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RESEARCH ARTICLE

IDENTIFYING THE CAUSES OF FOOTWEAR REJECTION AND DEVISING BETTER SOLUTION FOR THE IMPROVEMENT OF FOOTWEAR QUALITY

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ABSTRACT

Background: Footwear sector is the most potential and booming export sector in Bangladesh that means, the position of this sector is just right after RMG. Besides that, Bangladesh is set to emerge as a next manufacturing hub for global footwear industry. In the world every year about 176 million pairs of shoes are rejected due to different type of defects in shoe production which costs nearly 5 billion US dollar. The footwear production of Bangladesh is also included in that figure is the causes of serious economic loss of the country. The present work is aimed to identify the causes of footwear rejection and devising better solution for the improvement of footwear quality. Footwear industries situated at different regions of Dhaka was selected. Questionnaire survey was done with quality managers. After interviewing production and quality stuffs and investing the workplace physically solutions of some major and frequent defects were suggested.

Objectives:

(a) Primary objective:

•To find out the relative figure about the rejection in footwear manufacture in Bangladeshi Footwear company and to find out better solution for minimizing rejection.

(b) Secondary objective:

•To increase depth of knowledge for controlling quality production.

Methodology: To analyze the types of footwear rejection, causes of footwear rejection and find out better solutions several methods were used. To find out the causes of footwear rejection and suitable solutions different books, journals, papers was reviewed also searched through internet which helped a lot to reach to the conclusion.

Results: Footwear is rejected due to faulty production, wrong distribution and preservation and improper fitting issues. The less the rejection, better the profit and no industry cannot make good profit when more than 2% products are rejected. So, it can be surely said that, rejected footwear in supply chain is a major problem.

Conclusion: The study reveals that every industries should have research and development lab where engineers will work on the development of new category footwear and ensure the production without any defect. It helps us to identify the causes of footwear rejection and devise better solution for the improvement of footwear quality.

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INTRODUCTION

Footwear industries in Bangladesh are deliberated as a dynamic sector to get a strong economic status in export era (Amal et al. 2018). In 2017, Bangladesh exported about $632.5 million leather shoes which was about 1.2% of world total export (Workman, 2018). Footwear sector of Bangladesh is playing a dominant role in export sector as well as onward movement of our country's economy. Due to good product quality, availability of raw material, low labor cost, and exchange rate advantage, Bangladesh has become an attractive target for investors (Farhad et al. 2019). This sector has powerful stimulus to the economy than the other sectors (Arafat et al. 2016).

Today Higher Productivity achievement is very important factor for the production field. With the Higher productivity other various factors must be taken in to consideration in manufacturing industries such as global competition, lead time and customer need in terms of quality and quantity (Sayid et al. 2017). But its manufacturing comprises variety of processes which arise many potential sources of defects and problems which may lead to product complaints and rejection (Abu et. al. 2018). Defect minimization are concerning for ensuring the quality of footwear which also helps to sustain global competitive market (Adhir et al. 2018). The world is very competitive where the basic concern of manufacturing companies is to increase their customers' satisfaction by

constantly improving their quality at its best level (Sayid et al. 2017).

MATERIALS AND METHODS

Interview was taken of quality corresponding persons of 3 industries about quality control and quality assurance of footwear. 60 questions were made and send to different industries situated at different regions as of Bangladesh developing different styles of footwear and in different volume. This questionnaires were filled in by the quality control officers and the answers were collected. Then the answers were analyzed to find out the most common and frequent causes of footwear rejection. After taking interview the workplace was observed. Here several causes of footwear rejection was observed physically. Answer of the questionnaires was analyzed to find out the most common and frequent defects. From questionnaire survey, literature review and physical investigation causes of footwear rejection and way of minimizing the defects is found.

RESULT AND DISCUSSION

Causes of footwear rejections: Faulty footwear is continuing problem within the footwear supply chain. While accepting that it is all rejects, it should be possible to identify the main causes of any products which are not up to standard, ensure that the cause is rectified and prevent any future occurrence. There is no one dominant cause of faulty footwear. It is generally a combination of causes such as:

- Poor product design.
- Incorrect or misunderstood product specification.
- Lack of shoe making knowledge or manufacturing skill.
- Lack of correct inspection or an adequate quality program.
- Incorrect storage or transportation.
- Misleading or confusing product labelling.
- Poor retail skills and knowledge leading to footwear sold which is unsuitable for purpose.

