DEVELOPMENT OF A NOVEL KNOWLEDGE-BASED DECISION SUPPORT SYSTEM FOR ACCIDENT PREVENTION OF OIL AND GAS DRILLING PROCESS

MUHAMMAD MUJTABA ASAD

A thesis submitted in
fulfillment of the requirement for the award of the
Doctor of Philosophy

Faculty of Technical and Vocational Education
Universiti Tun Hussein Onn Malaysia

AUGUST 2018

Dedicated to my beloved Uncle Haji Amjad Farooq (Late), my beloved parents, grandparents, siblings, friends and lecturers, without your support, guidance and encouragement, I might not have had this kind of achievement. Thanks for all the support and patience during my PhD research

ACKNOWLEDGEMENT

In The name of Allah S.W.T, The most Gracious and The Most Merciful. All praise to Allah S.W.T for providing me guidance, strength and the ability to successfully accomplish my PhD, Alhamdulillah. Peace and Blessings be upon Prophet Hazrat Muhammad صلى الله عليه وسلم and the believers who followed His path to the Day of Judgment. Throughout the entire process of the development and implementation of my PhD research, I have been very fortunate to have a number of wonderful and experienced people around me.

First of all, I would like to take this opportunity to express my most profound gratitude and appreciation to my supervisor Associate Professor Dr. Razali Bin Hassan for his constant advice, kind guidance, valuable ideas, suggestions and generous support throughout the entire PhD journey. Secondly, I would like to thank my PhD research industrial advisor Mr. Qadir Mehmood Soomro for facilitating me during data collection process and guiding me inside out to solve the industrial issues in HSE oil and gas drilling domains. Also, I am very grateful to Assistant Professor Dr. James Gaskin from Brigham Young University (USA) for his guidance and tremendous support for handling my research analysis.

I would like to convey my deepest gratitude and thanks to the Ministry of Higher Education Malaysia (MOHE) for awarding me the Malaysian International Scholarship (MIS) to pursue my PhD study at Universiti Tun Hussein Onn Malaysia. Also, I would like to express my gratitude to all the academic and non- academic staff of my faculty (FPTV) and university for their cooperation and moral support. Similarly, being an international PhD scholar, I am also thankful to International office of Universiti Tun Hussein Onn Malaysia for nominating me as an international student's ambassador (Life Time) and processing our visa and insurance on time with generosity.

I would like to thank my beloved parents, Mr & Mrs Muhammad Ejaz Asad and my siblings, friends who have always motivated me and prayed for my success in my PhD research. Finally, all my family and friends whom I have not mentioned, I am absolutely grateful to all of them. Thank you all.

ABSTRACT

Oil and gas drilling process is highly associated with numerous hazardous conditions and potential risks at onshore and offshore drilling domains due to the unpredictable nature of this procedure. Thus, there is a sheer need of an efficient Knowledge-Based Decision Support System (KBDSS) based on the most effective and innovative potential hazards controlling factors, strategies and preventive measures to overcome the accidents at drilling sites. Therefore, in this study the most hazardous drilling operations with their associated potential hazards and effective hazard controlling factors at Malaysian, Saudi Arabian and Pakistani onshore and offshore drilling industries have been identified. Moreover, based on the identified hazard controls, a new KBDSS has been developed by using MySQL and Visual Studio 2015 software. In this study, sequential explanatory and evaluation research designs have been adopted. The developed system has been implemented on targeted industries to assess its decision-making potential, effectiveness of hazard controls, level of user satisfaction and performance for vestibule safety training activities. The quantitative and qualitative data has been gathered from oil and gas drilling crew (240 respondents) and safety and health experts (9 respondents) through survey instruments and semi-structured interviews. Furthermore, the descriptive and inferential statistical tests have been used for quantitative data analysis. Whereas, "What-If Analysis" and thematic analysis approaches have been utilized for analyzing the qualitative data. According to the overall quantitative and qualitative results of this study, the developed KBDSS based on the identified effective hazard controlling factors and preventive measures, proved to be suitable for appropriate decision making during hazardous conditions as well as for vestibule training activities at both drilling domains at oil and gas industries in Malaysia, Saudi Arabia and Pakistan with in moderate (Mean = 2.50-3.49) and high (Mean = 3.50-5.0) level of mean range. In conclusion, this study has introduced a new and efficient KBDSS for accident prevention at oil and gas extraction process which covers all onshore and offshore drilling operations from different regions to achieve the latest trend of industrial IoT as per international safety standards and regulations.

ABSTRAK

Proses penggerudian minyak dan gas sangat berkait rapat dengan pelbagai keadaan yang berbahaya dan berpotensi memberi risiko di kawasan penggerudian di pesisir mahupun luar pesisir. Proses penggerudian minyak dan gas ini, boleh mengakibatkan pelbagai kesan kemalangan yang tidak dapat dijangkakan. Berdasarkan faktor kawalan bahaya yang inovatif, strategi dan langkah pencegahan yang sesuai, sumber terbuka sistem sokongan membuat keputusan berasaskan pengetahuan (KBDSS) yang efektif amat diperlukan bagi mengatasi kemalangan di tapak penggerudian secara berkesan. Dalam kajian ini, operasi penggerudian yang berbahaya dan mempunyai potensi yang membahayakan beserta faktor kawalan yang berkesan telah dikenalpasti di 3 negara iaitu Malaysia, Arab Saudi dan Pakistan. Oleh itu, sistem ini telah dibangunkan dengan menggunakan MySQL dan Visual Studio. Kajian ini menggunakan reka bentuk kajian penelitian eksplanatori dan penilaian berurutan yang telah diadaptasi. Sistem yang dibangunkan telah dijalankan di industri penggerudian yang terpilih bagi menilai potensi membuat keputusan, keberkesanan kawalan bahaya, tahap kepuasan pengguna dan prestasi untuk aktiviti latihan simulasi keselamatan. Data kajian yang telah dikumpulkan adalah dari krew penggerudian minyak dan gas (240 responden), dan pakar keselamatan dan kesihatan (9 responden). Data yang diperoleh adalah dengan menggunakan borang soal selidik dan wawancara separa berstruktur. Analisis deskriptif dan statistik inferensi telah digunakan untuk menganalisis data kuantitatif. Manakala data kualitatif pula, "What-If" analisis dan analisis tematik telah digunakan. Mengikut kajian ini, keputusan kuantitatif dan kualitatif KBDSS dibangunkan berdasarkan faktor kawalan bahaya yang berkesan serta mengenalpasti langkah pencegahannya, terbukti sesuai membuat keputusan semasa dalam keadaan berbahaya dan aktiviti latihan vestibula di dua bidang pergerudian dalam industri minyak dan gas asli di Malaysia, Arab Saudi dan Pakistan dengan aras purata tinggi iaitu (3.50-5.0) dan purata sederhana iaitu (2.50-3.49). Kesimpulannya, kajian ini telah memperkenalkan sistem pengurusan keselamatan dan kesihatan yang baru, cekap dan terjamin yang meliputi semua proses penggerudian dari pelbagai bidang untuk mencapai trend industri IoT terkini selaras dengan piawaian keselamatan antarabangsa.

