safety performance of the company" are accepted.

The Behavior Based Safety (BBS) program can affect safety performance (of the company reflected by ownership, definition of safe / unsafe, training, observation, establishing baselines, reinforcement, feedback, goal-setting & review. Of the nine indicators, ownership indicators are the most dominant indicator with highest average value of 3.82. The implementation of BBS programs using Safety Observation Cards is an effort to improve worker safe behavior. The success of this BBS program will affect safe behavior of workers and company safety performance.

c. Safe behavior affects company safety performance

Estimation parameters for testing safety behavior with safety performance variables obtained a CR value of 3.721, the estimated value of 0.570 has a positive direction with a probability of p < 0.001. This value is significant at 5% significance level, thus H3 is accepted. It means that safe behavior at workplace will higher safety performance. So, hypothesis 3 which states "Safe behavior influences company safety performance are accepted.

The key to success for creating safe behavior at the workplace is commitment to carry out compulsive (continuous) implementation of Occupational Safety and Health (OSH) while the activity is still ongoing. Ramli (2013) also emphasized that Occupational Health and Safety (OHS) efforts must be carried out holistically to all aspects of activities at workplace and must be carried out planned manner based on conceptual approach. In order to ensure that every operational activity of company runs safely to achieves company objectives, it requires employees who aware of safety at their workplace. The safe behavior of employees, greatly contributes to improving company safety performance. Programs to improve behavior based safety at the workplace must be performed.

Most companies only oriented towards improving safe behavior, but corporate organizational responsibility is also one of the most instrumental factors in improving safety performance. This finding agrees with research that shows BBS should not be used as the only determinant of success of the company's safety performance improvement but as part of program implementation in comprehensive OSH management system (Hopkins 2006; Anderson 2005; DeJoy 2005; Ramli 2013).

One program that focuses on create Behavior Based Safety (BBS) program is safety observation card program, where each employee is required to perform observations to safe and unsafe conditions or action at workplace also documented into SOC cards. This program will be evaluated and implemented so that it can be achieved. Therefore, programs to improve behavior-based safety are effective must be applied to efforts to establish safe behavior and effort to improve the safety performance of the company.

### 5. Conclusions

Based on results of analysis research data using SEM (Structural Equation Modeling) method use AMOS program, the following conclusions were obtained:

- The BBS (Behavior Based Safety) program was proven to significantly interrelate with safe behavior. With an estimated value of 0.494 there is a positive direction. This means that a higher BBS program will produce higher safe behavior.
- 2) The Behavior Based Safety (BBS) program was proven to have a significant effect on the safety performance of MontD'Or Oil Tungkal Ltd. The most dominant BBS (Behavior Based Safety) Program indicator was ownership with highest average value of 3.82.
- Safe behavior was proven to have a significant effect on safety performance at MontD'Or Oil Tungkal Ltd. The most dominant safe behavior indicators was personal factors with the highest average value of 3.87. ■

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### The Downfalls of Workers' Compensation and Return to Work Systems

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### Abstract

Workers' compensation (WC) and return to work (RTW) systems are embedded with an array of complications. This literature review aimed to summarise and explore the common themes, in order to make recommendations of how to overcome these issues. Difficulties were recognised within the WC processes; evidence was found of discrimination; limitations of the experience rating system were noted; and the RTW systems were investigated. Results indicated that employer actions can greatly influence these factors, and effective and supportive management is required to ensure the satisfaction of injured workers and reduce the costs association with WC claims.

### **Key Words:**

Workers' Compensation Limitations, Experience Rating, Barriers Return to Work, Discrimination, Safety Management

### Introduction

The systems involved in workers' compensation (WC) procedures are at the essential core of health and safety. Effective safety management can prevent incidents from occurring at work, thus lessening the number of claims and lost-time injuries. Safety management continues to play a vital role in the events after an injury, as an employer's actions can heavily influence the return to work (RTW) process.

Western Australia is currently under the Workers' Compensation and Injury Management Act 1981, which is a no-fault entitlement scheme aimed to compensate workers who suffer an injury, manage RTW systems, and resolve disputes (WorkCover WA, 2016). This Act protects workers' rights to safety in the workplace, with the no-fault system aimed to provide care and support regardless of how the injury occurred. The system has been very successful for many years in providing medical treatment and support to injured workers, yet throughout the literature, many limitations of WC and RTW processes have been recognised. Four main themes have been observed, including issues with the WC process, acts of discrimination, the downfalls of using the experience rating system, and the barriers of returning to the workforce.

### Methods

To find appropriate literature on this subject, a search on ProQuest was conducted, limited to full text, peer reviewed, English articles after 1990, using the key words "workers compensation", "limitations" and "experiences". This yielded 27,359 results and a total of twelve high quality articles were selected based on the relevance to the subject.

From these articles, a further four were selected from the reference lists.

To gain further perception of the subject in an Australian setting, a search was conducted on the Safe Work Australia website with the phrase "workers compensation statistics" to retrieve the most current statistic report. The Workcover WA website was searched using the key words "workers compensation", and two final searches were conducted on Comcare using the phrases "return to work" and "insurance premiums" to obtain further relevant information. A total of twenty one publications were reviewed, founded on the relativity of the topic. This included sixteen journal articles, and a further five government references.

### Limitations of the Workers' Compensation Process

Multiple issues within the WC system have been found that range from the difficulties of navigating the system, through to moral and legal dilemmas regarding employer and insurance company actions. Many studies have found that there is generally an overall positive consensus regarding the ease of claiming WC, yet there is still a large percentage of negative experiences (Guthrie & Jansz, 2006; Brines, Salazar, Graham & Pergola, 1999; Williams, 1991; Butler & Johnson, 2010).

A phenomenological study conducted by Guthrie and Jansz (2006), which interviewed women who experienced a workplace injury, found that many participants were not satisfied with the WC system. Some participants indicated that they thought the insurer acted in an unprofessional manner, was an obstruction to the process, and was sympathising with the employer. Participants indicated that there were delays with claims and payments, and in some cases, medical treatments were not paid for by the insurer. The respondents also indicated that in putting forward a claim, there were fears of appearing fraudulent or malingering.

A WC insurer's main goal is to make a profit, and when malingering or false claims occur, this can be very costly to the insurer (Tobe, 2013). A study conducted by Greve, Ord, Bianchini and Curtis (2009) indicated that between 20 and 50 percent of chronic pain claims were malingered. It can therefore be understood why insurance companies may be so stringent when dealing with claims, yet it can be intimidating and make the process difficult for genuinely injured workers.

Issues have also been recognised in the administrative process of filing and progressing a claim. The case may be prolonged and complicated due to communication through letters, slow decision- making, and lack of face-to-face contact (MacEachen, Kosny, Ferrier & Chambers, 2010). The amount of paperwork required to secure financial compensation can delay the process of returning to work (Brines et al., 1999). These administrative limitations can lead to the miscommunication between relevant parties, which can heavily alter the decision-making of a claim if information is not accurately presented. These information gaps can ultimately lead to mental and physical strain for the injured worker, especially if delays occur (MacEachen et al., 2010). Discrimination in Workers' Compensation Women in Australia account for 46 percent of the Australian workforce, yet in 2016-17, only 36 percent of serious claims were made by women (Safe Work Australia, 2017). Guthrie and Jansz (2006) found that women were more likely to have claims disputed or denied, less likely to return to the workforce, and would receive less compensation than men. A Swedish study also found that men had a higher probability than women of their claim being accepted for musculoskeletal and mental disorders (Leijon, Lindahl, Torén, Vingård & Josephson, 2014).

The discrepancy between the gender experience of WC should be studied further to understand the mechanisms responsible. There is a lot of stigmatisation involved in claiming WC. Workers often fear accusations of dishonesty, malingering, and hysteria; which may prevent them from declaring an injury. Allegations of hysteria and deceitfulness of an injury is significantly prevalent with injuries that affect women dominated work industries (Lippel, 1999). This indicates that some women who experience an injury may not declare it, through fear of embarrassment due to the culture and stigmatisation of WC.

Another reason that workers choose not to declare an injury is often through fear of repercussions in future job prospects. During the application process of a new job, often employers ask whether the applicant has received WC. A question such as this can be seen as evidence of intent to discriminate based on a disability (Harcourt, Lam & Harcourt, 2007).

Claims have been denied due to the perception of workers being untrustworthy because of their race, gender or class. These same factors can affect the medical opinion on whether the injury is work related, which too can lead to the denial of a claim (Lippel, 1999). Under-reporting of claims may be linked to worker vulnerability, which is also related to race, gender and class (Mansfield et al., 2012).

Clearly, a review on the WC system is necessary to determine the causes, events and effects of discrimination. Stricter legislation is required so that insurers, employers and other relevant parties cannot act on discrimination, and ensure equity and fairness in the WC process.