Effects of footwear rejection

The effects of these causes can also vary, but most likely to include:

- Reduced income from replacement shoes and lost sale.
- Damaged to the product brand and company reputation.
- Late delivery of volume orders – often the entire consignment of the footwear can be delayed until all the pairs have been completed. A few rejected shoes can, therefore cause major problems with delivery dates.
- Excess production costs – usually due to inefficiencies caused by low volume of replacements. The smaller the quantity of footwear, the less cost effective it can be to manufacture.
- Shortage of materials and components for volume production caused by manufacturing additional shoes as replacements.
- The potential for final customer dissatisfaction and possible litigation.
- Less significant (but still of concern) are environmental problems, faulty products are generally unusable and scrapped.

Questionnaire survey

To find out some common defects that occurs frequently in footwear production, 60 questions were made which are listed below:

Cutting section

Table 4.1. Question chart for cutting section

No.	Name of the Defect	Footwear Industry – 1 If Yes No Rare Often	Footwear Industry – 2 If Yes No Rare Often	Footwear Industry – 3 If Yes No Rare Often
1	Is there any rejection due to color variation of components within the same pair in this factory?			
2	Is there any rejection due to cutting components with unexpected marks (vein mark, pox mark, pin mark, growth mark etc.) in this factory?			
3	Is there any rejection due to cutting components with loose leather in this factory?			
4	Is there any rejection due to the presence of any shallow cut in cut component in this factory?			
5	Is there any rejection due to the wrong direction of tightness of cut components in this factory?			
6	Is there any rejection due to the excess thickness of upper components in this factory?			
7	Is there any rejection due to the variation of tongue thickness within the same pair in this factory?			
8	Is there any rejection due to wrong direction of insole in this factory?			
9	Is there any rejection due to rough raw edge in this factory?			
10	Is there any rejection due to loose fiber on raw edge components in this factory?			
11	Is there any rejection due to excess dirty upper in this factory?			
12	Is there any rejection due to torn up or burnt upper while trimming in this factory?			
13	Is there any rejection due to wrong skiving allowance in this factory?			
14	Is there any rejection happen due to improper skiving of toe puff and stiffener leaving impression on upper in this factory?			
15	Is there any rejection due to improper thread burning on raw edges in this factory?			

Sewing section

Table 4.1. Question chart for sewing section

No.	Name of the Defect	Footwear Industry – 1 If Yes No Rare Often	Footwear Industry – 2 If Yes No Rare Often	Footwear Industry – 3 If Yes No Rare Often
1	Is there any rejection due to uneven topline folding in this factory?			
2	Is there any rejection due to crowded stitching in this factory?			
3	Is there any rejection due to visible needle punch in this factory?			
4	Is there any rejection due to wrong seam allowance in this factory?			
5	Is there any rejection due to wavy stitching in this factory?			
6	Is there any rejection due to uneven stitch density in this factory?			
7	Is there any rejection due to loose stitches in this factory?			
8	Is there any rejection due to missing stitches in this factory?			
9	Is there any rejection due to torn up upper in this factory?			
10	Is there any rejection due to up-down setting of eyelet piece in this factory?			
11	Is there any rejection due to visible impression of feed roller in this factory?			
12	Is there any rejection due to counter stiffener is not inserted upto top leaving gap in this factory?			
13	Is there any rejection due to rough or uneven lining trimming in this factory?			
14	Is there any rejection due to unexpected marks present on accessories in this factory?			
15	Is there any rejection due to asymmetry central line in this factory?			
16	Is there any rejection due to wrong setting of quarter in this factory?			

