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Linking asset management implementation to process safety performance and SHE risks

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Title

Linking asset management implementation to process safety performance and SHE risks.

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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in fulfilment of the requirements for the degree of Masters of Science in Engineering (Industrial Engineering)

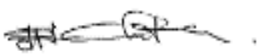
Johannesburg 2020

DECLARATION

I, Jealous Chitima, (Student number: 1285596) herewith submit the research report, in partial fulfilment of the requirements for the degree of Masters of Science in Engineering.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and / or without acknowledging the original source) is wrong;
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- I have followed the required conventions in referencing the thoughts and ideas of others;
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Signature:  Date: 10 October 2020

ABSTRACT

The purpose of this research was to identify how hazardous chemical process operations present a unique challenge to decision makers on how to manage assets, while concurrently considering how effective asset management (AM) effects process safety (PS) performance. The study was conducted at a division of an integrated hazardous chemical company in South Africa

The study was conducted in two stages. The first stage was to develop a theoretical framework for asset management and process safety management (PSM) capability assessment from literature. This was done by reviewing the concept of asset management and the life cycle of assets and process safety management concepts in a hazardous chemical operations. The result was the identification of the stages of an asset in its life cycle and the PSM concepts

The second stage of the study was to assess the link between the asset management life cycle standards and the PSM elements to gain a better understanding of the relationship between AM and PSM. The researcher utilised information from the published papers that are in the public domain and some information available from a South African chemical operation. Additionally, the researcher used some data from the data base of a hazardous chemical operations company that tracked the chemical process plants' asset management practices prior to and after the implementation of an asset management driven project. The researcher analysed process safety performance data prior to the AM project program initiation and process safety performance for a period of five years, post AM program. The AM project was executed over a period of two years. The process involved the analysis of records of the root cause analyses of process safety incidents, management actions taken, technical audits on the maturity level of AM life cycle standards prior to and post execution of the AM program and similarly compared the performance of PSM through the recorded number of incidents and the severity of process safety incidents from the hazardous chemical company. The researcher further, conducted interviews to assist in the identification of key assessment areas. The general results indicate that there could be a relationship between the asset life cycle stages and process safety management elements.
The theoretical framework from the research papers and the results of the survey were used to affirm the status quo and identify gaps or overlaps, which exist in the linkage of asset management life cycle and process safety performance to determine what could

be improved on the current relationship between asset management and process safety performance.

Recommendations are given on what could be done to better understand improvements needed to integrate or minimise duplication of roles and duties in the management of assets and process safety in hazardous chemical operation companies.