### **Issues with Experience Rating Systems**

The Australian WC System, much like schemes across the United States, New Zealand and Canada, have adopted experience ratings as a mechanism to encourage employers to adopt safety measures to prevent workplace injury and subsequent WC claims (Harcourt et al., 2007). The rate of an employer's insurance premium is based on their efficacy in preventing injury and promoting safe RTW processes (Comcare, 2019). This experience rating essentially means that organisations with higher than average claim levels ensue a penalty on top of their premium rate, whereas organisations with lower than average claim levels are rewarded a rebate (Harcourt et al., 2007).

The results of a Wisconsin study support the concept that the experience rating system inspires employers to improve safety and lower the number of WC claims (Barth, Klein & Krohm, 2008). Kralj (1994) found that companies subjected to this system were 17 to 20 percent more likely to report changes in their safety practices than those companies who had not. However, it has been argued that this improved safety performance and reduced rates of injury at workplaces may merely just be an illu-

sion, with employers instead focusing on accident claim costs rather than the prevention of incidents (Kralj, 1994).

A significant issue with the insurance experience rating, is that employers can manipulate the system in order to not incur costs. Employers have been known to appeal claims, suppress injury reporting, and pressure injured workers back to work, in attempt to lower experience rating costs (MacEachen et al., 2012). The insurer may deny a claim if the injury is not documented (Tobe, 2013). Workers who might fear job loss may continue to work, which can result in a more severe injury (MacEachen et al., 2010). This system also encourages employers to seek thirdparty contractors for high risk jobs, as a means to prevent extra costs if an incident were to occur MacEachen et al., 2012).

Many respondents, of a study on injured workers, reported fear of aggravation of an injury when returning to their regular job. This can be seen as evidence of employers not creating adequate job modification or pressuring injured workers to RTW, in an attempt to manipulate the experience rating system (Williams, 1991).

As an effect of experience ratings, employers may put the injured worker through invasive processes, unnecessary testing, and examinations by multiple health providers (Mansfield et al., 2012). Lippel (1999) suggests limiting the number of medical exams through legislation, to prevent unnecessary stress and invasion for the claimant.

### **Barriers of RTW**

Returning to work for some injured employers can prove extremely difficult, and a variety of factors can hinder the process. In an attempt to migrate from the traditional medicinal model, the biopsychosocial model has been implemented in the RTW process, to focus on individual specific factors, rather than just the injury (Comcare, 2017). The Heads of Worker's Compensation Authorities (HWCA) and Heads of Compulsory Third Party (HTPC) have adopted this model for injury management which comprises of:

- Biological factors: physical injury or condition, work activities, and mental capacity;
- Psychological factors: perceptions about work, beliefs and behaviours;
- Social factors: attitudes to disability, organisational culture, and support (HWCA & HTPC, 2011).

A study was completed to determine the perspectives of key stakeholders in regard to what influences a worker's RTW process. The results indicated that the assumed greatest effect on RTW were modifiable and psychosocial factors (Peters, Coppieters, Ross & Johnston, 2017). This implies that employer management can positively influence the RTW process, thus encouraging safe and beneficial progress.

Unfortunately, some employers may hinder the process through unjust and unsupportive actions. Poor relationships between the injured worker and the employer, including lack of communication and support, can increase the likelihood of the worker experiencing feelings of isolation, depression and anxiety (Comcare, 2017). Continual communication and personal support from the employer can greatly improve worker morale and promote feelings of inclusion, potentially influencing the worker to RTW earlier. The interactions between injured workers, health providers, and insurance companies were studied to understand the impact that they have on recovery. It was found that these interactions were made difficult due to organisational pressures and administrative demands, which could delay the RTW process and deter the injured worker from getting back to work. It has been recommended that increasing WC education and more efficient communication may promote participation of key stakeholders and improve worker recovery (Kilgour, Kosny, McKenzie & Collie, 2015).

A study by Williams (1991) gave insightful responses from injured workers who experienced a transition back to work following an injury. All those with negative responses to their RTW process did not rate their loyalty to the company after the injury as good or excellent. This indicates that commitment to an employer can be negatively influenced by a poor RTW process, and therefore worker morale and turn-over rates may too be affected if not managed appropriately. A prospective study by Butler and Johnson (2010) on injured workers with lower back pain, indicated that workers' satisfaction with the claim process significantly influences the recovery time and WC insurance costs. Higher satisfaction with treatment and employer care reduces recovery time, and up to 30 percent of claim costs. This study shows how employers can benefit from simply giving support to injured workers to improve satisfaction and reduce subsequent costs.

### Limitations

This literature review includes studies that were conducted in a range of countries. Each country has a different WC and health care system; therefore, the summary of these systematic downfalls is spanned across a variety of jurisdictions, not specifically to Western Australia. All WC systems studied assume the same no-fault scheme, yet further investigation is required if focusing on the limitations of WC in a specific region.

### **Recommendations and Conclusion**

Safety management can strongly influence a WC claim cost and the time for a worker to RTW. Effective injury prevention can reduce the number and severity of claims, and the way an employer manages the WC system influences the worker experience. Various issues in relation to the WC and RTW process have been identified.

Workers may avoid the WC process through fear of accusations of lying and malingering. Insurance companies add to this stigmatisation through the actions made when processing a claim. To make the system easier to navigate, communication and paperwork processes need to be updated.

Discrimination is prevalent within the WC system. Education and employer support are necessary to ensure equality for all workers. Legislative changes must be made to prevent acts of discrimination.

Efforts should be made to remove employer incentive to suppress and appeal claims, with stronger monitoring of unethical behaviours. The experience rating system may promote more harm than good, therefore further analysis should be conducted.

Employers can manage workers by giving support and communication, whilst not pressuring the RTW process. Employer support has been proven to increase worker satisfaction, lower claim costs and reduce RTW times. ■

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### Fly-in-fly-out (FIFO) work practices in the Australian mining industry: The effects on personal well-being of workers

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### Abstract

**Background**: Fly-in-fly-out (FIFO) work is common in the mining, service, and construction industries in remote areas due to the cheaper cost of company operation. There is a lack of information on how this affects the personal wellbeing of FIFO workers. The aim of this study was to identify and analyze the most crucial contributing factors related to FIFO arrangements and highlight the effects on the personal well-being of FIFO workers.

**Methods**: A comprehensive literature review was conducted on the effects of FIFO work on employees in literature that was published between 2009 and 2019 using defined inclusion and exclusion criteria. Data was extracted from the Curtin University library database and other online scientific databases.

**Results and Discussion**: Twenty-seven quality articles met the study inclusion criteria. Two contextual contributing factors were identified i.e. organizational factors and psychosocial factors. Organizational factor (85%) were identified as more important than psychosocial factor (15%). For psychosocial factors mental health was important (44%), while the sense of community (6%) was the least frequent reported factor. It was found that the negative effect (69%) outweighed the positive effect of FIFO work (21%).

**Conclusions and Recommendations**: Conclusions were that he most frequent contributing factor influencing the personal well-being of FIFO workers was the availability of facilities at the worksite. Recommendations are made for a comprehensive support system that gives priority to the health and safety of FIFO workers, provision of ongoing training and education, workplace interventions that encourage FIFO workers to thrive, and for future research that examines the economic and social values benefits of well-being oriented strategies to minimize cost. The findings of this research provide valuable information for policy makers and practitioners to use to support FIFO workers' personal wellbeing.

**Keywords**: Fly-in-fly-out (FIFO), drive-in- drive-out (DIDO), well-being, mental health

### **Background Information**

Mining industry is the primary contributor to the Australian economy and in 2018, it was reported that the Western Australian (WA)'s mineral and petroleum industries income totaled to \$127 billion (Department of Mines, Industry Regulation and Safety, 2019). Some 35% of the total Australia exports are derived from mineral exports such as gold, iron ore, nickel, coal, and uranium, to name a few (Chambers of Minerals and Energy of Western Australia, 2011). The abundance supply of such minerals is credited to the mining booms that occurred in the late 19th century in Australia, which attracted myriads of mining companies to be set up, especially in minerals rich regions such as Western Australia and South Australia (Britt et al., 2017). According to Australian Bureau of Statistics (2015), current estimate of the total number of FIFO workers is unavailable due to the lack of authoritative national data. This stems from the fact that FIFO workforce arrangements were normally dealt by the state/territory level, based on their concentration (Australian Bureau of Statistics, 2015).

For example, in WA, it is estimated that the average number of employees in the WA mining industries in 2018 was 112,021 (Department of Mines, Industry Regulation and Safety, 2019). In 2012, the total mining employment numbers had tripled from 77,200 in 2003 to 264,000 Australia wide (Australian Bureau of Statistics, 2015, Figure 1).



## Figure 1. Australian mining employment by state 2001 to 2014 (Australian Bureau of Statistics, 2015, p.1.)

In order to cater for the needs of miners relocated to mining sites that are often located in remote places in the heart of Australia, mining companies used to build family town houses near to the mining site. However, due to the increased demand in manpower, limited permanent residential places for the miners' families and also the increased in the company expenditure to have company houses and towns in the rural areas, the term fly-in-fly-out or 'FIFO' was introduced (Pini & Mayes, 2012).

