

Designing A System by Using International Quality Systems to Improve Production Performance in Knitting Factories

Dr. Shaymaa Ahmed Mohamed Ahmed

Lecturer at Spinning, Weaving & Knitting Department- Faculty of Applied Arts, Beni Swief University

eng_shaymaa86@yahoo.com

Summary:

Textile, knitting and clothing industry is one the largest industries in Egypt, in terms of worker's number and values of domestic production and export.

The private sector dominated the majority of knitting and clothing factories; it is different from the rest of the textile industries in its composition, where it faces a problem rarely found in other industries, namely its close connection with continuous development, its need to change in production methods, the diversity and overlap of production processes. As well as, the nature of inputs and outputs for each process, the high production costs and ways of rotation of raw materials and control its quality, ability to compete, which depend on reducing the required costs to implement the orders to be the lowest price and the highest quality achieved by companies in East Asia and especially China, the hard equation Hard. The production process, both material and service, deemed the basis of human activity and the axis of the continued growth of the economies of the countries, the progress and development of societies. Due to complexity and intertwining of economic relations and emergence of the system called the intercontinental economy, which led to a decline of traditional production systems to secondary grade. The global economy depends on competitive advantages, based on changes and sustainable development of production factor, through knowledge and technology in order to maximize the added value, organize and manage industrial resources, develop productive performance, improve production efficiency and eliminate mismatch between financial planning of orders with the tools and modern control of different production and service to actual financial flow of the order , The research seeks to increase the efficiency of the performance of production and service operations by reducing and eliminating the various sources of waste within the factory , And to achieve a strong basis for mutual understanding between senior management and employees , And to create a joint work strategy among all workers within knitting factories through the development and design of a system using international quality methods and systems based on integration of five concepts of KAIZEN (continuous improvement), BOKKA YOKI (quality from the source), quality circles, modern measuring and setting tools for production and service processes inside the knitting factory and up to the industry has the ability to compete globally .

Keywords:

International Quality Systems - Production Performance – Production Strategy

Research problem:**Knitting industry faces many local and global challenges in recently such as:**

- 1- With the tough international challenge, and the high prices of yarns, will be no a minimal position for any fabrics of low quality, or high price, therefore it is necessary to apply the latest international systems which capable of achieving that.
- 2- Lack of the workers' familiarity with the knitting factories and other industrial textile establishments with the concepts of productive performance, and the inability to apply and utilize the tools and systems of international quality.
- 3- Depending on traditional production systems, which depend on the processes of the launching the product instead of thinking about the withdraw for the required stage, which leads to a decrease in the efficiency of production performance within the knitting factories.

Importance of research:

- Creating opportunities to manage the factory in order to study the stages of work and identify the weaknesses and causes and eliminate them gradually and continuously.
- Developing a system of work and procedures keep up with the nature of the knitting factories in Egypt.
- Increasing the efficiency of production processes' performance and service by reducing and eliminating the sources of wasting within the factory and maximizing the utilization of the resources and available possibilities within the factory, which leads to increased profitability.
- Accomplish a strong basis for comprehending between employees, which leads to increase the efficiency of productive performance and enhancement working environment.

Research objective:

Providing specialists in the industrial establishments in the knitting sector with a new vision of how to form a production system based on the product life cycle within knitting factories using the international quality system.

Research hypothesis

- 1_ applying the system leads to improving the production and eliminating the economic inflation and the disability in order to reduce the various sources of overspending which leads to increase the profitability of the factory.
- 2_ applying the system leads to increase the efficiency of productive performance through improving work environment.
- 3_ applying the system, with the ability to create a joint work strategy among all employees, leading to improve the work environment, stability, and dedication of employees in performing their tasks and continuous struggling to development and improvement.

Research Methodology:

The research is based on analytical experimental approach.

Research theoretical framework

The concept of performance: It the fulfillment of demands and needs in accordance with the general requirements and specifications set for them and related to time and plans, also it is the measurements of achievements rates of various items at work, either for individuals or systems according to organized need, conditions and specifications in order to accomplish

those items. Performance is the extent in which goals are being achieved through the optimal usage of resources as a comprehensive, dynamic and integrated system.

The concept of production: There is no single definition of production but there are several ones in terms of the following aspects;

Social aspect: it is a human activity which reflects the prevailing ideology in society.

Technical aspect: requires using methods and techniques to achieve idealism.

Economic aspect: which includes activities aims to create benefit and value.

Organizational aspect: which converts inputs to outputs according to feedbacks through its interactions with external environment.

