

**FOOTWEAR INDUSTRY LEATHER CUTTING ISSUES AND
RECOMMENDATION OF WASTAGE MINIMIZATION RESEARCH
INNOVATIVE TECHNIQUES**

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Leather from different parts of the animal, its characteristics, and this has to be taken into account when using leather in several products. The main parts of the hide and skin such as the shoulder, butt, belly, and axillae are different properties in terms of strength, flexibility, and durability (Mesa *et al.*, 2019). They consumed for many types of footwear such as shoes, boots, sandals, slippers, etc. Footwear is divided into many categories such as athletic shoes also known as sneakers, galoshes, high heels, and many others. The leather clicking operation is very important for making shoe uppers mostly cow leather. Buff, goat skins are used for upper making. This operation is required a high level of skill efficiency (Elamvazhuthi *et al.*, 2009). Right now, African country's footwear industry is very faster developing based on leather sources This research already focused on the leather cutting section layout design, operation methods, time study, standard operating procedure, assorting, grading, nesting, machine maintenance, allocation sheet Stroke report, die cabinet, daily report techniques all are implemented and recommended to the African middle scale footwear sectors.

Keywords: leather, implementation, higher productivity.

INTRODUCTION

Leather is a natural material the hide/skin thickness varies all over the animal, and to get it to the right thickness it is usually split on special cutting machines or buffed to an even thickness. The main parts of the hides and skins vary property stated that K.T Sarkar (2005), such as shoulder, Butt, Belly, and Axillae. Particularly Footwear has become an important component of fashion accessories. Shoemaking is considered a traditional handcraft profession however now it has been largely taken over by the industrial manufacture of footwear (Nguyen, 2004). Nowadays a lot of materials are used for making shoes such as leather, fabrics, plastic, rubber, wood, jute fabrics, metal, etc. This leather cutting operation needs a high level of skills and knowledge otherwise the expensive leather has to be wasted. Nowadays medium sectors /African footwear sectors meet huge challenges in this primary operation of leather cutting process the quality parameters such as cost minimization, waste minimization, production efficiency, unskilled manpower, production targets, financial factors, etc. This research work was particularly focused on cutting waste minimization in Zambia's small/medium scale companies. This innovative research implemented the leather assorting, workplace cutting layout, cutting operation, time study management, standard operating procedure (SOP), leather quality grading techniques, cutting machine maintained methods, material saving techniques, cutting allocation sheet methods, cutting die allocation, damage dies cabinet systems, die checking marble stone, daily cutting stroke reports system.

RESEARCH METHODOLOGY

Selection of Leather

In footwear production commonly used for Goat skin, cow leather, buff leather, pig leather, and sheep skin. Finishing is a very important role in footwear production. Leather finishing has a lot of varieties such as full grain leather, correct grain leather, suede leather, patent leather, PU coated leather, Semi-aniline finish, pigmented finish, etc. (Alves *et al.*, 2012). Defected such as grain feel off, defected surface, poor thickness, improper finishing shade, looseness, color feel off, poor strength, testing failure, more chemical contents are shorted out the correct selection and the assorted process was followed for this research work.

Advanced Leather Grading Method

Grading is a very important factor in the footwear industry, nowadays SATRA five-point grading systems are commonly used in many countries, and grading is the key point. Commonly Grain defects, vein marks, color feel-off, poor strength, flaying cuts, and machinery defects are major problems in finished leather (Brun and Ciccullo, 2022). From this research leather inspection records, color swatches, sample shoes, inspection tools kits, and multi-light boxes are very important for the leather grading process. Based on the challenge upgraded cutting efficiency and cutting average standard was properly handled by the cutting section in the Middle sectors. This research referred to the SATRA five points grading rules and motivated the trained assorting skills. SATRA Leather grading level AQL level 1 light inspection (Accepted quality level), AQL level 2.5 – Normal inspection and AQL Level 4 (Minor leather inspection) was implemented.

Manual Nesting and Innovative Cutting Techniques

Before cutting nesting technical skill was very important for the upper leather cutting operator, finished leather has loose fiber leathers, brand marks, operation scars, open flaws, closed Flaws, wire marks, and scratches. Growth marks, fat wrinkles, veins, flay cuts, discolored finishing area, border dry area, insect or parasitic damage, etc. (Solomon, 2021). The nesting and dies interlocking technical skill, and cutting direction training were implemented by this valuable research.

Cutting Implementation and Machines Maintenance

The workplace is one of the important factors due to the research we trained key points about lack of cutting, loose leather components, uneven grain, components color matching issues, proper SOP, hourly QC report, stroke report, leather norms consumption systems, workplace safety prevention was implemented and it suggested to avoid up normal component cutting. Cutting board has two types of material cutting board (white color) and leather cutting board (green or Red Colour). Regularly every 2 hours color management systems such as yellow, blue, Green, and Red, are colors normally used for cutting board management systems. Board four edges were colored and 180-degree angle, the 360-degree angle changed based on that particular area not damaged, uniform board thickness was maintained Due to research techniques recommended below 16 mm thickness board not suitable for the leather cutting

operation, proper light effect, ventilation, waste piece collection bag or tank also allotted in all cutting machines, machines maintained record sheet upgraded in the cutting section (Sarkar, 2005).