FIFO is a method of employing people to work at mining sites in remote areas by flying them to live temporarily near the mine site instead of relocating the mine workers and their families permanently (Department of Mines and Petroleum, 2013). Usually, portable buildings are used that provide FIFO workers no long-term commitment to live in a particular town near to the mine. While, it has been reported that the local community would prefer the miners to settle in the area permanently as this could help to boost the local economy, mining companies found that it is more economical to offer FIFO employment status to their employees instead of providing them with permanent settlement, mainly due to the economic returns of such activity (Blackman et al., 2014). Although, it is prevalent that FIFO employment status benefits the employer the most, it also has a meaningful impact on the employees.

### Aim and Objectives

The aim of the study was to identify and analyze the most crucial contributing factor related to FIFO arrangement and highlight the effects on the personal well-being of FIFO workers. The research objectives of the study were to:

- 1) Conduct a comprehensive literature review on the relationship between FIFO arrangement and the personal well-being of workers.
- 2) categorize and identify the most crucial contributing factor of FIFO arrangement
- 3) on the personal well-being of workers.
- 4) Highlight the effects of FIFO arrangement on the personal well- being of workers.

### **Study Design**

A literature review focuses on information gathering and categorization. There are many literature review methods that can be used. Commonly used literature review methods include the critical literature review, which highlights and summarizes previous literature (Bastalich, 2015). In a critical literature review previous publications are compared, criticized and a new direction is offered (Bastalich, 2015). A meta-analysis literature review tends to focus on analyzing a summary of quantitative published research results to identify a predetermined outcome. It also reports on the weaknesses, strengths and the biases of the published research reviewed (Card, 2012). A literature overview focuses more on general background information on a particular topic and does not have a comprehensive depth of detail (Galvan and Galvan, 2017). A systematic literature review is normally used to appraise the current state of literature knowledge on a certain topic and identify future research priorities based on the synthesize of the published literature allowing researcher to describe the quality of the evidence based on the information gathered, at which the strengths of the literature are compared and summarized (Moher et al., 2009).

Based on the stated considerations, this research has adopted the systematic literature review method as the main study design. The systematic review methodology adheres to the preferred reporting items for systematic reviews and metaanalyses, the PRISMA statement (Liberati et al., 2009). The aim and the objectives of the current study align well with the systematic literature review, in which the contextual factors are identified and categorized through the systematic literature search. This led to identifying the effects of FIFO arrangement on the personal well-being of workers. The inclusion and exclusion criteria serve as a framework for the scope of work carried by the literature review (Meline, 2004). In this study the inclusion and exclusion criteria are presented in Table 1.

Table 1 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Peer reviewed	Non-peer reviewed
articles are included	articles are excluded
Government publications are included	Non-credible online sources are excluded
Latest data (2009 –	Publications prior to
present) is included	2009 are excluded
English language	Non-English
articles are	language articles are
considered	excluded

For the inclusion criteria, peer reviewed articles include indexed and non-indexed journal papers as well as peer reviewed conference papers. Government publications, including government funded research reports, statistics, standards and codes of practices were considered. Only secondary and/ or tertiary data that was 10 or less years old (from 2009 onwards) and was written in the English language was considered. The exclusion criteria included non-peer reviewed articles, non-indexed journal papers, non-peer reviewed conference papers, non-credible online sources such as Wikipedia, non-credible websites and news portal, secondary and/or tertiary data that was more than 10 years old (published before 2009) and publications that were not in the English language.

The publications to be reviewed were derived from either, or using the combination of, Google search engine, print books and from the Curtin University library database and included Google Scholar, ProQuest, Scopus, Science Direct, Web of Science, JSTOR, Springer Standard Collection, PubMed and Directory of Open Access Journals. In order to maintain the focus of the research, some broad and specific (broad keywords used in combination with these terms) keywords were selected to filter the gathered data. The broad keywords used were Fly in fly out (FIFO), drive in drive out (DIDO), workers, personal well-being and health. The specific key words used were mental health, anxiety, depression, social and economic issues, abuses, work performance, miners and construction workers.

Initially 45,783 publications were gathered from the Curtin University library database using the broad keywords. Also 8 publications were identified through grey literature government sources. This amount was reduced to 1221 when the inclusion and exclusion criteria and the specific keywords were applied. The number was further reduced to 607 when the data was screened by the specific title and abstract as determined by the inclusion and exclusion criteria. The publications were further scrutinized by focusing on full text peer- reviewed articles for key findings from recent research. In addition, specific keywords such as the industry and also occupation types were used to further limit the full text peer reviewed articles used in this study. Finally, the full text peer reviewed articles included in this study for analysis were limited to, n = 27 suitable research publications. The overview of the literature search is presented in Figure 2. Note that an additional 28 publications are cited in this report as well as the 27 research based publications analyzed, providing a total of 55 publications cited.

A comprehensive literature search was conducted taking into consideration the inclusion and exclusion criteria. The literature search focused on the FIFO Australian mining workers and how the FIFO arrangements affect the workers well-being. It was conducted to be able to answer the 3 research objectives, which were to (1) conduct a comprehensive literature review on the relationship between FIFO arrangement and the personal well-being of workers. (2) Categorize and identify the most crucial contributing factor of FIFO arrangement on the personal well-being of workers. (3) Highlight the effects of FIFO arrangement on the personal well-being of identifying and analyzing the most crucial contributing factor of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO arrangement and highlighting the effects on the personal well-being of FIFO workers.

### Relationship Between FIFO Arrangement and the Well-Being of Workers

In the context of occupational health and safety (OHS), FIFO work arrangements could have an impact towards the wellbeing of workers as the FIFO arrangements in the workplace, such as the duty roster, working hours, accommodation, internet access etc. could impact the OHS aspects of the workers in terms of their personal safety, well-being and mental health (Bowers, 2015). The following literature review seeks to unravel this relationship.

Langdon et al. (2016) conducted a comprehensive literature review on the Australian FIFO operations focusing on the impacts on communities, safety, workers and their families. They found most of the studies on FIFO workers showed that these workers had a lower work safety performance as a result of poor sleep quality due to fatigue. These authors established that absence from families influences workers' personal relationships, psychological well-being, job satisfaction especially for FIFO workers in the mining industry. Langdon et al. (2016) concluded that FIFO workers are exposed to physical and mental risks because of the isolation and lowered psychological well-being as a result of the absence of friends and families. On the other hand, they found that FIFO workers that are engaged with their families in a unique lifestyle rarely have any family issues. Their study found that it was the influence of many factors that affect the well-being of FIFO workers, rather than just one factor.

Bowers et al. (2018) using 1,124 participants, conducted a cross-sectional study to examine the psychological aspects of construction and mining workers in Western and South Australia. They found that 311 respondents (28%), aged 25 - 34 years old, indicated a relatively higher distress level when compared to the overall Australia population (10.8%). Among the serious stressors reported were missing families (86%), financial stress (62%), and social isolation (60%). It was recommended that a clinical study should be conducted in order to further ascertain the relationship between the stigma associated with FIFO workers and mental health problems.

Robinson et al. (2017) performed a cross- sectional study involving 2639 mining and energy workers on a FIFO employment basis looking at the relationships between the parents' work pattern and the children behavior. They discovered that among factors that contribute towards the children's behavior were that FIFO parents often work on long hours (12-hour shifts) leading the working parent to being sleep- deprived, tired and emotionally drained. These factors contributed to adverse behavioral outcomes among children and FIFO parents to suffer from possible family institution breakdowns that caused adverse effect on their children behavior (Lester et al., 2016).

McTernan et al. (2016) conducted an ethnographic study to investigate the stress level and the sense of remoteness amongst FIFO miners. It was found that FIFO miners experienced work-family and work-life conflict as a result of the impaired psychological well-being due to work stress and sleep deprivation when working continuously for 12 hours a day. Their qualitative study concluded that the lack of a positive company safety culture as an upstream organizational factor effected FIFO miners' well-being.

### **Factors Affecting Well-Being of FIFO Workers**

Hutchins et al. (2011) and Sibbel (2010) attributed management practices and workplace policies as factor affecting wellbeing of FIFO workers in the mining industry. They argued that management decisions effected the accommodation, provision of healthy meals, ensuring the availability of sporting and social facilities near to the mining sites, and managing the employees' hours of work on the duty rosters at the workplace. McKenzie (2016) stated that the ability of the mining companies to provide types of services that connect to the individual needs of FIFO workers (and subsequently their families) is the key to FIFO workers well-being.

Not having flexible workplace policies was one of the concerns of FIFO workers with families (Clifford, 2009; Sibbel, 2010; Bradbury, 2011; Henry et al. 2013). Flexible workplace policies are important to all workers, especially FIFO based workers with families, because it allows them to benefit from having access and time to deal with emergency matters back home. Flexibility would help to alleviate FIFO workers stress level knowing that plans could be devised at work to allow them time to deal with family issues if an emergency was to arise (Sibbel, 2010).

Denniss & Baker (2012) stated that a FIFO employment environment with a poor workplace culture could have negative effects on FIFO workers. Workplace culture that promotes favoritism for example, has been reported by Clifford (2009), in which contract FIFO workers received fewer benefits than permanent workers and the level of assistance provided to FIFO workers differed amongst workers (Torkington et al.

