international DESIGN JOURNAL
Print ISSN 2090-9632
Online ISSN 2090-9640

Using Pareto Diagram to Improve Textile Product Quality: A Case Study

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Abstract:

In today's competitive global market, organizations must adhere to stringent quality standards, fulfill consumer expectations, optimize energy consumption, and foster continuous product development. This study examines a case involving a textile factory that specializes in the production of gabardine fabrics. To facilitate improvements in quality, a Pareto chart was utilized to analyze samples of the fabric, identifying defects that significantly affect overall quality. The analysis revealed five predominant defects: dirt, lint, weft filling, twill, and assortment issues. To further investigate these findings, an Ishikawa cause-and-effect diagram was employed to determine the underlying causes of these defects. Subsequently, seven potential solutions were proposed to mitigate the identified defects, which included regular maintenance of machinery, implementation of training programs for personnel, conducting quality assessments of supplied threads, and the installation of a monitoring device for temperature and humidity levels. After the implementation of these solutions, a follow-up analysis of a new set of samples demonstrated an impressive 80% enhancement in product quality. Notably, the incidence of dirt defects decreased from 8 to 2, lint defects from 6 to 1, and weft filling issues from 5 to 1.

Results : 1)Soiling was one of the most influential defects, as shown in the Pareto diagram. After applying the cause and effect diagram, it became clear that there were five causes for the defect, and solutions were developed for them. After conducting a second sample, the total number of soiling defects decreased from 8 to 2, a 75% improvement. 2)The pile filling defect ranked second among the most influential defects, as shown in the Pareto diagram. After applying the cause and effect diagram, it became clear that there were five causes for the defect, and solutions were developed for them. After conducting a second sample, the total number of pile filling defects decreased from 6 to 1, a 80% improvement.. 3) The weft filling defect ranked third among the most influential defects, as shown in the Pareto diagram. After applying the cause and effect diagram, it became clear that there were four causes for the defect, and solutions were developed for them. After conducting a second sample, the total number of pile filling defects decreased from 5 to 1, a 80% improvement.

Paper History:

Paper received March 16, 2025, Accepted May 17, 2025, Published on line July 1, 2025

Keywords:

Pareto chart, cause and effect diagram, textile products, quality improvement tools

References:

1- L. Pelyk, O. Kalashnyk, O. Kyrychenko, and S. Moroz, "Quality Assessment of Textile Products as a basis for Responsible Production and consumption," BIO Web Conf., vol. 114, Jun. 2024, doi: 10.1051/bioconf/202411401024.
2- A. Günay, O. Özbek, F. Mutlu, and T. Aktin, "Analyzing the Operations at a Textile Manufacturer's Logistics Center Using Lean Tools," 2023, pp. 415–426. doi: 10.1007/978-981-99-6062-0_38.
3- D. Siwiec, R. Gawlik, and A. Pacana, "Fuzzy Multi-criteria Decision Model to Support Product Quality Improvement," Manag. Prod. Eng. Rev., vol. 14, pp. 134–149, Jun. 2023, doi: 10.24425/mper.2023.146030.
4- D. Siwiec and A. Pacana, "Method of Improve The Level of Product Quality," Prod. Eng. Arch., vol. 27, pp. 1–7, Mar. 2021, doi: 10.30657/pea.2021.27.1.
5- M. Al-Kayyal, "Quality Control Systems In Manufacturing," Tishreen Univ. J., vol. 43, no. 3, pp. 351–366, 2021.
6- P. Erdinç, Z. Buduneli, C. Erton, Ç. Gerşil, M. Paldrak, and E. Staiou, "Applications of Statistical

Process Control, Quality Improvement Tools and Techniques, and a Simulation Model in a Garment Manufacturing Company," 2024, pp. 409–422. doi: 10.1007/978-3-031-53991-6_31.
7- K. Lakhder, T. Kandouci, and A. Khadija, "The Role of Quality Control Tools In Improving The Performance of Organizations 'case study,'" J. Econ. Growth Entrep., vol. 2, no. 1, 2019.,
8- D. Aly, "The Role of Control In Improving Product Quality A case study of a Pipe Company ALFAPIPE," Ghardaia, 2021. [Online]. Available: http://dspace.univ-bouira.dz:8080/jspui/handle/123456789/10740
9- M. M. A. Ahmed, M. M. A. H. Sobh, M. I. Obaid, and N. M. F. Al-Shahat, "Evaluating The Effects Of Using The Seven Quality Control Mthods On Environmental Performance An applied study on tourist villages in the Red Sea," J. Environ. Sci., vol. 1, no. 5, pp. 514–516, 2021

CITATION Ahmed Mohamed (2025), Using Pareto Diagram to Improve Textile Product Quality: A Case Study, International Design Journal, Vol. 15 No. 4, (July 2025) pp 345-350