TABLE OF CONTENTS

LIST OF TABLES

REFERENCES

Abbassian, F., Andresen, P. A., Honey, M. A., McKay, J., Reinertsen, T. S., Skarbo, R. A., & Lockyear, C. F. (2015). *U.S. Patent Application No. 14/703,788*.

Abdelhamid, Y., Hassan, H., & Rafea, A. (1997). A proposed methodology for expert system engineering. In *5th International conference on artificial intelligence applications. Egyptians Computer Society, Cairo, Egypt*.

Abimbola, M., Khan, F., & Khakzad, N. (2014). Dynamic safety risk analysis of offshore drilling. *Journal of Loss Prevention in the Process Industries*, *30*, 74-85.

Abualfaraj, N. (2016). *Identifying Potential Exposure Pathways and Estimating Risk from Marcellus Shale Gas Development*. Drexel University.

Abusair, M., Di Marco, A., & Inverardi, P. (2017, July). Context-Aware Adaptation of Mobile Applications Driven by Software Quality and User Satisfaction. In *Software Quality, Reliability and Security Companion (QRS-C), 2017 IEEE International Conference on* (pp. 31-38). IEEE.

Adgate, J. L., Goldstein, B. D., & McKenzie, L. M. (2014). Potential public health hazards, exposures and health effects from unconventional natural gas development. *Environmental science & technology*, *48*(15), 8307-8320.

Akinremi, T. A., Anderson, R., Olomolaiye, A., & Adigun, L. (2015, November). Risk Management as an Essential Tool for Successful Project Execution in the Upstream Oil Industry. *In Abu Dhabi International Petroleum Exhibition and Conference. Society of Petroleum Engineers*.

Akram, N. A., Isa, D., Rajkumar, R., & Lee, L. H. (2014). Active incremental Support Vector Machine for oil and gas pipeline defects prediction system using long range ultrasonic transducers. *Ultrasonic, 54*(6), 1534-1544.

Al Garni, H., Kassem, A., Awasthi, A., Komljenovic, D., & Al-Haddad, K. (2016). A multicriteria decision making approach for evaluating renewable power generation sources in Saudi Arabia. *Sustainable Energy Technologies and Assessments*, *16*, 137-150.

Al-Kassem, A. H. (2014). Determinants of employee's overall satisfaction toward training and development programs. *International Journal Edu Training*, *3*(3).

Alkhaldi, M., Pathirage, C., & Kulatunga, U. (2017). The role of human error in accidents within oil and gas industry in Bahrain. In *13th International Postgraduate Research Conference (IPGRC): conference proceedings* (pp. 822-834). University of Salford.

Altunkaynak, A. (2014). Predicting water level fluctuations in Lake Michigan-Huron using wavelet-decision support system methods. *Water resources management 28*(8), 2293-2314.

Al-Yami, A. S. H., & Schubert, J. (2013). *U.S. Patent Application 13/827,794*.

Amir-Heidari, P., Farahani, H., & Ebrahemzadih, M. (2015). Risk assessment of oil and gas well drilling activities in Iran–a case study: human factors. *International journal of occupational safety and ergonomics*, *21*(3), 276-283.

Antonovsky, A., Pollock, C., & Straker, L. (2016). System reliability as perceived by maintenance personnel on petroleum production facilities. *Reliability Engineering & System Safety*, *152*, 58-65.

Arkün, S., & Akkoyunlu, B. (2008). A Study on the development process of a multimedia learning environment according to the ADDIE model and students' opinions of the multimedia learning environment. *Interactive educational multimedia: IEM*, (17), 1-19.

Aronson, J. E., Liang, T. P., & Turban, E. (2005). *Decision support systems and intelligent systems*. Pearson Prentice-Hall.

Asad, M. M & Hassan, R.B. (2014). A Systematic Review: Development Techniques and Utilization of Expert Systems Inferences for Health and Safety Environment in Oil & Gas and Petroleum Industries. In *Malaysia University Conference Engineering Technology*.

Asad, M. M., Hassan, R. B., Soomro, Q. M., & Sherwani, F. (2017). Development of KBES with Hazard Controlling Factors and Measures for Contracting

Health and Safety Risk in Oil and Gas Drilling Process: A Conceptual Action Plan. *The Social Sciences*, 12(3), 584-594.

Asad, M. M., Hassan, R.B., Ibrahim, N.H & F. Sherwani (2018). Indication of Decision Making through Accident Prevention Resources among Drilling Crew at Oil and Gas Industries: A Quantitative Survey. *Journal of Physics-IOP*, 1049(1), 012022.

Asad, M. M., Hassan, R.B., Ibrahim, N.H & F. Sherwani (2018). Level of Satisfaction for Occupational Safety and Health Training Activities: A Broad Spectrum Industrial Survey. *Journal of Physics-IOP*, 1049(1), 012031.

Asia Marketing Research, Internet Usage, Population Statistics, & Facebook Information (2012). *Internet World Stats: Usage and Population Statistics.* Retrieved at http://www.internetworldstats.com/asia.htm

Baba, A. (1997), *Statistical research in education and the social sciences*. Publisher Universiti Kebangsaan Malaysia.

Bybee, K. (2004). Well Intervention and Control: Offshore Applications of Underbalanced-Drilling Technology. *Journal of petroleum technology*, 56(01), 51-52.

Bahr, N. J. (2014). *System safety engineering and risk assessment: a practical approach*. CRC Press.

Baker Hughes Incorporated. (2010). Rotary Rig Count. Houston, *TX: Baker Hughes Incorporated.*

Baker, S. P., Shanahan, D. F., Haaland, W., Brady, J. E., & Li, G. (2011). Helicopter crashes related to oil and gas operations in the Gulf of Mexico. *Aviation, space, and environmental medicine*, *82*(9), 885-889.

Bamberger, M., & Oswald, R. E. (2012). Impacts of gas drilling on human and animal health. *New solutions: a journal of environmental and occupational health policy*, *22*(1), 51-77.