2011). Henry et al. (2013) highlighted that FIFO workers chose to deal with their well- being by themselves because of the lack of support available at their workplace. Joyce et al., (2013) found that FIFO mining workers tended to drink more alcohol than the non-FIFO employees. However, this finding only applied to young single FIFO workers and excluded those who were older and had family responsibilities (Hoath & McKenzie, 2013). Recently, routine alcohol and drug tests have been conducted to monitor the level of alcohol consumption in mining sites (Torkington et al. 2011).

As a result of the constant demands for minerals, mining production has increasingly become a 24-hour operation. This promoted the practice of what is known as combined rosters [living/working for 12 hours shifts followed by rest days at home] (Storey, 2009). The type of FIFO roster arrangements varies depending on the size of the mine site, the working load and the employer (Sibbel, 2010). For instance, FIFO roster arrangement for underground miners and the machinery and plant operators may differ in terms of the time and pattern (Sibbel, 2010). The proportion of the FIFO workers on this roster depends on the work hours offered by the employer. For example, Table 4 shows the most commonly adapted asymmetrical roster used in FIFO roster arrangement. There is a need for the employer to closely monitor the hours of work with FIFO rosters because it has been reported that roster arrangements can affect positively or adversely employee satisfaction (Clifford, 2009).

Table 4. Commonly adapted asymmetrical roster used inFIFO arrangement (Sibbel, 2010)

Arrangement	Abbreviation
5 days on, 2 days off	5/2
8 days on, 6 days off	8/6
9 days on, 5 days off	9/5
2 weeks on, 1 week off	2/1
6 weeks on, 1 week off	6/1

Access to communication is another key factor that could impact the lifestyle of children and families of FIFO workers (Gardner et al., 2018). This is because with good electronic communication facilities a level of emotional support could easily be attained through regular communication between family members (Fresle, 2010). Access to communication works in two ways. (1) Ease that the family can communicate when the FIFO worker is on site. (2) Ease with which a family can contact the worksite. If there was restricted communication and difficulty in contacting the FIFO workers on site, it was found that FIFO workers partners were more likely to be depressed and show signs of frustration (Lester et al., 2016).

The location of the mining sites at which the FIFO employees work can affect the variety of communication facilities available with remote locations not always having access to Wi-Fi networks. Henry et al. (2013) reported that lack of access to technological devices such as mobile phones and wireless internet at remote mining sites affected the morale of FIFO workers. Conversely, a study by Sincovich et al. (2018) identified that FIFO employees who used communication technology, such as Facebook, Skype and FaceTime to stay connected with their families, had less social issues in their family relationships.

The accommodation available at mining sites varies in terms of the quality of the facilities, management, and the design that suited individual privacy needs (Sibbel, 2010). For example, non-resident worker accommodation in Queensland was reportedly better than what was provided to their counterparts in Western Australia (Makeham, 2011). According to a survey conducted by URS Australia (2012), the difference in terms of comfort of the accommodation has an impact on FIFO workers satisfaction and well-being. Sibbel et al. (2016) highlighted the complaints made by the FIFO workers related to their accommodation namely the inability to sleep well due to the isolating conditions, and quality of the food. Similarly, Henry et al. (2013) reported that many participants the uneasiness of their temporary housing stems from basically noise as a result of too much drinking and uncontrolled private activities. Barclay et al. (2013) reported that financial stability is among the reasons that encouraged young single FIFO workers to venture into FIFO work. It was reported that an entry-level FIFO worker could earn up to \$50-\$80/hour on casual basis (Sibbel, 2010). The intrinsic value of FIFO work often allows FIFO workers to spend more time away from work with blocks of days off and this is seen to be a lucrative advantage to young single FIFO workers (Carter & Kaczmarek, 2009). However, Weeramanthri & Jance (2013) argued that the benefits gained from FIFO arrangement are part of the individual's assessment for their career advancement because the needs of workers' change as they progress in life and career. While high-level incomes are portrayed to be rewarding to enter a FIFO/DIDO lifestyle, Hoath & McKenzie (2013) suggested that a young family man or woman indulging in FIFO lifestyle choices could fall into a trap, at which they tend to have financial overcommitment.

Family commitment can influence adjustment to FIFO living (Sibbel, 2010). Voysey (2012) suggested that FIFO parents might face unique challenges dealing with their growing children's stages in life (hospitalization, schooling etc.) as they continue to work by FIFO arrangement. Rolfe et al. (2011) reported that challenges such as the family plan for their children education opportunities might be affected since good schools often only available at city-based locations.

# The Effects of FIFO Arrangement on the Well-Being of Workers

A number of studies indicated the effects of FIFO on the wellbeing of workers including their families. Both positive and negative effects are presented to provide a balanced picture on this matter. Positive effects such as improved social networking, increased quality time at home with loved ones, and appreciating the adventure was reported by 20 female FIFO workers (Pirotta, 2009). According to 13 FIFO participants interviewed by Bradbury (2011), no difference was recorded in their family functioning when compared to the community samples. Taylor & Simmonds (2009) using a quantitative approach with 22 participants found FIFO work arrangements have no significant effect on healthy family functioning.

A cohort study by Clifford (2009) using a semi-structured interview involving 30 respondents found that FIFO employees and their partners enjoyed a better quality of life than the daily commute from hoe to work mining employees when workplace support was provided. The most positive effects of FIFO work were identified when researchers and the FIFO workers were able to reflect on their experiences and provide more detailed explanations used qualitative research methods.

In a quantitative study Henry et al. (2013) performed a survey with 900 participants and recorded greater likelihood of a psychological distress amongst FIFO workers compared with the general population. A study by Voysey (2012) indicated a similar trend with psychological effect of work being more prominent in FIFO workers compared to their partners. Hoath & McKenzie's (2013) found that FIFO workers in Western Australia have a strong feeling of isolation or depression when asked about their long-term expectations doing FIFO work. This response may have been influenced by the economic situation in 2013 when the price of iron ore was low and some FIFO employees' contracts were not being renewed (Department of Mines, Industry Regulation and Safety, 2018). Studies showed that FIFO rosters could have negative influence on FIFO employees and their families (Clifford, 2009; Sibbel, 2010; Hoath & McKenzie, 2013). For example, Vojnovic & Bahn (2015) found that a good satisfaction on the FIFO roster arrangements could lead to less work-family conflict. Similarly, Henry et al. (2013) identified that employees who has compressed rosters had higher scores on the Kessler Psychological Distress Scale (K10), which indicates a higher anxiety level. Too little leave-to-work transition period also lead to significantly higher stress levels Clifford (2009).

Dollard & Bakker (2010) indicated that travel distance and poor accommodation in the mining sites could lead to body fatigue among FIFO workers thus, affecting their work performance. Barclay et al. (2013) listed crucial facilities such as having exclusive room, internet and TV connections in the accommodation as being important to FIFO employee satisfaction. According to a study by Vojnovic, Michelson, Jackson, & Bahn (2014) 57% of 132 participants found that separation from family and friends was stressful while, 65% believed that being away from home had a negatively impact their relationship with family members. Pirotta (2009) concluded that FIFO work is mostly isolating and can lead to the difficulty in maintaining friendships. The long working hours can also be demanding at times.

### RESULTS

The results are presented as answers to the research aim and objectives.

#### **Objective 1: Conduct comprehensive review on the relationship between FIFO arrangement and the personal well-being of workers**

Twenty seven full text articles were screened using the systematic literature review method outlined in Chapter 2 that were used to access the relationship between FIFO work arrangement and the personal well-being of workers. Of the 27 articles, 7 were survey studies (analytical and descriptive), 6 were interview qualitative studies (where data is collected until saturation occurs and no new themes emerge), 6 were focus group studies while 8 (most common) were observations based studies.

#### **Objective 2: Categorize and identify the** most crucial contributing factors of FIFO arrangement on the personal well-being of workers

Based on the assessed literatures, the identified contributing factors that effected FIFO employee well-being were categorised in Table 5. The themes of management practices, workplace policies, workplace culture, treatment bias, attitudes towards help seeking behaviour, communication access, roster cycle, accommodation and facilities at the worksite were categorised as Organisational Factors as these factors were controlled by the company. Contributing factors that included motivation, emotion and family structure were categorised as Psychosocial Factor as they were personal to the FIFO employee. Contextualisation of factors is crucial in order to identify significance key issues pertaining to the problem investigated (Moher et al., 2009).

#### Table 5 Contextualise factors category

Contextualise factor	Contributing factors	References
Organisational	Management practices, workplace policies, workplace culture, treatment bias, attitudes towards help seeking behaviour, roster cycle, access to communication, accommodation, and facilities at worksite	Clifford (2009); Storey (2009); Fresle (2010); Hutchins et al. (2011); Sibbel (2010); Bradbury (2011); Makeham (2011); Torkington et al. (2011); Pini & Mayes (2012); Denniss & Baker (2012); Henry et al. (2013); Hoath & McKenzie (2013); Joyce et al. (2013); Lester et al. (2016); McKenzie (2016); Sibbel et al. (2016); Gardner et al. (2018); Sincovich et al. (2018)
Psychosocial	Motivation, emotion, and family structure	(2018) Carter & Kaczmarek (2009); Sibbel (2010); Rolfe (2011); Voysey (2012); Barclay et al. (2013); Hoath & McKenzie (2013); Weeramanthri & Jance (2013)

Figure 4 shows the overview of the personal well-being aspects reported in the literature. It is noted from Figure 4(a) that the most frequent contributing factor appearing in the literature is the issue of facilities at worksite (n = 6). In contrast, the least frequent contributing factors reported are tied between the attitude and the treatment bias (n = 1) for each issue.



