The Intensification of Interplanetary Within the Laboratory Through Fabricating Steel Material into Shelve

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Abstract

There is a discovery of space limitless within the laboratories particularly for universities. This is centered on the multifunctioning university laboratory that generate practical for semester and yearly students. Storages within the laboratory has shown capabilities in storing a maximum of metal and all other type of material but that reduces the available space. Space maximization project with high technical and engineering skill obligation. An early fulfillment of space with the laboratory increases the health and safety failure every year and might results in increase of injuries with the work pace. This article adopts inventory control, facilitates planning and material handling to reveal the major challenges. As university laboratories are improved in storing through engineering design to maximize space will have positive impact manufacturing industries as well by improving material control and limiting the unnecessary incidents. The statistical technique was further employed to quantify the improvements through fabrication of raw material. Results show that metal material can be protected from abstracting rust by fabricating the steel material shelves designing. A proper technology involvement to fabricate all material utilized within the laboratories still to be addressed in the future through research.

Keywords
Laboratory, Storage maximization, fabrication of raw material

1. Introduction

Fabrication of raw steel material shelves is enforced by the accumulation of material in the flow, as every time space keeps on shrinking in the eyes of supervision. Inventory control is the major conduct that can lead in improvement of organisation turnover. Steel material is one the scarce material as they are ordered in the well-established countries if your country is still in developing state. Garvey, Norman and Barrett, (2022), believe that future steel demand can be affected multiple uncertainties and be controlled by the everchanging global economy. In South Africa most of our university laboratories seem to surfer from the unavailable of space. This is the result of the accumulating material and final product. Space within university laboratories is utilised by the students, laboratory technician, laboratory equipment, raw material ordered, and finished products produced by the students. Therefore, free open space is needed to ensure numerous factors such as prevention of unnecessary incidents. In addition to this is to ensure stick is controlled properly especial steel raw material.

An unattended material ends in the wrong hands for personal reason which does not benefit the laboratories. The scope of laboratory management is to ensure safety within laboratory and control the material among others. It further creates a potential hazard to people walking around the laboratory consignment of requested steel material which was delivered and left cluttered on the laboratory floor posing hazard. This urgently necessitated a selection for a raw steel storage area and appropriate reaction from the laboratory management.

The aim of this article is to address the unavailability of space within our university laboratories. To ensure that the challenges is addressed properly, it was necessary to develop the following research questions:

- What are the root causes of the unavailability of space within the university laboratories?
- How much space will be consumed by the fabrication steel raw material shelve?
- Will developing inventory control system necessary to address the current challenge?
- What are the relevant costs and skills of developing the needed fabrication framework to control the steel raw material?

The cluttered raw material is also creating environmental degradation within the laboratory. This article will adopt inventory control, facilitates planning and material handling to address the inadFFequate cluttering material. The statistical technique will also be adopted to further analyse the impact of cluttering raw material in university laboratory surface. A recommendation of relevant improvement will be outlined to ensure continuity of the raw material control to protect affected segments such as environment and prevent potential incidents.
This article is managed in the following custom: Literature review which is section 2 deals with historical information around cluttered material and inventory control within the industrial hubs. The section 3 deals with methodology that addresses the way this study was conducted. Results section deals with data analysis, discussion and relevant recommendation on the section 4 and section 5 is the conclusion which is the last section of the study which reps up everything.

1. Literature review

1.1 An overview of steel industry

The economic vaibility of scrap recovery for use in secondary production can be determined by the global scrap prices particulary for steel (Nguyen and Robinson Fayek 2022). Griffin and Hammond (2021) has proven that steel industrial has high contribution in carbon dioxide, but has never opposed the fact that steel is still import to every industry for multfunctionality. The following graph clearly demonstrate that steel has almost 25% of carbon dioxide contribution (Figure 1).