Bano, M., Zowghi, D., & da Rimini, F. (2017). User satisfaction and system success: an empirical exploration of user involvement in software development. *Empirical Software Engineering*, 22(5), 2339-2372.

Barakat, E. R., Barber, J. C., & Wood, J. (2010, January). Achieving Sustainable Incident-Free Operations Through Managing the Human Factor: A Success

Story of Applying E-Colors. In *SPE Annual Technical Conference and Exhibition*. Society of Petroleum Engineers.

Baram, M. S. (2010). Preventing accidents in offshore oil and gas operations: The US approach and some contrasting features of the Norwegian approach.

Barna (2003). Knowledge management: A critical e-business strategic factor. Unpublished Master's Thesis, San Diego State University, USA.

Bavon, A. (1995). Innovations in performance measurement systems: a comparative perspective. *International Journal of Public Administration*, 18(2-3), 491-519.

Beijerse (2000). Knowledge management in small and medium sized companies: knowledge management for entrepreneurs. Journal of Knowledge Management, 4(2), 162-179.

Bennear, L. S. (2015). Offshore Oil and Gas Drilling: A Review of Regulatory Regimes in the United States, United Kingdom, and Norway. *Review of Environmental Economics and Policy*, reu013.

Bergh, L. I. V., Ringstad, A. J., Leka, S., & Zwetsloot, G. I. (2014). Psychosocial risks and hydrocarbon leaks: an exploration of their relationship in the Norwegian oil and gas industry. *Journal of Cleaner Production*, *84*, 824-830.

Biswas, G., & Anand, T. S. (2013). A decision support system shell for mixed initiative reasoning. *Journal of the Indian Institute of Science*, *67*(11&12), 465.

Bjerga, T., & Aven, T. (2015). Adaptive risk management using new risk perspectives–an example from the oil and gas industry. *Reliability Engineering & System Safety*, 134, 75-82.

Blackley, D. J., Retzer, K. D., Hubler, W. G., Hill, R. D., & Laney, A. S. (2014). Injury rates on new and old technology oil and gas rigs operated by the largest United States onshore drilling contractor. *American journal of industrial medicine*, *57*(10), 1188-1192.

Bonett, D. G., & Wright, T. A. (2015). Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning. *Journal of Organizational Behavior*, *36*(1), 3-15.

Boyle, M. D., Payne-Sturges, D. C., Sangaramoorthy, T., Wilson, S., Nachman, K. E., Babik, K., ... & Sapkota, A. (2016). Hazard ranking methodology for assessing health impacts of unconventional natural gas development and production: The Maryland case study. *PloS one*, 11(1), e0145368.

Brannen, J. (2005). Mixing methods: The entry of qualitative and quantitative approaches into the research process. *International Journal of Social Research Methodology, 8*(3), 173-184.

Brittingham, M. C., Maloney, K. O., Farag, A. M., Harper, D. D., & Bowen, Z. H. (2014). Ecological risks of shale oil and gas development to wildlife, aquatic resources and their habitats. *Environmental science & technology*, *48*(19), 11034-11047.

Bryman. (Ed.). (2008). *Social Research Methods* (3, Revised ed.). Oxford/GB: Oxford University Press

Bullard D. Wyoming Occupational Fatalities, (2011). Wyoming Department of *Workforce Services*.Available from: http://doe.state.wy.us/lmi/trends/0912/a3

Bureau of Labor Statistics. (2008). Occupational Injuries.Washington, *DC: United States Department of Labor.*

Bureau of Labor Statistics. (2012). Census of Fatal Occupational Injuries. *Washington, DC: United States Department of Labor.*

Caldwell, B., & Hinton, J. (2015, March). Data Drilling: Changing the Way the Oil and Gas Industry Manages Safety and Risk. In *SPE E&P Health, Safety, Security and Environmental Conference-Americas*. Society of Petroleum Engineers.

Carneiro (2001). The role of intelligent resources in knowledge management. Journal of Knowledge Management, 5(4), 358-367.

Cascante, L. P., Plaisent, M., Maguiraga, L., & Bernard, P. (2002). The impact of expert decision support systems on the performance of new employees. *Information Resources Management Journal (IRMJ)*, *15*(4), 64-78.

Centers for Disease Control and Prevention. (2013). Fatal injuries in offshore oil and gas operations-United States, 2003-2010. *MMWR. Morbidity and mortality weekly report*, *62*(16), 301.

Centner, T. J. (2013). Oversight of shale gas production in the United States and the disclosure of toxic substances. *Resources Policy*, *38*(3), 233-240.

Chan, L. A., Chua, H. L., & Chan, K. L. (2002). Knowledge management practices: a study of MSC-status companies. *unpublished academic dissertation, Multimedia University, Melaka*.

Chan, R. K., King, B. T., Renz, E. M., & Cancio, L. C. (2014). Traumatic injuries incidental to hydraulic well fracturing: a case series.

Chandrasekaran, S., & Kiran, A. (2015). Accident Modelling and Risk Assessment of Oil and Gas Industries. In *Advances in Structural Engineering* (2533-2543). Springer India.

Chebel-Morello, B., Nicod, J. M., & Varnier, C. (2017). *From Prognostics and Health Systems Management to Predictive Maintenance 2: Knowledge, Reliability and Decision*. John Wiley & Sons.

Chen, Y. T., Chen, T. J., & Tsai, L. Y. (2011). Development and evaluation of multimedia reciprocal representation instructional materials. *Int. J. Phys. Sci*,*6*(6), 1431-1439.

Chourides, Longbottom, & Murphy (2003). Excellence in knowledge management: an empirical study to identify critical factors and performance measures. Measuring Business Excellence, 7(2), 29-45.

Conde, C., Lonsdale, K., Nyong, A., & Aguilar, I. (2005). Engaging stakeholders in the adaptation process. *Adaptation policy frameworks for climate change: Developing strategies, policies and measures*, 47-66.

Coronel, C., & Morris, S. (2016). *Database systems: design, implementation, & management*. Cengage Learning.

Creswell, J. W., Shope, R., Plano Clark, V. L., & Green, D. O. (2007). How interpretive qualitative research extends mixed methods research. *Research in the Schools*, *13*(1), 1-11.

Creswell, JW & Plano Clark, VL (2007), *Designing and conducting mixed methods research*, Sage Publications, United States of America.

Creswell, JW (2003), Research *design: Qualitative, quantitative, and mixed methods approaches*, 2nd ed, Sage publication United States.