Lasting section

Table 4.1. Question chart for lasting section

No.	Name of the Defect	Footwear Industry – 1 If Yes No Rare Often	Footwear Industry – 2 If Yes No Rare Often	Footwear Industry – 3 If Yes No Rare Often
1	Is there any rejection due to inside quarter is not 2mm up than outside quarter in this factory?			
2	Is there any rejection due to uneven back height within the same pair in this factory?			
3	Is there any rejection due to cracked back seam in this factory?			
4	Is there any rejection due to crease on counter in this factory?			
5	Is there any rejection due to the crease on vamp portion in this factory?			
6	Is there any rejection due to loose quarter in this factory?			
7	Is there any rejection due to the shortage of lining allowance in this factory?			
8	Is there any rejection due to the impression of rod cement present in this factory?			
9	Is there any rejection due to the stitch failure while lasting in this factory?			
10	Is there any rejection due to uneven or excess roughing of lasting allowance in this factory?			
11	Is there any rejection due to the presence excess glue in this factory?			
12	Is there any rejection due to burnt upper while heat setting or mulling in this factory?			
13	Is there any rejection due to improper sole attaching in this factory?			
14	Is there any rejection due to the gap between upper and sole in this factory?			
15	Is there any rejection due to heel does not seat flat in this factory?			
16	Is there any rejection due to the rocking problem in this factory?			
17	Is there any rejection due to the deviation on toe spring in this factory?			
18	Is there any rejection due to the crease on lining in this factory?			
19	Is there any rejection due to sole surface waving in this factory?			
20	Is there any rejection due to wrong position of sandal strap in this factory?			
21	Is there any rejection due to impression on foot bed in this factory?			
22	Is there any rejection due to wrong size labelling in this factory?			
23	Is there any rejection due to uneven insole attaching in this factory?			
24	Is there any rejection due to uneven finishing within the same pair in this factory?			
25	Is there any rejection due to the presence of any abrasion mark on visible parts in this factory?			
26	Is there any rejection due to any kind of metal contamination in this factory?			
27	Is there any rejection due to fungal growth while storing or shipping in this factory?			
28	Is there any rejection due to twisted apron in this factory?			
29	Is there any rejection due to looseness of shoe strap in this factory?			

Rejection Condition Found in Observation

From the questionnaire survey and factory observation it was found that the following defects are the most common and frequent causes of rejection of different sections-

Cutting section

1. Cutting components with loose leather
2. Cutting components with unexpected marks (vein mark, pox mark, pin mark, growth mark etc.)
3. Color variation of components with in the same pair
4. Wrong direction of stretchiness of cut components

5. Twisted apron
6. Improper skiving

Sewing section

1. Wavy stitching
2. Loose stitches
3. Visible needle punch
4. Uneven stitch density
5. Up-down setting of eyelet piece
6. Impression of toe puff and stiffener on upper

Lasting section

1. Cracked back seam while lasting
2. Crease on apron
3. Presence of excess adhesive while toe lasting
4. Stitch failure while lasting
5. Uneven or excess roughing of lasting allowance
6. Excess cementing
7. Improper sole attaching
8. Rocking problem
9. Uneven finishing within the same pair
10. Asymmetry of central line
11. Handling problem

Minimization of Rejection: Through physical investigation of the footwear production floor and interviewing production and quality stuff causes of most common defects in different section was found. By further analysis effective solutions for the defects to improve footwear quality was obtained-

Minimization of Rejection in Cutting Section

- Each and every leather should be checked properly before cutting under sufficient lighting.
- Loose part of the leather should be marked before cutting.
- While placing the pattern knives operator must avoid the loose parts.
- Proper training should be provided to the cutting operators.
- Parts of leather with unexpected marks should be marked properly before cutting.
- Leathers should be graded before cutting so that the operator can have a rough idea about the percentage of defected area of the leather.
- All the components of a pair of shoe should be cut from the same leather if possible.
- Operators must be instructed to cut components pair wise.
- Direction of components must be marked on sample pattern and knives.
- Direction of stretchiness must be checked before placing the knives.
- 3 pins must be attached in cutting knife which will act as reference points on cut upper. These reference points will be very effective to place the apron of athletic shoe accurately.
- Notch marks can be included in cutting knives to mark the skiving allowance while cutting.
- Skiving show board should be displayed.
- Skiving operators must concentrate to their operations.