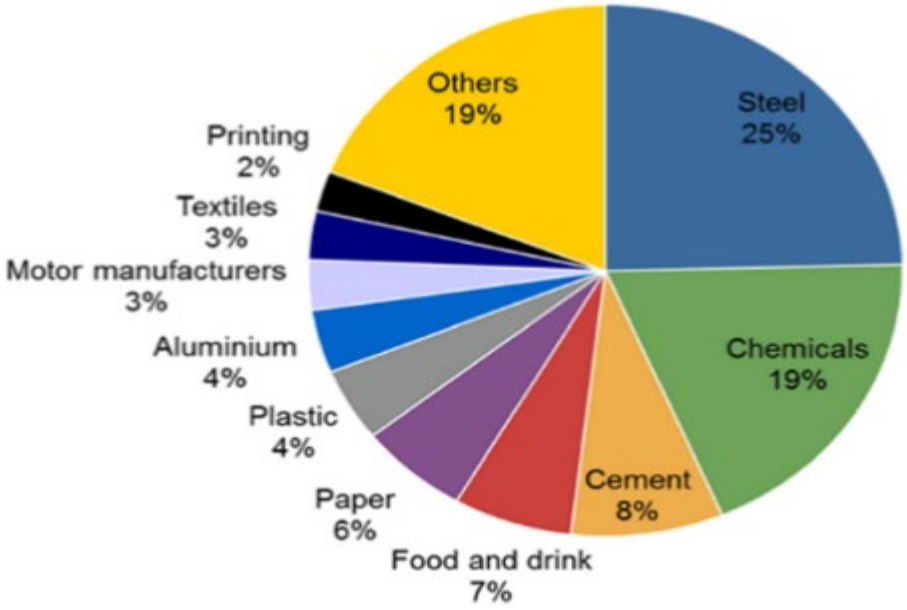

Figure 1. Greenhouse gas (GHG) emissions from well developed country (Griffin and Hammond, 2021)

1.2 Safety application in industries

Issues concerning safety in high commodity-driven sector is believed that it has become inevitable due to the impact it has in the economic state of the industry (Renganath Rao, Sathish and Raghava Rao 2021). Based on the technological importance, simulation of human-machine system is manufactured with steel material which bring cognitive mismatch between human safety and the machine by factors such as fault-tolerant and reliability of the system (Yoshikawa *et al.* 2001).

As steel material is classified as hazardous wastes and it handled require close expression as the population increase has become growing problem (Forsberg 2021). However, the physical environmental quality is pressured by the grand challenges which increase pressure in physical environment such as climate (Lenderink *et al.* 2022). Safety can being delayed by the lack of encouraging procurement method that uplift innovation (Aziz *et al.* 2019).

1.3 Fabricating raw material impact

LIU (2020), believes there are three main reasons for the ineffective development of the difficult-to-produce reserves. The first reason is due to the poor quality of resources and the difficulty of effective development, The second reason is that it is difficult to develop on an effective scale due to engineering technology limitations and the Thirdly, limited to the current system and mechanism, the motivation of effective development is not strong enough.

2. Methodology

a) Research design

It was necessary to analyse the research design to answer the initial research questions. This research consists of multiple phases for it to be successful. All these phases or stages are interconnected from investigation to raw steel fabrication design and production. Problem discovering has been the important stage for the research to continue. To proceed with the research, the next phase was necessary, which was data gathering within the laboratories and through literature concerning raw material handling within the laboratories. The utilization of collected data becomes the next stage. Here data is analysed using various techniques such as cost analyses, statistical approach and facility cause and effects diagram.

Then in the next phase data was checked for validity. Results and recommendations are addressed in the next stage when the presentation and interpretation of data is discussed. Lastly, the research conclusion is presented; this is a summary of everything discussed in this study.

To attain the objectives of this research, the study was conducted using the quantitative method. The Root cause analysis: the analysis of the major problems facing the KZN region, and its contributors revealed problems such as the environment (dramatically changing environment), manpower (lack of skill), and method (inadequate method), etc.

b) Legislation standards and resource consideration

For this project to be successful, a consideration of factors such as raw steel rods and other tubing's sizes which are only supplied in 6m lengths and steel plates that is supplied in 1.2m X 3.0m. The transportation of steel materials to the machines for cutting to sizes, an ergonomic and safety of individuals was taken to consideration. Due to limited travel of an overhead gentry and space movement for transportation of heavy steel, a selection of close area to operations machines such as guillotines, band saws and CNC plasma cutter to minimize handling. The carrying distance for the people in need for steel materials will be kept noticeably short.

An additional cost was initiated to purchase steel toe safety boots and leather gloves to hand cuts to be issued to people working with heavy steel material as a standard procedure to minimise accidents and this became mandatory to comply with health and safety legislation.

Due to budget limitations, a redundant light stores material racking was used that welds heavy steel channels footings for rigidity on the floor and welded strong wing carriers to hang most of the steel materials used here. It was also necessary designed a separate racking for heavy steel plates using the same steel channels and square steel tubing's leaned at ± 35° and 20mm high flat bar as stoppers at the edge of steel channels to prevent plates from slipping off and cause the accidents.