Dai Qiushi, X. Z., & Yi, P. (2013). Study on the technology of offshore drilling fluid. *International Journal of Advancements in Research & Technology*, *2*(5), 246-248.

Davenport, T. H. (1999). *Knowledge management and the broader firm: strategy, advantage, and performance*. Knowledge management handbook, 2, 1-2.

Davies, Richard J., Sam Almond, Robert S. Ward, Robert B. Jackson, Charlotte Adams, Fred Worrall, Liam G. Herringshaw, Jon G. Gluyas, and Mark A. Whitehead. (2014). Oil and gas wells and their integrity: Implications for shale and unconventional resource exploitation. *Marine and Petroleum Geology 56*, 239-254.

Demirkesen, S., & Arditi, D. (2015). Construction safety personnel's perceptions of safety training practices. *International Journal of Project Management*, 33(5), 1160-1169.

DOSH (2016), *Occupational Safety and Health Master Plan 2016-2020*, Retrieved from: http://www.dosh.gov.my/index.php/en/543-public-poll/1812 strategy-in-osh-mp-2020.

Duffield, S., & Whitty, S. J. (2015). Developing a systemic lesson learned knowledge model for organizational learning through projects. *International journal of project management*, *33*(2), 311-324.

Ebrahimi, M. H., Abbasi, M., Khandan, M., Poursadeghiyan, M., Hami, M., & Biglari, H. (2016). Effects of administrative interventions on improvement of safety and health in workplace: A case study in an oil company in Iran (2011-2015). *Journal of Engineering and Applied Sciences*, *11*(3), 346-51.

Elfaki., Elshaiekh, M., & Sultan. (2008). Introducing Feature Model as a Knowledge Representation Method in Knowledge-based decision support systems. *Paper presented at the Proceedings of the Regional Development International Conference 2008 (REDICE''08) REDICE2008., Cyberjaya, Malaysia.*

Elshaiekh, M., Eldin, N., Chong, C. W., & Woods, P. C. (2011). Knowledge-based development in Sudan: Key factors affecting the use of K-BDSS Tools in small and medium-sized enterprises. *Journal of Knowledge Management Practice*, *12*(2).

Elshaiekh, N. E. M. (2011). *Key factors that influence the use of knowledge-based decision support system in medium-sized companies in Sudan*. Doctoral Thesis. Multimedia University.

Emily, P. (2013). CDC: Death by helicopter leading killer for oil and gas workers. Retrieved from http://fuelfix.com/blog/2013/04/26/cdc-death-by-helicopter-leading-killer-for-oil-and-gas-workers/

Enhances the Drilling Efficiency in a Deep Gas Exploratory Well in Saudi Arabia. *SPE Asia Pacific Oil & Gas Conference and Exhibition*. Society of Petroleum Engineers.

Ericson, C. A. (2015). *Hazard analysis techniques for system safety*. John Wiley & Sons.

Esswein, E. J., Snawder, J., King, B., Breitenstein, M., Alexander-Scott, M., & Kiefer, M. (2014). Evaluation of some potential chemical exposure risks during flowback operations in unconventional oil and gas extraction: preliminary results. *Journal of Occupational and Environmental Hygiene*, *11*(10), D174-D184.

Eitrheim, E. S., May, D., Forbes, T. Z., & Nelson, A. W. (2016). Disequilibrium of Naturally Occurring Radioactive Materials (NORM) in Drill Cuttings from a Horizontal Drilling Operation. *Environmental Science & Technology Letters*, *3*(12), 425-429.

Flick, von Kardoff, Steinke, & Ebooks (2004). A Companion to Qualitative Research, from http://public.eblib.com/EBLPublic/PublicView.do?ptiID=354934

Frazer, L., & Lawley, M. A. (2000*). Questionnaire design & administration: A practical guide,* John Wiley & Sons Australia, Brisbane.

Gardner, R. O. N. (2003). Overview and characteristics of some occupational exposures and health risks on offshore oil and gas installations. *Annals of occupational Hygiene*, *47*(3), 201-210.

Garrido Cruz, R. A., Muqeem, M. A., Alghuryafi, A. M., Duran, R. C., Hadj-Moussa, A., Mazouz, C. M., ... & Aloudat, R. (2014). *Combining Managed Pressure Drilling and Advanced Surface Gas Detection Systems Enables Early Formation Evaluation.*

Gibson M. Risk Impact Analysis Maximises Safety. “Efficiency & Drilling Cost Effectiveness: Vital in Today's Oil Price Era,” In IADC/SPE Asia Pacific Drilling Technology Conference, vol 22, Aug 2016.

Goetsch, D. L. (2010). *Occupational safety and health*. Pearson India.

Gomes, J. O., Woods, D. D., Carvalho, P. V., Huber, G. J., & Borges, M. R. (2009). Resilience and brittleness in the offshore helicopter transportation system: the identification of constraints and sacrifice decisions in pilots' work. *Reliability Engineering & System Safety*, *94*(2), 311-319.

Gonzalez, V., & Ysolda, P. (2013). *Bayesian Networks and Geographical Information Systems for Environmental Risk Assessment for Oil and Gas Site Development* (Doctoral dissertation).

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. *Journal of child psychology and psychiatry*, *38*(5), 581-586.

Guo, Z. X., Ngai, E. W. T., Yang, C., & Liang, X. (2015). An RFID-based intelligent decision support system architecture for production monitoring and scheduling in a distributed manufacturing environment. *International journal of production economics*, *159*, 16-28.

Haavik, T. K. (2011). Challenging controversies: A prospective analysis of the influence of new technologies on the safety of offshore drilling operations. *Journal of Contingencies and Crisis Management*.

Handal, A. (2013, April). Safety barrier analysis and hazard identification of blowout using managed pressure drilling compared with conventional drilling. In IADC/SPE Managed Pressure Drilling and Underbalanced Operations Conference and Exhibition. Society of Petroleum Engineers.

Harrison, R. J. (2016). Sudden deaths among oil and gas extraction workers resulting from oxygen deficiency and inhalation of hydrocarbon gases and vapors—United States, January 2010–March 2015. *MMWR. Morbidity and mortality weekly report*, *65*.

Hassanain, M. A., & Iftikhar, A. (2015). Framework model for post-occupancy evaluation of school facilities. *Structural Survey*, *33*(4/5), 322-336.

Hays, J., Finkel, M. L., Depledge, M., Law, A., & Shonkoff, S. B. (2015). Considerations for the development of shale gas in the United Kingdom.*Science of The Total Environment*, *512*, 36-42.