#### Figure 4 Overview of the personal well- being aspects reported in the literature: (a) Contributing factors and (b) Contextual factors.

As shown in Figure 4, facilities at worksite were identified as most important (22%) in published literature as contributing towards the personal well-being of FIFO workers. According to the findings of a survey by Barclay et al. (2013), facilities at worksite have direct link towards FIFO workers' satisfaction. In the research conducted by Barclay et al. (2013), 65% of the workers felt that their worksite lacked proper facilities that could support their personal well-being, such as sporting, and social amenities, and this was was perceived as adversely affecting their personal well-being. Conversely 55% of the surveyed workers claimed that they were keen to extend their FIFO employment status provided ample amenities were provided in their worksite (Barclay et al., 2013). McKenzie (2016) pointed out that the presence of proper facilities at the worksite could potentially minimize the drinking culture among underground miners by directing the miners' attention to other type of entertainment pleasures, such as sporting games, barbecues and social events at their workplace.

The least frequent contributing factors to FIFO employees' well-being were tied between attitude and treatment bias in the workplace (4% each). The very low number recorded for each of these factors in the published literature may stem from the fact that these issues were isolated cases. This may be because more stringent rules have now been adapted in the mining industry to prevent the alcohol intoxication habits among

employees in their workplace and/or at their respective temporary settlement (Hoath & McKenzie, 2013).

Similarly, the issue of treatment bias, which some of the temporary FIFO workers reported mistreated in terms of their roster, working hours and entitlements (Sibbel, 2010) and being bullied at the workplace by the more senior permanent workers are increasingly well regulated through the introduction of the Code of Practice, Mentally Healthy Workplaces for Fly-in Fly-out (FIFO) Workers in the Resources and Construction Sectors published by the Department of Mines, Industry Regulation and Safety in 2019 and the auditing conducted at Western Australian mine sites by Resources Safety Government Inspectors using the Psychosocial Harm Audit (2016) to assess if mining industry employers were minimizing the risk of work related psychosocial harm occurring to their employees, both at work in in the accommodation provided by their employer for FIFO workers.

Based on Figure 4(b), it is concluded that the organizational factor (85% of reports related to effects on the personal wellbeing of FIFO employees) is more dominant than the psychosocial factor (15%). This finding was based on the selected 27 full text peer- reviewed articles screened in this study. These findings assist with identifying the aspects of FIFO work and FIFO workplaces that may contribute to FIFO employees' personal well-being. Previously, it has been reported that the personal well-being of FIFO workers was influenced by both job resources, demands and design (organizational), and emotional component of the workers (psychosocial) as remarked by Albrecht & Anglim (2017) who surveyed a total of 52 FIFO workers. While, studies like Lester et al. (2016), Tuck et al. (2013) and Bowers et al. (2018) focused on the psychosocial factors such as anxiety and depression levels (quantitative measurable data).

Meredith et al. (2014) have suggested that mining companies should be more proactive in their actions to mitigate issues linked to the personal well-being of FIFO workers as the mining industry is a key contributor to the Australian economy. No clear indication has been reported in the literature as to how to promote positive organizational factors apart from the descriptive implementation of rules and regulations to regulate good practices in the workplace.

# Objective 3: Highlight the effects of FIFO arrangement on the personal well- being of workers

To promote a balanced examination on the effects of FIFO arrangement on the personal well-being of workers, both positive and negative effects were considered. Effects were grouped into either positive or negative factors. See table 6. In table 6 it is identified that job/life satisfaction, sense of community and high income are among the positive effects while mental health, psychosocial factors and work-life balance are categorized as the negative effects of FIFO arrangement on the personal well- being of workers. The relative effects were obtained after comparison between the personal well-being of FIFO workers and the personal well-being of workers' in other types of employment were made. Records in published literature are more biased towards the negative effects of FIFO arrangement on the workers' personal well- being (Henry et al., 2013; Lester et al., 2016; Considine et al., 2017; Sellenger & Oosthuizen, 2017; Bowers et al., 2018).

Effect	Effects recorded	References
Positive	Job/life satisfaction. Sense of community.	Clifford (2009); Pirotta (2009); Taylor & Simmonds (2009); Bradbury (2011)
Negative	Mental health. Psychoso- cial factors. Work-life balance.	Velander et al (2010); Torkington et al (2011); Voysey (2012); Henry et al (2013); Hoath & McKenzie (2013); Considine et al (2017); Selenger & Suther- land et al (2017); Bowers et al (2018)

 Table 6. Effects of FIFO arrangement on the personal well-being of workers.

Figure 5 shows the overview of the effects of FIFO arrangement on the personal well- being of workers as reported in the literature. It is noted from Figure 5(a) that the most frequent effect on personal well- being appearing in the literature is the issue of mental health of FIFO workers (n = 7). In contrast, the least frequent effect reported is the sense of community (n = 1).





As shown in Figure 5(a), mental health factors are reported in published literature

as having the most effect (44%) on the personal well-being of

FIFO workers. Mental health in terms of stress, anxiety and depression was often reported in the literature as the main negative effect of FIFO arrangement on the personal well-being of workers (Henry et al., 2013; Lester et al., 2016; Considine et al., 2017; Sellenger & Oosthuizen, 2017; Bowers et al., 2018). The relationship between FIFO arrangement and the mental health issues were captured using measurable scientific methods such as the Kessler psychological distress scale (K10) and the Depression, Anxiety and Stress Survey (DASS) (Parker & Griffin, 2015).

Due to the seriousness of FIFO workers' mental health issues in Western Australia, the state government commissioned primary research to look at this matter in response to concerns raised by families and recommendations from the Education and Health Standing Committee (2015) on FIFO mental health. The findings of this research were reported in a document titled Impact of FIFO work arrangements on mental health and wellbeing of FIFO workers, which was published in September 2018. The report findings indicated that FIFO workers were more likely to have mental health issues such as psychological distress, contemplating suicide and burnout than the general population. The impact on their well-being was complex and depended on the FIFO employee's age, education level and job role. The company, worksite, social life and family considerations were seen to contribute towards FIFO employees' mental health and well-being. It was also documented in this report that 17% of FIFO workers caused injury to themselves, or to another person, due to their alcohol consumption and 29% of FIFO workers reported using illegal drugs in the last 12 months. Both positive and negative coping strategies were identified through the interviews. The three prongs recommendations were to (1) mitigate illnesses, (2) prevent harm and to (3) promote thriving as a shared responsibility of the company and the FIFO workers to mitigate the adverse mental health and well- being risks amongst FIFO employees.

The least frequent reported effect in the published literature reviewed on FIFO workers was the sense of wanting to do community work (6%). Sense of community is related to the positive effect of FIFO arrangement on the personal wellbeing of workers. According to Pirotta (2009) this attribute was shown by mainly the early- career entry FIFO workers, when they were still fresh and very committed to their job and they found satisfaction in contributing back to the community by doing FIFO work when not many people are eager to do this work. Pirotta's (2009) research also discovered that the early-career FIFO workers were keen to meet people from new backgrounds and did not mind the isolation they may have to face when they relocated to remote rural areas.

Based on Figure 5(b), it is concluded that the negative effects (69%) were more dominant than the positive effect (21%). This finding was based on the selected 27 full text peerreviewed articles screened in this study. The findings of the current research are in-line with the direction of the research in the field of FIFO employment in Australia whereby negative effects of FIFO work outweigh its positive effects on FIFO employees (Dittman, Henriquez, & Roxburgh, 2016).

### Summary of Findings Related to the Research Aim

The aim of this research was to identify and analyse the most crucial factors of FIFO employment and to highlight the effects of FIFO employment on the personal well- being of these workers. To this end, articles from the systematic literature search were screened using the PRISMA statement, and the key ideas were categorised to form the contextualise factors i.e. organisational and psychosocial factors. The frequency of these factors appearing in the literature was recorded. Based on the frequency the most crucial contributing factors were determined. The positive and negative effects of FIFO arrangement on the personal well-being of workers were organised into themes and examined. The results indicated that some common factors contributing to the personal well-being of FIFO workers could be categorised into contextual factors, such as organisational, and psychosocial factors.

The most frequent contributing factor that influence the personal well-being of FIFO workers reported in the literature was the availability of facilities at worksite, while the least frequent contributing factors reported were tied between attitude to the FIFO worker and treatment bias. It was also determined that organizational factors (85%) were more reported than the psychosocial factor (15%) based on the screened published literature. The effects (both positive and negative) of FIFO arrangement on the personal well-being of workers were also categorized. Mental health was the most effected (44%), while the sense of community (6%) was the least frequent reported effect in the published literature. It was found that the negative effect (69%) outweighed the positive effect (21%) of FIFO work.