Cutting Stroke Record Implementation

The footwear industry nowadays has fast developments in African countries such as Ethiopia, Kenya, Zambia, South Africa, Morocco, and Egypt. etc. India China and Europe have more developed footwear industries and advanced technologies, but upcoming African countries lack technical ethics and technology, and implementation is required for every operation. In this regard, Copperstone University’s Leather Department research was analyzed and reduced the leather cutting issues. Implemented the operator cutting stroke efficiency. As per the international SATRA standard operator cutting efficiency per day 2500 Stroke (8 Hours) capacity and lining and other material cutting operator 3200 strokes (8 hours) based on the statement we provided better innovative cutting training and motive prevention techniques.

RESULTS AND DISCUSSION

Vietnam, Bangladesh, India, and China, have more footwear industries, right now some Europe customers give a special focus to African countries, because the African continent has a lot of cattle population and at the same time price wise also very cheap than Asian countries, Zambia having 2.3 million cattle population in African countries, footwear industry very fast movement along with other African countries (Baldacci *et al.*, 2014).

Table 1. Monthly Leather Cutting Data

Before implementation in leather cutting					
S.No week wise	Leather Cutting Norms for one pair (S.Ft)	Total Leather Cuttability per day	Total No. of pairs	Total Leather Cutting Consumption S.Ft	Leather Shortage (Extra Norms)
1	2.87	6*1550	9300	26691	3.25%
2	3.83	6*1350	8100	31023	2.86%
3	3.36	6*1425	8550	28728	3.74%
4	3.25	6*1280	7680	24960	4.15%
Total			33630	111402	14%

After implementation in leather cutting					
S.No Week wise	After Cutting Methods Implementation	Total No. of Pair After Implementation	Shortage Norms in S.Ft	Leather Saving Norms (in S.Ft.)	International Leather Cutting Loss Norms (S.Ft) Based On Grade
1	6*1650	9900	1.28%	0	A,B,C grade 1.20%
2	6*1425	8550	0	1.25%	C,D grade 1.5-1.70 %
3	6*1523	9138	0	1.85%	A,B,C grade 1.20 %
4	6*1375	8250	0	2.10%	A,B,C grade 1.20 %
Total	118676	35838			

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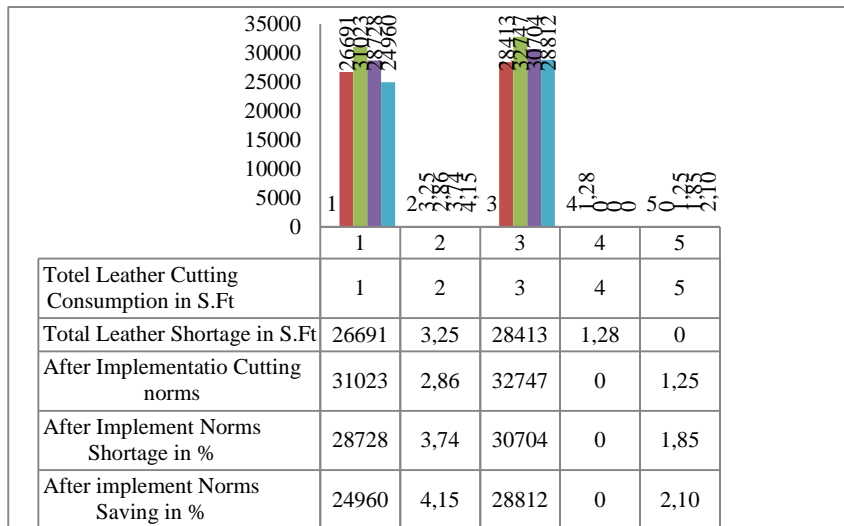


Figure 1. Leather cutting Consumption Norms detail

Based on this valuable estimation prevention training and workers' motivation factors were also improved by this research. After implementing the innovative cutting techniques for existing productivity and after implementing production efficiency, the leather consumption record was recorded and compared. The first two-month leather cutting efficiency was evaluated and the final result was better than previous leather cutting consumption values. Skilled manpower is another important parameter for manufacturing footwear. Educated operators, hard-working innovative-minded supervisors, and operators are important to upgrade innovative thoughts (Cipriani, 2002). After one month the same company's (Copper belt Footwears) leather cutting section's total productivity, leather consumption, quality of cut components status, and leather cutting waste consumption ratio were gradually reduced by this innovative research and recommendation.

CONCLUSION

This research analyzed and identified the leather components cutting current issues and refers to the quality implementation techniques in each cutting process (Sonobe *et al.*, 2007). After this cutting implementation, 2.10% of leather norms were saved, and cutting quality productivity also improved by this cutting implementation methods. In case 1 S.Ft leather 1.50 USD market values based on this research every month average 2492.196 S.Ft leather is saved by cutting department (Cipriani, 2002). So every month footwear company leather cutting section 3738.294 USD per month benefit for the above research. In this way, Zambia's medium sectors footwear company upgraded the innovative cutting techniques and regular productivity with quality standards of leather cutting, and wastage was reduced.

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