Heinecke, J., Jabbari, N., & Meshkati, N. (2014). The Role of Human Factors Considerations and Safety Culture in the Safety of Hydraulic Fracturing (Fracking). *Journal of Sustainable Energy Engineering*, *2*(2), 130-151.

Hester, S. E., Merrill, L. D., & Lloyd, C. R. (2014). *U.S. Patent No. 20,140,353,252*. Washington, DC: U.S. Patent and Trademark Office.

Hidayat, A. M., Irawan, F., & Iskandar, Y. P. (2017). Breakthrough in Tripping and Running Completion System Technique During Underbalanced Drilling Operation Changes the Horizon in West Java Field Future Development.

Hill, R., Retzer, K., O'Connor, M., Lincoln, J., & Gunter, M. (2014, March). Fatal Injuries in Offshore Oil and Gas Operations: United States, 2003-2010. In *SPE International Conference on Health, Safety, and Environment*. Society of Petroleum Engineers. https://www.osha.gov/SLTC/oilgaswelldrilling/safetyhazards.html

Hillson, D., & Murray-Webster, R. (2017). *Understanding and managing risk attitude*. Routledge.

Ijab, M. T., Anwar, R., & Hamid, S. (2004). Teaching and learning of e-commerce courses via hybrid e-learning model in Unitar. *Journal of Electronic Commerce in Organizations (JECO)*, *2*(2), 78-94.

Imran, Z. (2008). Item Analysis Assumption. *Difficulty & Discrimination Indexes 3*(7), 47-142.

Ingraffea, A. R., Wells, M. T., Santoro, R. L., & Shonkoff, S. B. (2014). Assessment and risk analysis of casing and cement impairment in oil and gas wells in Pennsylvania, 2000–2012. *Proceedings of the National Academy of Sciences*, *111*(30), 10955-10960.

Ishimatsu, T., Doufene, A., Alawad, A., & de Weck, O. (2017). Desalination network model driven decision support system: A case study of Saudi Arabia. *Desalination*, *423*, 65-78.

Jackson, R. B. (2014). The integrity of oil and gas wells. *Proceedings of the National Academy of Sciences*, *111*(30), 10902-10903.

Jennex., & Olfman. (2002). Organizational Memory/Knowledge Effects on Productivity: A Longitudinal Study. Proceedings of the annual hawaii international conference on system sciences (conf 35), 109.

Johansson, R. (2015, September). The Importance of Active Choices in Hazard Analysis and Risk Assessment. In *CARS 2015-Critical Automotive applications: Robustness & Safety*.

Kahlon, K. S. (2014). An embedded fuzzy decision support system for adaptive WFQ scheduling of IEEE 802.16 networks. *Decision support systems with Applications 41*(16), 7621-7629.

Karpov, A. A., Vakhrushev, S. A., Sitdikov, M. R., Zdolnik, S. E., & Kuzmin, A. M. (2014). Well Control and Management: Killing Fluids for Oil Fields of JSOC Bashneft. In *SPE Russian Oil and Gas Exploration & Production Technical Conference and Exhibition*. Society of Petroleum Engineers.

Kassotis, C. D., Klemp, K. C., Vu, D. C., Lin, C. H., Meng, C. X., Besch-Williford, C. L., ... & Isiguzo, C. J. (2015). Endocrine-disrupting activity of hydraulic fracturing chemicals and adverse health outcomes after prenatal exposure in male mice. *Endocrinology*, 156(12), 4458-4473.

Keaveney, S. M., & Parthasarathy, M. (2001). Customer switching behavior in online services: An exploratory study of the role of selected attitudinal, behavioral, and demographic factors. *Journal of the academy of marketing science*, *29*(4), 374-390.

Khakzad, N., Khan, F., & Amyotte, P. (2013). Quantitative risk analysis of offshore drilling operations: A Bayesian approach. *Safety science*, *57*, 108-117.

Klein, M., & Methlie, L. B. (2009). *Knowledge-based decision support systems with applications in business: a decision support approach*. John Wiley & Son Ltd.

Kothari, C. R. (2004). *Research methodology: Methods and techniques (2nd Ed)*. Publisher, New Age International. India.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educ Psychol Meas*.

Krueger, RA & Casey, MA (2009), Focus groups: *A practical guide for applied research*, 4th edn, Sage Publications, Thousand Oaks.

Kulkarni, P. P. (2013). A literature review on training and development and quality of work life. *Computers & Geosciences*, *53(7)*, 70-75.

Laskar, S. (2017, April). A Holistic Approach to Sustainable Operational Risk Assessments in E&P Industry. In *SPE Health, Safety, Security,* *Environment, & Social Responsibility Conference-North America*. Society of Petroleum Engineers.

Leveson, N. (2015). A systems approach to risk management through leading safety indicators. *Reliability Engineering & System Safety*, *136*, 17-34.

Lewis, W. E. (2016). *Software testing and continuous quality improvement*. CRC press.

Lilley, J., & Firestone, J. (2013). The effect of the 2010 Gulf oil spill on public attitudes toward offshore oil drilling and wind development. *Energy Policy*, *62*, 90-98.

Lincoln, J. M., O'Connor, M. B., Retzer, K. D., Hill, R. D., Teske, T. D., Woodward, C. C& Conway, G. A. (2013). Occupational fatalities in Alaska: two decades of progress, 1990-1999 and 2000-2009. *Journal of safety research*, *44*, 105-110.

Liu, E. Z. F., Kou, C. H., Lin, C. H., Cheng, S. S., & Chen, W. T. (2008). Developing multimedia instructional material for robotics education. *WSEAS Transactions on Communications*, *7*(11), 1102-1111.

Macdonald, I. I., John, T., & Macdonald III, J. T. (2014). *U.S. Patent No. 20,140,371,485*. Washington, DC: U.S. Patent and Trademark Office.

Magrabi, F., Aarts, J., Nohr, C., Baker, M., Harrison, S., Pelayo, S., & Coiera, E. (2013). A comparative review of patient safety initiatives for national health information technology. *International journal of medical informatics*, *82*(5), e139-e148.

Mahmoud, S. H., & Alazba, A. A. (2014). Identification of potential sites for groundwater recharge using a GIS-based decision support system in Jazan region-Saudi Arabia. *Water resources management*, *28*(10), 3319-3340.

Majowicz, S. E., Hammond, D., Dubin, J. A., Diplock, K. J., Jones-Bitton, A., Rebellato, S., & Leatherdale, S. T. (2017). A longitudinal evaluation of food safety knowledge and attitudes among Ontario high school students following a food handler training program. *Food Control*, *76*, 108-116.