### Conclusions

### **Objective 1 Conclusion**

The comprehensive literature review revealed that limited research had been undertaken dealing directly with the issue of FIFO arrangement on employees' personal well-being. Only 55 articles related to this topic were found using the systematic review. Most studies focused on the effects of FIFO work on the mental health of workers and their families.

### **Objective 2 Conclusion**

The most frequent contributing factor to influence the FIFO workers' personal well- being reported in the published literature reviewed was the availability of good facilities at worksite. The least frequent contributing factors reported were the attitude to FIFO workers and treatment bias. The contributing factors were categorized into two contextualize factors; organizational and psychosocial factors. It was determined that the organizational factors (85%) were more common influences on FIFO employees' personal well-being feeling than the psychosocial factor (15%).

### **Objective 3 Conclusion**

When examining both positive and negative effects of FIFO arrangement on the personal well-being of workers, mental health issues were identified as the most common effect (44%), while the sense of community (6%) was the least frequently reported effect. It was found that the negative effects (69%) outweigh the positive effect (21%) of FIFO work.

### **Research Aim Conclusions**

The aim of this research was to identify and analyze the most crucial contributing factor related to FIFO arrangement and highlight the effects on the personal well-being of FIFO workers. Based on the findings of this study the most crucial contributing factor identified as affecting the personal well- being of FIFO workers was the availability of good facilities at the workplace. Contributing factors were contextualized into two broad categories; organizational, and psychosocial factors, with organizational factors being the most commonly reported factors affection the personal well-being of FIFO workers. It was identified that FIFO arrangements have both positive and negative effects on the personal well-being of FIFO workers. The main negative effect of FIFO arrangements on FIFO workers was on their mental health.

#### Recommendations

The findings of this study revealed that the following recommendations should be taken into consideration:

Mining operators should be more attentive to their employees, especially FIFO workers well-being, by having a comprehensive support and communication system at their worksite.

The research findings showed that, mental health and wellbeing of the employees should be a high company priority to promote their employees' health and safety.

FIFO workers should be informed of the benefits and challenges of FIFO lifestyle before employment so that informed employment choices could be made. Ongoing training and education should be offered to FIFO workers and their families to deal effectively with the FIFO lifestyle.

Policy makers and practitioners in FIFO work should be actively engaged in initiatives to promote healthy mining sites, expand workplace access and support well-being issues particularly mental health training, research and advocacy in their respective workplaces.

Mining organizations should encourage mentoring and buddy schemes to be introduced in the workplaces to assist FIFO workers to respond appropriately towards FIFO issues.

Significant investment in primary research involving a longitudinal study over a number of years should be conducted in order to minimize, prevent, monitor and to keep up to date with FIFO employment issues at mining sites in order to better understand the complexities of FIFO issues.

Further research focusing on the assessment of the economic and social values of the FIFO workers well-being oriented strategies relative to the production cost should be undertaken. Such analyses could be helpful in motivating employers to make prioritized strategy decisions to minimize cost.

#### Implications

This research has added to the body of knowledge about the personal effects of Fly- in Fly-out work on the employees who do this work. It has identified current FIFO problems and opportunities for employers, employees, safety and health practitioners and policy makers to improve FIFO employment conditions. It has made significant recommendations for future research based on the findings of this research and the gaps in knowledge identified. ■

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### Factors influencing FIFO arrangement

Authors & Year	Type of study	Influencing factors	Recommendations
Storey (2009)	Cross-sectional	Issues with management practices namely roster duty, time, workload, and leave arrangement.	Management interventions such as fair distribution of work, and roster time duty were recommended.
Carter & Kazmarek (2009)	Cross-sectional	Work motivation, FIFO workers emotion, and family functioning.	Sample can be extended to family members and partners. Broader perspective is proposed e.g. mother and/or child perceptions.
Fresle (2010)	Cross-sectional	Communication styles and access were found to influence how emo- tional support from their partners was experienced. Communication was summed up as the "proxy" to their relationship.	Social support systems. Emotional support. Social interactions through Skype and video calls were popular op- tions for families. Family resilience through positive reappraisal.
Makeham (2011)	Longitudinal	Attitudes among FIFO workers towards roster cycles, and treatment bias.	Incorporate OHS role in monitoring FIFO workers attitudes. Favoritism should be avoided at workplace.
Rolfe (2011)	Longitudinal	Emotion factors of FIFO workers such as personal distress, lifestyle, and mental health.	Standardize method to measure emotional quotients. Mental health relationship with FIFO workers needs further scrutiny.
Dennis & Baker (2012)	Cross-sectional	Workplace policies such as favor- ing permanent over casual FIFO workers, and seniority in job dis- tribution.	Sample size (n = 8) can be improved. Fair work policy should be implemented at workplace.
Pini & Mayes (2012)	Correlational	Family structure factor was reported. Positive aspects included having male partners attend family focused daytime functions such as school events. Workplace culture concerns among partners. Women's experiences vary depend- ing on their partner's roster.	Availability and efficiency of communication technology along with space and time for commu- nication. Workplace culture and home culture should be separated.
Joyce et al. (2013)	Cross-sectional	Workplace culture i.e. alcoholism and smoking.	Comparison with shift workers and other employment types.
Barclay et al. (2013)	Cross-sectional	Workplace culture i.e. alcoholism, smoking, and prescriptive drugs. Accommodation at site. Facilities for social events.	Reporting frequencies and prevalence only. Correlations described without effect sizes.
Weeramanthi & Jane (2013)	Cross-sectional	Family structures such as children age, distance from home, and fam- ily stage.	Provide easy access for family members in terms of commu- nication to reach FIFO work- ers at sites.
Sibbel et al. (2016)	Cross-sectional	Workplace culture i.e. alcoholism.	Mostly descriptive results. Limited comparisons.
Gardner et al. (2018)	Cross-sectional	Facilities at workplace such as recreational and sport amenities were lacking.	Relationship between workplace facilities and the impact on FIFO workers should be investigated further. Management should take note.
Sincovich et al. (2018)	Cross-sectional	Communication between FIFO workers and their family members.	Improve internet connection at workplaces. Ensure telecommunication signals to workplace.

### FIFO arrangement effects on personal well-being of workers

Authors & Year	Type of study	Effects on FIFO workers	Recommendations
Bradbury (2011)	Cross-sectional	FIFO employment did not significantly affect the family unit functioning. Children reported negative emotions such as paternal support, and restriction to their lifestyle and activities. FIFO lifestyle bode well with majority of the participants.	FIFO parents should spend more time with their chil- dren. Family members should buffer the family strains.
Clifford (2009)	Cross-sectional	FIFO workers have similar attributes to the daily commune employees. Working arrangement can be stressful. Compressed rosters have negative impact on FIFO workers relationship with their partners.	Compressed rosters should be reviewed. Stress level correlation with compressed rosters should be made.
Taylor & Simmonds (2009)	Cross-sectional	Good family satisfaction was reported. Healthy family functioning was recorded. No significant differences were found based on the roster type, previous experience, partner employment, family stress, stage, and coping.	Longitudinal study should follow up the reported findings.
Pirrota (2009)	Cross-sectional	Developing and maintaining relationships and friendships issues were reported. Difficult to maintain friendship, intimate relationship, daily contact with family and being open to discuss personal issues.	Company's organizational work factors need to be revised. Provide opportunities to varied social events.
Velander et al. (2010)	Cross-sectional	Depression, anxiety, and stress were detected in FIFO workers.	DASS score as measure of depression, anxiety, and stress can be improved.
Torkington et al. (2011)	Cross-sectional	Negative effects such as loneliness, sad- ness, and stress were reported. Effects to the family unit were significant. Effects on children differ according to the age of the child. FIFO work affects singles lifestyle.	Increase communication access at FIFO workplace. FIFO commitment should be made clear prior to entering FIFO business.
Voysey (2012)	Cross-sectional	FIFO work affects partners more than FIFO workers. No correlation found between perceived stress and perceived social support.	Roster length time should be adjusted. More time off should be <b>spent with FIFO workers'</b> family.
Henry et al. (2013)	Cross-sectional	FIFO work affects family and friend rela- tionship qualities, especially for workers with children. High compression rotation workers reported higher K10 (indicating higher levels of psy- chological distress) compared to those working lower compression rotations. FIFO work influences the stress levels of FIFO workers especially those aged be- tween 30-39. The number one stress of FIFO work was family/home separation. A significant por- tion of the stress of family/home separa- tion relates to rosters; longer periods at work were found to be more stressful, par- ticularly for workers with young children.	Increase family openness e.g. apologizing to family mem- bers for their time away. In- troduction of positive coping that uses social networking sites (e.g., Facebook), having photos of kids emailed to them, using Skype, using "Facetime" application on smartphone, daily phone contact.
Hoath & McKenzie (2013)	Cross-sectional	Feelings of isolation or depression were detected. Compressed rosters have a more negative impact on families that more balanced rosters. Absence from important family events in- creases stress on family relationships.	Social events at workplace should be encouraged. Man- agement to monitor workplace culture.