A fabricated adjustable height steel benches with top steel rollers feeding band saws for cutting down to size. When the cut steel requirements are met, the remaining steel materials must be immediately returned to the steel racks to promote good housekeeping, close estimates of inventory controls and management and further prevent injuries to other people.

3. Results and discussion

Based on the laboratory incident result before the fabricated raw steel material and after designed fabricated material. University laboratories are treated as place of up skilling, it has been important for innovations that are cost effective. Policies that guide innovation are even more importance to ensure sustainability within the laboratories. Lenderink *et al.* (2022) have declared that interventions of side policy procurement are in demand as they intend to increase innovation.

Fabrication of raw steel material has brought significant improvements within the laboratory as it has eliminated all the potential incident and maximizing space for free movement of all individuals that are utilising laboratory (Figure 2).

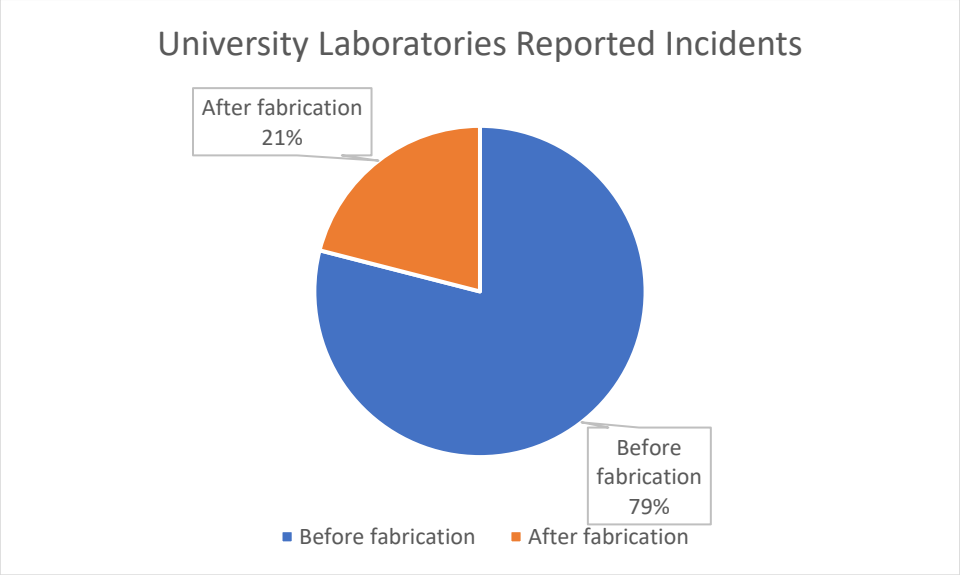

Figure 2. University laboratories reported incidents summary from the developing country

If one can note the significant improvement displayed by the number of incidents reported in the university laboratories were there has been almost 58% improvement of prevention of incidents. A very low magnitude of incidents will be expected inside the laboratory. In similar study conducted by Greenland, (2021) reveal that untreated control can be prognostically indistinguishable from treated one. The significant of utilising the skill of engineering particularly industrial engineering through oversight management, design engineering and implementing innovativeness withing the laboratories.

Designing the fabricated raw shelve using a steel material that has been unattended has improve the material handle and reordering process in the university laboratories. The figure 3 below demonstrate the material queuing system to ensure proper ordering system. The innovative idea of designing fabricated steel shelve has maximised the moving space by almost 2 metres by 14 metres (Figure 3).