Mannan, M. S., Mentzer, R. A., Rocha-Valadez, T., & Mims, A. (2014). Offshore Drilling Risks: Study Risk indicators have varying impact on mitigation. *Oil & Gas Journal*, *112*(5), 64-69.

Manuele, F. A. (2005). Risk assessment and hierarchies of control. *Professional Safety*, *50*(5), 33-39.

Marsters, P., Alvarez, F. C., de Leon Barido, D. P., Siegner, L., & Kammen, D. M. (2015). An Analysis of the Environmental Impacts of the Extraction of Shale Gas and Oil in the United States with Applications to Mexico.

Marti, B. S., Bauser, G., Stauffer, F., Kuhlmann, U., Kaiser, H. P., & Kinzelbach, W. (2013). A decision support system for real-time well field management. *Integrated Water Resources Management in a Changing World: Lessons Learnt and Innovative Perspectives*, 43(2).

Mason, K. L. (2017). Occupational Fatalities Resulting from Falls in the Oil and Gas Extraction Industry, United States, 2005–2014. *MMWR. Morbidity and Mortality Weekly Report*, *66*.

Mason, K. L., Retzer, K. D., Hill, R., & Lincoln, J. M. (2015). Occupational fatalities during the oil and gas boom United States, 2003-2013. *Morbidity and Mortality Weekly Report*, *64*(20), 551-554.

McFarland, M. B., & Petrie, T. A. (2012). Male body satisfaction: Factorial and construct validity of the Body Parts Satisfaction Scale for men. *Journal of counseling psychology*, *59*(2), 329.

McNamara, C. (2008). Overview of methods to collect information. Basic Guide to Program Evaluation. *Minneapolis, MN,* Free Management Library.

Mendes, P. A., Hall, J., Matos, S., & Silvestre, B. (2014). Reforming Brazil′ s offshore oil and gas safety regulatory framework: Lessons from Norway, the United Kingdom and the United States. *Energy Policy*, 74, 443-453.

Meng, Q. (2016). The spatiotemporal characteristics of environmental hazards caused by offshore oil and gas operations in the Gulf of Mexico. *Science of the Total Environment*, *565*, 663-671.

Merriënboer, J. J., & Martens, R. (2002). Computer-based tools for instructional design: An introduction to the special issue. *Educational Technology Research and Development*, *50*(4), 5-9.

Meyer, N., Cho, J. J., & Phillips, R. G. (2014, September). Mitigating HSE Risks for Oil & Gas Services using a Comprehensive Risk Management Program during New Product Development. In *SPE Middle East Health, Safety,* *Environment & Sustainable Development Conference and Exhibition*. Society of Petroleum Engineers.

Mishra, P. K., Kumar, R. V., Al-Kanderi, J., Baillet, R., Maury, G., Dubille, M & Al Saeed, H. (2017, June). Integrated Workflow for Prediction of Drilling Hazards Due to High Pore Pressures in North Kuwait Fields. In *79th EAGE Conference and Exhibition 2017*.

Mode NA, Conway G. 2008. Fatalites among oil and gas extractionworkers — *United States 2003 –2006*, (16), 429 –431.

Moridis, G. J., Reagan, M. T., Anderson Kuzma, H., Blasingame, T. A., Wayne Huang, Y., Santos, R & Nikolaou, M. (2013). SeTES: A self-teaching decision support system for the analysis, design, and prediction of gas production from unconventional gas resources. *Computers & Geosciences*, *58*, 100-115.

Mosa, A. M., Rahmat, R. A. O., Ismail, A., & Taha, M. R. (2013). Decision support system to control construction problems in flexible pavements. *Computer Aided Civil and Infrastructure Engineering*, *28*(4), 307-323.

Muehlenbachs, L., Cohen, M. A., & Gerarden, T. (2013). The impact of water depth on safety and environmental performance in offshore oil and gas production. *Energy Policy*, *55*, 699-705.

Mulloy, K. B. (2014). Occupational health and safety considerations in oil and gas extraction operations. *The Bridge*, *44*(3).

Musen, M. A., Middleton, B., & Greenes, R. A. (2014). Clinical decision-support systems. In *Biomedical informatics* (pp. 643-674). Springer, London.

Myers, D. K. (2015). *Environment, Health & Safety Acquisition Integration* Doctoral Thesis. Rensselaer Polytechnic Institute.

Nagori, V., & Trivedi, B. (2014). Types of Decision support system: Comparative Study. *Asian Journal of Computer and Information Systems*, *2*(2).

Nandha, M., & Faff, R. (2008). Does oil move equity prices? A global view. *Energy Economics*, *30*(3), 986-997.

National Institute for Occupational Safety and Health (2014), NIOSH Cincinnati, OH: *Department of Health and Human Services; Centers for Disease Control and Prevention*,*12*(5).

Newman, L. S. (2014). Oil and gas drilling industry: Health and safety training challenges. *Journal of industrial hazards*.

Nie, W., Wu, Y., & Hu, D. (2014). Scoring System of Simulation Training Platform Based on Decision support system. In *Computer Engineering and Networking (809-816)*. Springer International Publishing.

Noble, F., Thet, W. N., Muir, K., Chanpen, C., Utama, B., Budi, I. M. G., & Won, K. S. W. (2014). Installation of Long Interval Conductor String across Challenging Offshore Drilling Environment. In International *Petroleum Technology Conference*. International Petroleum Technology Conference.

Nolan, D. P. (2014). *Handbook of fire and explosion protection engineering principles: for oil, gas, chemical and related facilities*. William Andrew

Olah, G. A., Goeppert, A., & Prakash, G. S. (2011). *Beyond oil and gas: the methanol economy*. John Wiley & Sons.

Olajire, A. A. (2015). A review of oilfield scale management technology for oil and gas production. *Journal of Petroleum Science and Engineering*, *135*, 723-737.

Oluwatayo, J. A. (2012). Validity and reliability issues in educational research. *Journal of Educational and Social Research*, 2(2), 391-400.

Onwe, O. J. (2014). Problems and Prospect of Labor Management Relations in the Nigerian Oil and Gas Industry: Some Conceptual and Contextual Issues. *Journal of Human Resources*, *2*(2), 113-128.

Orban, J. (2012). *U.S. Patent No. 8,113,302*. Washington, DC: U.S. Patent and Trademark Office.

OSHA. (2016). Safety Hazards Associated with Oil and Gas Extraction Activities.