Minimization of Rejection in Sewing Section

- Components should be marked using marking pattern.
- Feed roller thickness should be maintained according to the operation.
- Components should be held carefully and accurately while stitching.
- Machine must be set accurately every time before starting operation.
- Needle thread to bobbin thread ratio must be maintained according to the standards.
- Stitching must be checked on sample leather before starting a new model for accuracy.
- A backer should be attached before stitching to prevent the joint from over stretching.
- Nylon tapes should be added to give joins extra strength where lasting pressure will affect.
- Hammering should be done on the excess thickness on the seam.
- Oil can be applied on PU to make the stitching easy.
- The position of eyelet piece must be marked using marking pattern.
- The edge of the material must be tapered skived properly.
- If needed the reinforcement pattern should be changed to insert the material to the top.

Minimization of Rejection in Lasting Section

- Leather tear strength must be checked while purchasing.
- Back part moulding pressure must be set according to the upper material.
- Last must be used in accurate fit and size of the upper.
- After attaching there must be edge of toe puff under the vamp and apron joint flap so that there is no wrinkle.
- Operators must concentrate to their work.
- The pressure knob of the toe lasting machine is to be adjusted in order to control the adhesive application.
- Optimum level of lasting pressure must maintain.
- Optimum level of thread tension should be maintained.
- Machine rpm should be set according to the upper material.
- The grit of emery paper must be maintained according to the material.
- The lasting margin should be marked according to the sole cavity.
- There should be a visible mark of lasting allowance.
- Adhesive application should be according to the marking.
- Adhesive should be applied with a brush for even and neat coating.
- Priming of the upper and sole should be done accurately and seriously.
- Primer must be applied according to the soling material.
- The ratio of adhesive and hardener must be maintained accordingly.
- Roughing on the lasting allowance must be done carefully.
- Sole surface must be roughed properly.
- Sole welt should be hand roughed.
- Adhesive should be applied in adequate amount and evenly.
- At least 2 coats of adhesive should be applied.
- Enough drying time must be given in between coatings.

- Lasting pressure should be maintained according to the rules.
- Expiry dates of all the chemicals must be checked before applying.
- Shank must be positioned accurately.
- Filling the extra cavity in the heel part of the sole mould by using sheet (layers) can avoid this defect.
- De-lasting should be performed carefully.
- Brush must be used according to the purpose and brushing must be even.
- Wax must be used in adequate amount.
- Fine cotton cloths or foam should be used for apply cream evenly.
- Every last should have central line marked on back.
- Counter moulding machine should have led indicator for center positioning.
- Proper pressure distribution must be maintained while back part lasting.
- Excess pulling should be avoided while side lasting.
- Paper should be placed on conveyor trays to keep the components without friction.
- While moving to other section components should be organized and tied pair or size wise to keep them clean.
- Roughing should be done carefully.
- After lasting shoes should be organized pairwise.

Conclusion and Recommendations

From physical investigation and questionnaire survey in three different footwear industries situated at different regions of Dhaka Division who produces different styles of footwear in varying volume, it was found that a huge percentage of materials and a certain number of footwear are rejected at the last stage of production though they produce high quality footwear. Despite of rejection, labor and time is engaged in repair too. We know that shoes are rejected when its quality is lower than sample. Looseness of skin and fungus are the most dangerous problems in footwear production in Bangladesh. Due to some hazards, several problems arise while collecting quality skin. So, skins should be examined properly while collecting from tanneries and must be preserved in good manner. Other faults of cutting section like cut edge, hidden defects of skin, color variation, adhesion fail of leather finish, low tear strength are harmful too. In sewing section, looseness, seam impression, distortion of shape of ornament, wavy stitching of zipper edge, glue stain, wavy stitching, wrinkle on apron, discoloration while crimping, visible needle punch, curvy structure at the edge of buckle strap, excess or shortage of lining at lasting margin, impression of feed roller, uneven alignment of ornament are the main problems. Other major problems of lasting and finishing are excess roughing and cementing, wrinkle at counter, impression of counter stiffner, improper sole bonding, impression on outsole, surface gap, hammer impression, rocking effect, fungus etc. Though rejection problem cannot be overcome properly but the production must meet the factory demand. Thus production cost can be reduced which will effect selling price. Normally footwear is rejected due to faulty production, wrong distribution and preservation and improper fitting issues. The less the rejection, better the profit and no industry cannot make good profit when more than 2% products are rejected. So, it can be surely said that, rejected footwear in supply chain is a major problem. To overcome this problem, the reasons behind the problem should be identified appropriately and proper steps should be taken in real time production.