### Appendix 2, continued

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Considine et al. (2017)	Cross-sectional	Psychological distress, FIFO work satis- faction, and perceived mental health were reported.	Mental health relationship with workplace attributes should be considered.
Sellenger & Oost- huizen (2017)	Cross-sectional	Psychological distress, bullying/ harassment, and social isolation were recorded.	Kessler 10 comparison should be made with the general population. Study area should be varied (not focused on remote sites only).
Sutherland et al. (2017)	Exploratory	FIFO was seen as difficult with young children. Issues caring for dependents in general. Missing family events.	Sample size was too small (n = 4 for the semi-structured interview).
Bowers et al. (2018)	Longitudinal	Mental health issues such as depression, and anxiety were determined using K <sub>10</sub> method. Social isolation due to family factors was reported.	Stigmatization of mental health problems needs to be addressed at workplace.

#### FIFO arrangement effects on personal well-being of workers

### About the Authors



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Dr Janis Jansz, RN, RM., Dip. Tch, BSc. Grad. Dip. OHS, MPH, PhD, FSIA is an Associate Professor in Occupational Health, Safety and Environmental Health in the School of Public Health at Curtin University in Western Australia and a Professor at the Xi'an University of Science and Technology, China. Janis is the Director of the World Safety Organization National Office for Australia, a Member of the Board of Directors for World Safety Organization, Vice President of the Occupational Health Society

of Australia and has been awarded Life Membership of the Australia an Institute of Health and Safety for many years of work improving, teaching and conducting research to advance occupational safety and health practices and for taking a leadership role the safety and health profession.

## World Safety Organization (WSO)

The WSO was founded in 1975 in Manila, The Republic of the Philippines, as a result of a gathering of over 1,000 representatives of safety professionals from all continents at the First World Safety and Accident Prevention Congress. The WSO World Management Center was established in the United States of America in 1985 to be responsible for all WSO activities, the liaison with the United Nations, the co-operation with numerous Safety Councils, professional safety/environmental (and allied areas) organizations, WSO International Chapters/Offices, Member Corporations, companies, groups, societies, etc. The WSO is a not-for-profit corporation, non-sectarian, non-political movement to "Make Safety a Way of Life... Worldwide."

### World Safety Organization Activities

- WSO publishes WSO Newsletters, World Safety Journal, and WSO Conference Proceedings.
- WSO provides a network program linking various areas of professional expertise needed in today's international community.
- WSO develops and accredits educational programs essential to national and international safety and establishes centers to support these programs.
- WSO receives proposals from professional safety groups/ societies for review and, if applicable, submits them to the United Nations for adoption.
- WSO presents annual awards: The James K. Williams Award, Glenn E. Hudson International Award, J. Peter Cunliffe Transportation Award, Concerned Citizen, Concerned Professional, Concerned Company/Corporation, Concerned Organization, Educational Award, WSO Chapter/National Office of the Year, and Award for Achievement in Scientific Research and Development.
- WSO provides recognition for safety publications, films, videos, and other training and media materials that meet the WSO required educational standards.
- WSO establishes and supports divisions and committees to assist members in maintaining and updating their professional qualifications and expertise.
- WSO has Chapters and National/International Offices located throughout the world, providing contact with local communities, educational institutions, and industrial entities.
- The WSO organizes and provides professional support for international and national groups of experts on all continents who are available to provide expertise and immediate help in times of emergencies.

### **Benefits of Membership**

WSO publishes the "WSO Consultants Directory" as a service to its Members and to the Professional Community. Only Certified Members may be listed.

WSO collects data on the professional skills, expertise, and experience of its Members in the WSO Expertise Bank for a reference when a request is received for professional expertise, skill, or experience.

- WSO provides a network system to its Members whereby professional assistance may be requested by an individual, organization, state, or country or a personal basis. Members needing assistance may write to the WSO with a specific request, and the WSO, through its
- Membership and other professional resources, will try to link the requester with a person, organization, or other resource which may be of assistance.
- WSO provides all Members with a Membership Certificate for

display on their office wall and with a WSO Membership Identification Card. The WSO awards a Certificate of Honorary Membership to the corporations, companies, and other entities paying the WSO Membership and/or WSO Certification fees for their employees.

- Members have access to WSO Newsletters and other membership publications of the WSO on the WSO website, and may request hard copies by contacting the WSO World Management Center. Subscription fees apply to certain publications.
- Members are entitled to reduced fees at seminars, conferences, and classes given by the WSO. This includes local, regional, and international programs. When Continuing Education Units (CEUs) are applicable, an appropriate certificate is issued.
- Members who attend conferences, seminars, and classes receive a Certificate of Attendance from the WSO. For individuals attending courses sponsored by the WSO, a Certificate of Completion is issued upon completion of each course.
- Members receive special hotel rates when attending safety programs, conferences, etc., sponsored by the WSO.

### Membership

The World Safety Organization has members who are full time professionals, executives, directors, etc., working in the safety and accident prevention fields, including university professors, private consultants, expert witnesses, researchers, safety managers, directors of training, etc. They are employees of multi- national corporations, local industries, private enterprises, governments, and educational institutions. Membership in the World Safety Organization is open to all individuals and entities involved in the safety and accident prevention field, regardless of race, color, creed, ideology, religion, social status, sex, or political beliefs.

### **Membership Categories**

Associate Membership: Individuals connected with safety and accident prevention in their work or individuals interested in the safety field, including students, interested citizens, etc.

Affiliate Membership: Safety, hazard, risk, loss, and accident prevention practitioners working as full time practitioners in the safety field. Only Affiliate Members are eligible for the WSO Certification and Registration Programs. Institutional Membership: Organizations, corporations, agencies, and other entities directly or indirectly involved in safety activities and other related fields. Sustaining/Corporate Member: Individuals, companies, corporations, organizations or other entities and selected groups, interested in the international effort to "Make Safety A Way Of Life...Worldwide."

The WSO Membership Application is included on the following pages and is also available on the WSO website: http:// worldsafety.org/application- for-wso-membership/ and http:// worldsafety.org/quick- downloads/

## World Safety Organization



## **Application for Membership**

[1]	Application Fee	\$20.00 USD
[]	Associate Membership	\$65.00 USD
[]	Affiliate Membership	\$90.00 USD
[]	Institutional Membership*)	\$195.00 USD
[]	Corporate Membership*)	\$1000.00 USD

\*) In case of institution, agency, corporation, etc., please indicate name, title, and mailing address of the authorized representative.

(Please	print	ar type. )
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NAME (Last, First, Middle)	[ ] Mr. [ ] Ms. [ ] Mrs. [ ] Dr. [ ] Engr.
POSITION/TITLE:	
COMPANY NAME AND ADDRESS:	[ ] Preferred
HOME ADDRESS:	[ ] Preferred
BUSINESS PHONE:	FAX:
CELL PHONE:	HOME PHONE:
E-MAIL AD DRESS(ES):	
PROFESSIONAL MEMBERSHIP(S),	DESIGNATION(S), LICENSE(S):
EDUCATION (degree(s) held):	

### REFERRAL

If you were referred by someone, please list his/her name(s), chapter, division, etc.:

WSO Member: \_\_\_\_

WSO Chapter: \_\_\_\_\_

WSO Division/Committee: \_\_\_\_\_

Other: \_\_\_\_\_

PLEASE specify your area of professional expertise. This information will be entered into the WSO "Bank of Professional Skills," which serves as a pool of information when a request for a consultant/information/expertise in a specific area of the profession is requested.

- [ ] Occupational Safety and Health (OS&H)
- [ ] Environmental Safety and Health (EH&S)
- [ ] Fire Safety/Science (FS&S)
- [ ] Safety/Loss Control Science (S&LC)
- [ ] Public Safety/Health (PS&H)
- [ ] Construction Safety (CS)
- [ ] Transportation Safety (TS)
- [ ] Industrial Hygiene (IH)
- [ ] Product Safety (PRO)
- [ ] Risk Management (RM)
- [ ] Hazardous (Toxic) Materials Management (HAZ)
- [ ] Nuclear Safety (NS)
- [ ] Aviation Safety (AS)
- [ ] Ergonomics (ERG)
- [ ] Petroleum (PS)
- [ ] Oil Wells (OW)
- [ ] Other:\_\_\_\_\_

### PAYMENT OPTIONS

For secure Credit Card Payment, please visit the SHOP on WSO's website (https://worldsafety.org/shop) and select "WSO Membership Application Fee" to make your payment. You will receive an emailed invoice for the Membership Fee upon approval.

Check or Money Order payable to WSO may be mailed with application packet to: WSO-WMC, Attn: Membership Coordinator, PO Box 518, Warrensburg MO 64093 USA. International postal money orders or bank drafts with a U.S. routing number are acceptable for applicants outside the United States. For alternate payment arrangements, please contact WSO-WMC.