Ouimet, J, Bunnage, J, Carini, R, Kuh, G & Kennedy, J 2004, 'Using focus groups, expert advice, and cognitive interviews to establish the validity of a college student survey', *Research in Higher Education*, *45*(3), 233-250.

Park, H. M. (2015). Univariate analysis and normality test using SAS, Stata, and SPSS.

Penning, T. M., Breysse, P. N., Gray, K., Howarth, M., & Yan, B. (2014). Environmental health research recommendations from the inter-environmental health sciences core center working group on unconventional natural gas drilling operations. *Environmental health perspectives*, *122*(11), 1155.

Peterson, C. (2003). Bringing ADDIE to life: Instructional design at its best. *Journal of Educational Multimedia and Hypermedia*, *12*(3), 227-241.

Piro, G., Grieco, L. A., Boggia, G., Capozzi, F., & Camarda, P. (2011). Simulating LTE cellular systems: an open-source framework. *Vehicular Technology, IEEE Transactions on*, *60*(2), 498-513.

Popper, M., & Gyärfäš, F. (2012). Rated in our diagnostic decision support system CODEX. Their principles. *Medical Informatics Europe 85: Proceedings, Helsinki, Finland August 25–29, 1985*, *25*, 163.

Pranesh, V., Palanichamy, K., Saidat, O., & Peter, N. (2017). Lack of dynamic leadership skills and human failure contribution analysis to manage risk in deep water horizon oil platform. *Safety science*, *92*, 85-93.

Pribadi, Mohamad Fauzan Amir, and Tomy W. Poerwanto (2014), Production Facilities Maintenance Information System: a Decision Support System for Maintaining National Oil and Gas Production Facilities.

Probart, R. (2013). Training and development treasures: on the cover. *HR Future*, 18-20.

Qadir, M. I., Asrar, M. (2011). Gas hydrates: A fuel for future but wrapped in drilling challenges. In *SPE/PAPG Annual Technical Conference*. Society of Petroleum Engineers.

Rai, A., Vudathu, B., Vieira, P., & Torres, F. (2011). The Challenges and Results of Applying Managed Pressure Drilling Techniques on an Exploratory Offshore Well in India: A Case History. In *IADC/SPE Managed Pressure Drilling and Underbalanced Operations Conference & Exhibition*. Society of Petroleum Engineers.

Renner, R. E. (2010). Cable Tool Drilling Webinar, In *Webinar Archive*, *(2)*, 8-19.

Retzer KD, Hill R, Pratt SG. (2013). Motor vehicle fatalities among oiland gas extraction workers. *Accident Analysis Preview*,168 –174.

Retzer, K., Hill, R., Mason, K., & Ridl, S. (2015, January). Fatalities in the US Oil and Gas Extraction Industry: Recent Trends and New Details. In *ASSE Professional Development Conference and Exposition*. American Society of Safety Engineers.

Retzer, K., Hill, R., Mason, K., & Ridl, S. (2016). Fatalities in the US Oil & Gas Extraction Industry. *Transportation*, *479*, 1-7.

Rezaei, A. R., & Lovorn, M. (2010). Reliability and validity of rubrics for assessment through writing. *Assessing writing*, *15*(1), 18-39.

Ridenour, C & Newman, I (2008), *Mixed methods research: Exploring the interactive continuum*, Carbondale: Southern Illinois University Press.

Ronconi, R. A., Allard, K. A., & Taylor, P. D. (2015). Bird interactions with offshore oil and gas platforms: Review of impacts and monitoring techniques. *Journal of environmental management*, *147*, 34-45.

Ronen, S., Rokkan, A., Bouraly, R., Valsvik, G., Larson, L., Ostensvig, E. & Swanson, M. (2012). Imaging shallow gas drilling hazards under three Forties oil field platforms using ocean-bottom nodes. *The Leading Edge*, *31*(4), 465-469.

Rubright, S. (2017). *Cyanide and Hydrogen Sulfide: a review of two blood gases, their environmental sources, and potential risks*. Doctoral Thesis. University of Pittsburgh.

Saad, S., Mohamed Udin, Z., & Hasnan, N. (2014). Dynamic Supply Chain Capabilities: A Case Study in Oil and Gas Industry. *International Journal of Supply Chain Management*, *3*(2), 70-76.

Sale, J. E., Lohfeld, L. H., & Brazil, K. (2002). Revisiting the quantitative-qualitative debate: Implications for mixed-methods research. *Quality and quantity*, *36*(1), 43-53.

Salkind, N.J. (2005). Exploring Research. 6th edition.

Samuel, R. (2014). Horizontal Drilling Engineering-Theory, Methods and Applications. SigmaQuadrant Publisher.

Sawyer, G. L., Lochhead, I., Marshall, D. S., Mckenzie, T. J., Vickers, S. R., Peytchev, P. A & Kosandar, B. (2011). The Contribution Of Synthetic Based Non-Aqueous Drilling Fluids To The Successful Development Of Mangala Field Indias Largest Onshore Oilfield. In *SPE Asia Pacific Oil and Gas Conference and Exhibition*. Society of Petroleum Engineers.

Schlumberger, (2013), Oil field Glossary, *Eng Policy*, *12*, 1-7.

Sharda, R., Delen, D., & Turban, E. (2013). *Business Intelligence: A Managerial Perspective on Analytics*. Prentice Hall Press.

Shen, C. (2009). *Investigating measurement richness effect on the relationship between information technology use and individual performance*. Doctoral Thesis. Concordia University.

Shultz, J. M., Walsh, L., Garfin, D. R., Wilson, F. E., & Neria, Y. (2014). The 2010 Deepwater Horizon Oil Spill: The Trauma Signature of an Ecological Disaster. *The journal of behavioral health services & research*, 1-19.

Simon, D., Hogarth, P., Raiffa, S. (1987). Decision Making and Problem Solving. Interfaces, 17(5).

Simon, M., Wraight, P., Stoller, C., Stephenson, K. E., & Bazarko, A. (2014). *U.S. Patent Application, (14), 281-945*.

Skiba, A., Doig, D., Marcella, R., & Pirie, T. (2014, September). Tick Safety Not Boxes: Competency and Compliance in The Oil and Gas Industry. In *ASSE Professional Development Conference and Exposition*. American Society of Safety Engineers.

Skogdalen, J. E., & Vinnem, J. E. (2012). Quantitative risk analysis of oil and gas drilling, using Deepwater Horizon as case study. *Reliability Engineering & System Safety*, *100*, 58-66.