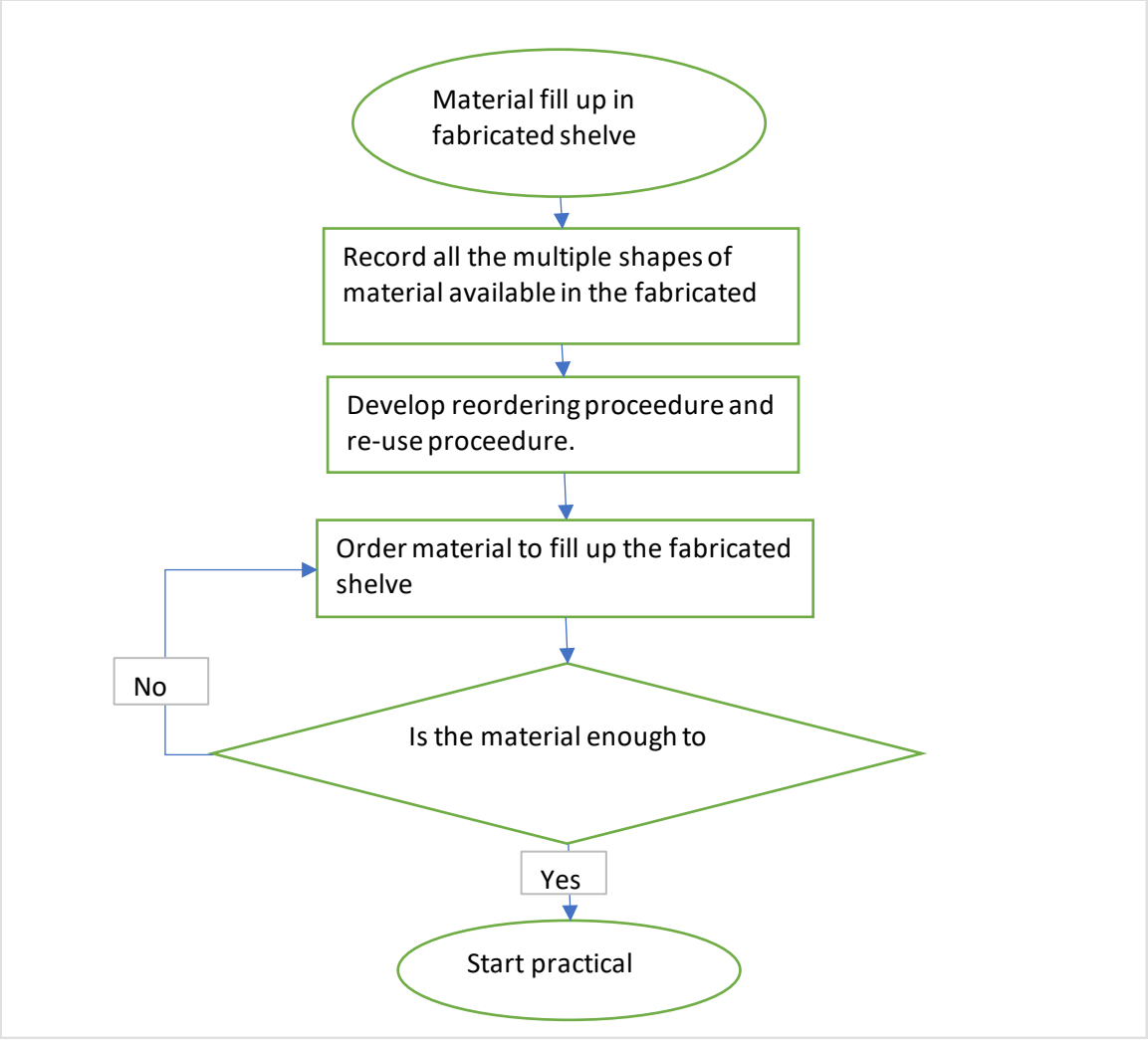

Figure 3. Flow diagram for queuing system of reordering of material

As university laboratory has using the undocumented way of reordering system which have led to steel material to overflow in the floor for unintended utilization. This has been driven by the availability of budget to be used for ordering material in the laboratory. Therefore, before any order is being processed and double checking of the fabricated steel shelves must correspond with the need of ordering. Figure 3 above clear outline the technicalities that will asking the university laboratory to function at it best through controlling inventory within the laboratory.

Technical Report & Evaluation that shows benefits of selected design.

The space constraints helped me to minimise inventory levels by ordering what is really needed for practical's, the issues and stock balances for a given period

1. The steel rack promotes good housekeeping
2. It reduces chances of accidents happening in the laboratory from the movement of these materials around the machines.
3. It also reduces chances of injuries to personnel.
4. It complies with OHS legislation in terms of safety compliance.

4. Conclusion

The importance of maximising space withing the university laboratories has been the overlooked because the group utilising the laboratories keeps on changing every semester and every year. Based on the demand of ensuring safety in the working area and implementing improvement has yield positive outcomes to the university facilities.

A root cause of the almost 58% of the incident was due to entireness of the workplace. This has created an impression that female individuals are not feet to work in the laboratory because of the level of unsafety in the

laboratory. In reducing the number of incidents was through implementing the skills of engineering and ensuring that safety majors are putted in place.

Recommendation

The end-user of the system must be trained to report the use of material so that everyone if keen to inform the laboratory to place an order. The effective use of fabricated shelve with ensure safety to the individuals if all material will be removed from the floor into the fabricated shelve. Based on the need of safe space to move around the laboratory as well. Major space should be free if it not occupied by the machines in the laboratory and proper storing shelves such as fabricated steel shelve. Demarcation of the laboratory is highly recommended for everyone to be safe and understand where he/she can walk, or which machine is found where.

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