To reduce the harmful repair and rejection of footwear, following steps should be followed:

- Qualified staffs and labor should be appointed in footwear production. Training program should be arranged to increase the expertise of workers.
- Proper monitoring and controlling must be ensured in footwear production. Here, Quality assurance must be implemented rather than quality control. The number of workers in quality section should not be more than 8% of total workers.
- All information related to defect must be enlisted in proper order and proper analysis must be done by regular audit. Analysis result should be applied in future production to reduce the defects in footwear and working staffs must be acknowledged with it by discussion or training program.
- In-house testing laboratory should be setup where physical and chemical tests can be operated. After production, some samples have to be sent to this laboratory as early as possible for testing. Other important and complex testing should be done from outside. But without ensuring proper material quality, production cannot be run in random way.
- Sample specification must be observed properly before footwear production. Proper engineering testing must be done in product design section to avoid future production problems.
- Skins and other materials should be collected by proper investigation and testing. If low quality production materials are collected, it would be so tough to reduce the number of rejected products after production. It will be better if skins are collected according to the grading of footwear design.
- Every industries should have research and development lab where engineers will work on the development of new category footwear and ensure the production without any defect.
- Real time posters should be hanged on walls including detailed info about how to remove the defects so that workers can ensure effective production.
- Proper training program should be arranged for the workers about good house-keeping system like 5S system and must be implemented properly. In 5S system all accessories are arranged in a proper way so that workers can get necessary tools in the shortest possible time which reduces the defects of production.
- Bangladesh Labor Law should be implemented in footwear industries to ensure the quality of footwear production. Ex: according to law, skin grading with proper lighting can be helpful to beneficial production. When law is properly implemented, health and mind of workers remains in better condition which results in production of quality products.

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REFERENCES

Ali, Md. F., Sarkar, M. R., Hossain, Md. A. (2019): The Safety Compliances of Footwear Industries in Bangladesh, International Journal of Engineering Research & Technology (IJERT), http://www.ijert.org, ISSN: 2278-0181, IJERTV8IS060718, Vol. 8 Issue 06

Deb, A. K., Chowdhury, M., Azam, F. A. B., Hossain, M. I. (2018): Workers' Health and Workplace Condition Evaluation (WCE) Of the Footwear Industries in Bangladesh, IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) e-ISSN: 2319-2402, p- ISSN: 2319-2399.Vol. 12, Issue 8 Ver. I, PP 07-13, www.iosrjournals.org, DOI: 10.9790/2402-1208010713

Hossain, Md. A., Sarkar, M. R., Ali, Md. F., Roy, K. U. (2016): Evaluation on Economic Loss for Rejection of Finished Leather in Bangladesh, Universal Journal of Environmental Research and Technology, ISSN: 2249 0256, Volume 6, Issue 2: 91-96, Available Online at: www.environmentaljournal.org

Jor, A., Alam, Md. S., Alam, Md. J. (2018): Application of Six Sigma Concept in Shoe Manufacturing for Quality Improvements: A Case Study, European Journal of Advances in Engineering and Technology, 2018, 5(7): 450-458, ISSN: 2394 - 658X, Available online www.ejaet.com

Mia, Md. A. S., Alam, Md. N., Ahmad, F., Uddin, K. M. (2017): Footwear Industry in Bangladesh: Implementation of Six Sigma Methodology, Industrial Engineering and Management, ISSN: 2169-0316, Vol. 6, Issue 2, DOI: 10.4172/2169-0316.1000211

Mia, Md. A. S., Alam, Md. N., Rahman, Md. L., Uddin, K. M. (2017): Footwear Industry in Bangladesh: Reduction of Lead time by using Lean Tools, JECET; June 2017-August 2017; Sec. C; Vol.6. No.3, 251-259. E-ISSN: 2278–179X, DOI: https://doi.org/10.24214/jecet.C.6.3.25159, Available online at www.jecet.org

Paul, A. C., Islam, Md. A., Hossain, Md. S. (2018): Studies on Sewing Complication through Pareto Chart and Cause-Effect Diagram analysis of a Footwear Industry, International Conference on Mechanical, Industrial and Energy Engineering 2018, Khulna, BANGLADESH

Workman, D. (2018): Leather Shoes Exports by Country, www.worldstopexports.com

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