Skogdalen, J. E., Khorsandi, J., & Vinnem, J. E. (2012). Evacuation, escape, and rescue experiences from offshore accidents including the Deepwater Horizon. *Journal of loss prevention in the process industries*, *25*(1), 148-158.

Smith, M. (2014). Adult learning and industrial training. *Education for Adults: Volume 1 Adult Learning and Education*, *83*, 94.

Soeder, D. J., Sharma, S., Pekney, N., Hopkinson, L., Dilmore, R., Kutchko, B., & Capo, R. (2014). An approach for assessing engineering risk from shale gas wells in the United States. *International Journal of Coal Geology*,*126*, 4-19.

Soleimani, M., & Pourgol-Mohammad, M. (2014). Design for reliability of complex system with limited failure data; case study of horizontal drilling equipment. *Proceedings of the Probabilistic Safety Assessment and Management PSAM*, *12*.

Speight, J. G. (2014). *The chemistry and technology of petroleum*. CRC press.

Spiegelhalter, D. J., Franklin, R. C., & Bull, K. (2013). Assessment, criticism and improvement of imprecise subjective probabilities for a medical decision support system. *arXiv preprint arXiv:1304.1529*.

Steiner, M. F., & Ormerod, A. D. (2012). Oil Rig Workers. In *Kanerva's Occupational Dermatology* (pp. 1585-1596). Springer Berlin Heidelberg.

Stephenson, S. R., & Agnew, J. A. (2016). The work of networks: Embedding firms, transport, and the state in the Russian Arctic oil and gas sector. *Environment and Planning A*, *48*(3), 558-576.

Strezov, V., Markovska, N., & Karanfilovska, M. (2016). 18 Sustainability of Minerals Processing and Metal Production for European Economies in Transition. *Sustainability in the Mineral and Energy Sectors*.

Summerhayes, C. (2011). Deep water–the gulf oil disaster and the future of offshore drilling. *Underwater Technology*, *30*(2), 113-115.

Sung, Y. T., Chang, K. E., & Liu, T. C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education*, *94*, 252-275.

Tan, C., Wahidin, L. S., & Khalil, S. N. (2014). An Architecture Framework of Design for Assemble Decision support system.

Tashakkori, A & Teddlie, C (2003), *Handbook of mixed methods in social & behavioral research,* Sage Publications, Inc.

The world's worst offshore oil rig disasters, 2014, retrieved from: www.offshoretechnology.com

Tayab, M. R., Valappil, S., Al Yammani, S., & Shepherd, J. (2016, November). Drilling Safe Wells Through Efficient, Rapid and Site Specific Planningto Manage Risks & Improve Performance. In *Abu Dhabi International Petroleum Exhibition & Conference*. Society of Petroleum Engineers.

Torres, L., Yadav, O. P., & Khan, E. (2016). A review on risk assessment techniques for hydraulic fracturing water and produced water management implemented in onshore unconventional oil and gas production. *Science of the Total Environment*, *539*, 478-493.

Utvik, T. I. R., & Jahre-Nilsen, C. (2016, April). The Importance of Early Identification of Safety and Sustainability Related Risks in Arctic Oil and

Gas Operations. In *SPE International Conference and Exhibition on Health, Safety, Security, Environment, and Social Responsibility*. Society of Petroleum Engineers.

Varonen, U., & Mattila, M. (2000). The safety climate and its relationship to safety practices, safety of the work environment and occupational accidents in eight wood-processing companies. *Accident Analysis & Prevention*, *32*(6), 761-769.

Vengosh, A., Jackson, R. B., Warner, N., Darrah, T. H., & Kondash, A. (2014). A critical review of the risks to water resources from unconventional shale gas development and hydraulic fracturing in the United States. *Environmental science & technology*, *48*(15), 8334-8348.

Vesper, J. L., Kartoğlu, Ü., Herrington, J., & Reeves, T. C. (2016). Incorporating risk assessment into the formative evaluation of an authentic e-learning program. *British Journal of Educational Technology*, *47*(6), 1113-1124.

Walsh, M. (2003). Teaching qualitative analysis using QSR NVivo. *The Qualitative Report*, *8*(2), 251-256.

Wang, H., Dong, P., Liu, H., & Xing, L. (2017). Development of an autonomous treatment planning strategy for radiation therapy with effective use of population-based prior data. *Medical physics*, *44*(2), 389-396.

Wang, Z., Yin, D., Luo, Y., Liang, H., Yang, L., & Lu, H. (2013). Corrosion and Its Inhibition in Water-Based Drilling Fluid Used in Onshore Oilfied. *Natural Resources*, *4*, 456.

Water, D. (2011). The gulf oil disaster and the future of offshore drilling. *Report to the President of the USA*.

Witter, R. Z., McKenzie, L., Stinson, K. E., Scott, K., Newman, L. S., & Adgate, J. (2013). The use of health impact assessment for a community undergoing natural gas development. *American journal of public health*, *103*(6), 1002-1010.

Witter, R. Z., Tenney, L., Clark, S., & Newman, L. S. (2014). Occupational exposures in the oil and gas extraction industry: state of the science and research recommendations. *American journal of industrial medicine*, *57*(7), 847-856.

Wolfe, D. E. (2016). Mindfulness-Based Safety: Increasing Attention to Task in Alberta's Oil and Gas Drilling and Completions Operations.

Xu, J. H., & Fan, Y. (2014). An individual risk assessment framework for high-pressure natural gas wells with hydrogen sulfide, applied to a case study in China. Safety Science, 68, 14-23.

Yang, L., Geng, X., & Cao, X. (2015). A knowledge factor space model on multi–decision support systems for oil–gas reservoir protection. *International Journal of Industrial and Systems Engineering*, *19*(1), 1-17.

Yoo, C. W., Kim, Y. J., & Sanders, G. L. (2015). The impact of interactivity of electronic word of mouth systems and E-Quality on decision support in the context of the e-marketplace. *Information & Management*, *52*(4), 496-505.

Yoo, C. W., Goo, J., Huang, C. D., Nam, K., & Woo, M. (2016). Improving travel decision support satisfaction with smart tourism technologies: A framework of tourist elaboration likelihood and self-efficacy. *Technological Forecasting and Social Change*.

Yuan, J. L., Deng, J. G., Tan, Q., Yu, B. H., & Jin, X. C. (2013). Borehole stability analysis of horizontal drilling in shale gas reservoirs. *Rock Mechanics and Rock Engineering*, *46*(5), 1157-1164.

Zsambok, C. E. (2014). *Naturalistic decision making*. Psychology Press.