Annual dues hereafter will be billed and payable on the anniversary date of your membership. **U.S. funds only.** 

### By submitting this application, you are accepting that WSO will use the information provided to perform an independent verification of employer, credentials, etc.

Mail or email completed form, along with current résumé/CV:

### WSO World Management Center

PO Box 518 | Warrensburg, Missouri 64093 USA Phone 660-747-3132 | FAX 660-747-2647 | membership@worldsafety.org



### Student Membership Application WORLD SAFETY ORGANIZA

Instructions | Complete all applicable fields and mail to WSO Wor Management Center, PO Box 518, Warrensburg, MO 64093 USA, ema membership@worldsafety.org, or fax to 1-660-747-2647. For assistance completing this application, please call 1-660-747-3132, or email questions to membership@worldsafety.org.

### Membership Level | Choose One

### College/University Student Membership – FREE

You will receive all member benefits including subscriptions to WSO World Safety Journal and WSO NewsLetter, as well as access to WSO's Mentor Program.

### Middle/High School Student Membership – FREE

You will receive all member benefits including subscription to WSO World Safety Journal and WSO NewsLetter, excluding access to WSO's Mentor Program.

TION	WSO Member:	
rld ail to	WSO Chapter/National Office:	
ce	WSO Division/Committee:	

Occupational Safety and Health (OS&H)

division, etc.:

Other:

### What Interests You?

Please specify your area(s) of interest. These areas of interest will allow you to connect with others who share similar interests throughout the world.

If you were referred by someone, please list name(s), chapter,

and WSO NewsLetter, excl.	aing access to WSO s	mentor Program.	0	[ ] Environmental Safety and Healt	h (EH&S)
				[ ] Fire Safety/Science (FS&S)	
				[] Safety/Loss Control Science (Sa	SLC)
ast Name/Family Name				[ ] Public Safety/Health (PS&H) [ ] Construction Safety (CS)	
First Name/Given Name		Initial	(Gender)	[ ] Transportation Safety (TS)	
				[] Industrial Hygiene (IH)	
Birthdate MM / DD / YYYY (Applicat	on must include exact bithdate w	im year to be processed)		[ ] Product Safety (PRO)	
				[ ] Risk Management (RM)	
Current Street Address 🖸 On Campus 🗋 Off Campus (Attach separate sheet if you need more room for your address)			[] Hazardous (Toxic) Materials Ma	inagement (HAZ)	
			· · · · · ·	[ ] Nuclear Safety (NS)	
2ity		State/Province	Country	[ ] Aviation Safety (AS)	
			Landline Mobile	<ul> <li>[ ] Ergonomics (ERG)</li> </ul>	
Dip/Postal Code Telephone Number (including area code)		(Туре)	[ ] Petroleum (PS)		
			12	[ ] Oil Wells (OW)	
Permanent Street Address				[ ] Other:	
City		State/Province	Country	Required Signatures &	Parmissions
			Landline D Mobile	I subscribe to the above record and when ap	proved will be adverned by th
p/Postal Code Telephone Number (including area code)			(Type) Constitution and By-Laws of WSO and its Code of Ethics as I continu member. I furthermore agree to promote the objectives of the WSO v and whenever possible.		xde of Ethics as I continue as objectives of the WSO where
	Termanens Adurdas			2	
-mail Address/es)			1.1	X	
				Applicant Signature	Date

### COLLEGE/UNIVERSITY STUDENT

Category: Undergraduate Graduate/Post-Graduate

Degree(s) Sought/Obtained

Name of College/University

Campus

### MIDDLE / HIGH SCHOOL STUDENT

I am a Middle Schooler in: G 6th Grade G 7th Grade G 8th Grade

I am a High School Freshman Sophomore Junior Senior

Name of School

Approximate Date of Graduation (MM / YYYY)

(For High School and College/University students, application must include approximate date of graduation to be processed.)

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FOR MID/HIGH SCHOOLERS ONY. WSO subscribes to the Family Educational Rights and Privacy Act (FERPA) philosophy in protecting student privacy and information. WSO may disclose "directory" information such as a student's name, WSO Student Chapter affiliation, name of school, grade in school, etc., along with group or individual photos in WSO NewsLetters, NewsFlashes, eNews, on WSO website, and on WSO's social media accounts

My student has permission to participate as outlined above.

My student has permission to participate with exclusions.

х

Parent/Guardian Signature (Mid/High Student)

х

WSO Student Chapter Mentor Signature [IF APPLICABALE]

Date

Date

File: Application Student 2019: 03/2019

Kazakhstan Mongolia

Uztiekisti Alghani

Arabia

Ethiopia:

China

Papua New Guinea

Zealand



,United Kingdom

Algeria

Chad

Mal

# WSO National and International Offices and Directors

WSO National Office for Australia Dr. Janis Jansz, Director c/o Curtin University Phone: (618)9266-3006 Fax: (618)9266-2958 Contact: j.jansz@curtin.edu.au

North

Pacific

WSO National Office for Austria Dr. Majid Alizadeh, Director c/o Payesh System Mehr Engineering Company Contact: majidealizadeh@gmail.com

WSO National Office for Cameroon Mr. Clement Bantar Nyong, Director c/o Cameroon Safety Services Contact: info wso@cameroonsafetyservices.com

WSO National Office for Canada Mr. Michael Brown, Director c/o Apex One Management Group Contact: mike@apexone.ca esarmiento@wsowesterncanada.ca Website: www.wsowesterncanada.ca

WSO National Office for Ghana Mr. Peter Oko Ahunarh, Director c/o Ghana National Fire Service Contact: pahunarh23@gmail.com

WSO National Office for Guam Mr. James H. Akin, Director c/o Safeworx Training Solutions and Consulting Contact: safeworxtsc@icloud.com

### WSO National Office for India

Mr. C. Kannan, Director c/o Indian Society of Safety Engineers (ISSE) Contact: support@worldsafety.org.in Website: www.worldsafety.org.in

#### WSO National Office for Indonesia

Mr. Soehatman Ramli, Director c/o Prosafe Institute Contact: soehatman@prosafe.co.id soehatmanramli@yahoo.com

### WSO National Office for Iran

Mrs. Fatemeh Gilani, Director c/o Payesh System Mehr Engineering Company Contact: gilani@imsiran.ir

WSO National Office for Iraq

**Dr. Eng. Khaldon Waled Suliman, Director** c/o NAYA Engineering Services & Training Contact: naya\_engineering\_services@yahoo.com WSO National Office for Lebanon Dr. Elias M. Choueiri, Director c/o Ministry of Transportation Contact: elias.choueiri@gmail.com

WSO National Office for Myanmar Mr. Win Bo, Director c/o OSHE Services Company, Ltd.

Phone: (95)936091909 Contact: winbo@osheservices.com

WSO National Office for Nigeria Mr. Olalokun Soji Solomon, Director c/o Danarich Creative Concept Limited Phone: (234) 08121697235 Contact: info@worldsafety.org.ng Website: www.worldsafety.org.ng

WSO National Office for Pakistan Mr. Syed Tayyeb Hussain, Director

c/o Greenwich Training & Consulting Contact: doctimes@gmail.com

WSO International Office for Philippines

**Eng. Alfredo A. De La Rosa, Jr., Director** Phone: (63) 2 709-1535, (63) 2 709-1738 Fax: (63) 2 709-1737 Contact: info@wsophil.org

WSO National Office for Qatar Mr. Allan N. Milagrosa, Director c/o Bright Services Contact: dolphin\_ems@yahoo.com

WSO National Office for Saudi Arabia (KSA) Mr. Garry A. Villamil, Director c/o The Academy of Sciences for Medical Education Contact: director@worldsafetygcc.com; villamga@gmail.com Website: www.worldsafetygcc.com

WSO National Office for Taiwan, Republic of China Dr. Shuh Woei Yu, Director c/o Safety and Health Technology Center/SAHTECH Contact: swyu@sahtech.org

WSO National Office for Vietnam Mr. Binh Pham, Director c/o Tuong Khoa Trading Service Company Ltd. Contact: binh@worldsafety.org.vn Website: www.worldsafety.org.vn

# World Safety Organization Code of Ethics

Members of the WSO, by virtue of their acceptance of membership into the WSO, are bound to the following Code of Ethics regarding their activities associated with the WSO:

#### જે•જ

Members must be responsible for ethical and professional conduct in relationships with clients, employers, associates, and the public.

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Members must be responsible for professional competence in performance of all their professional activities.

#### థా•ళ

Members must be responsible for the protection of professional interest, reputation, and good name of any deserving WSO member or member of other professional organization involved in safety or associate disciplines.

#### థా•ళ

Members must be dedicated to professional development of new members in the safety profession and associated disciplines.

#### థా•ళ

Members must be responsible for their complete sincerity in professional service to the world.

#### **چ**•ھ

Members must be responsible for continuing improvement and development of professional competencies in safety and associated disciplines.

#### ૡૢૢૢૢૢૢૢ

Members must be responsible for their professional efforts to support the WSO motto:

"Making Safety a Way of Life...Worldwide."



Published by the WSO National Office for Australia www.worldsafety.org editorialstaff@worldsafety.org