Global quality system:

The five years plan: a simple method of planning _originated in Japan_ which creates a clean, clutter-free and well organized workplace where things can be reached or found very fast without any crashes.

Hirok Hirano: (an expert at Toyota) is the first one introducing this project as it is an integral part of the continuous development, a key element in Japanese schools in order to decrease costs and it is being applied gradually and regularly.

Kaizen: A Japanese term seeks for continuous improvement in all establishments' and organizations' departments not only in the basic stages of production but also in continuous improvement of organizational life also of home, personal, social and practical life at the lowest possible cost.

The concept of kaizen is illustrated through a strong intense of activities, focused efforts in a short period, continuous improvements in the flow of operations and activities, working on problems and removing wastage (there are two types of improvements; improvements at the macro level which leads to quantitative changes in productivity rate, quality and efficiency while the improvements at the micro level are being easier, faster and less risky because of their limited impact and more positive than those ones of improvements at the macro level).

Poka_Yoka: A Japanese concept leads to preventing errors from the basic source and working on them in order to detect them before they happen. Shigeo (Japanese quality engineer) coined this method in 1967.

Pika_yoka technique uses standard and statistical tools to detect the deviation rate of every Step or stage of its proper functioning. The quality circles detect the causes of those deviations, they also treat and eliminate them immediately. Shigeo says the causes of defeats in worker error, and defeats are the result of neglecting those errors, it follows that mistakes will not turn into defeats if worker errors are discovered and eliminated beforehand.

Quality circles: Quality circle is a participatory management technique that enlists the help of employees in solving problems related to their own jobs. Circles are formed of employees working together in an operation who meet at intervals to discuss problems of quality and to devise solutions for improvements.

Scientific Study: The suggested system is applied within a factory for the production of knitting of weft (circular knitting), which produces cotton underwear fabrics on the production and service stages of the factory.

1/ The stage of identifying problems of the company) under study 2019):

1-1 Low production efficiency.

1-2 high defects for the produced fabrics.

1-3 the deterioration of work environment inside the production halls

1-4 Low rates of absence and instability of workers in the factory.

2/ The stage of goal setting:

Setting a plan for the factory's continuous and gradual development in order to carry out the research goal as pre mentioned.

3/ The stage of selecting study team: (June 2019 AD).

Sponsor: Factory director. / **Coordinator:** quality manger. / **Project manager:** The researcher.

The ringleader: production manager. / **Members:** sections managers (Sales/ imports/ Stores) Heads of shifts.

4/ The stage of measuring company problems under study: (February: March 2019).

5/ The stage of analyzing company problems under study: (March: April 2019 AD).

6- The stage of enhancing problems under study: (April: May 2019 AD).

1-6 increasing production efficiency stages:

- Create cooperation between maintenance and quality teams in order to evaluate the exporters of raw and spare parts, to select the highest quality and commitment to the dates of exporting and its proximity to the factory and to enable exporters to review their assessments and put comments on them and discuss those who are responsible for evaluation.

- Prepare models in order to follow up with the possibility of implementing a new model to follow the daily productivity of production for each worker and each machine and a model to follow the production damage through showing the reason and the duration of damage and the measurements taken to get rid of the damages with different reasons.

Getting rid of holes' defects: Preparing a statement of the needle break-up rate, adjusting the needles centralizing well, selecting a suitable yarn, adjusting the height of the dial with the cylinder and adjusting the machine hooks.

Getting rid of defects of vertical lines: Cleaning machines, especially needles ducts, fixing the warps in the needle path and adjusting the centralization of the needles in their correct position.

Getting rid of the fly stitch: adjusting the tension in the cloth folding device and adjusting the sleeves.

Getting Rid of Yarn Cut: Adjusting the tension in supplying, good recycling, cleaning the thread path and making sure that the thread is not exposed to sharp or corroded parties, and the thread is regular and avoiding the loops (nodes)

Getting Rid of Defects of Stain on Fabrics: Following up with the maintenance program of machines, especially lubrication.

Preparing system for periodic and preventive maintenance to ensure the control of the efficiency of mechanical parts in a timely manner and preparing a model for the names of maintenance personnel and machines that they are responsible for.

3-6 Developing hygiene, ventilation, and lighting inside the production halls:

Paying attention to the cleanliness of production halls of lint and dust, which may cause an increase in the percentage of defects and the second degree of the produced fabric as a result of volatility in the machines during operation.

Paying attention to repairing, operating and periodic maintenance on ventilation hoods inside the production halls in order to get rid of lint and fly dust, which reduces the density inside the production halls and improves work environment.

Developing lighting inside the production halls as well as raising the efficiency of the internal lighting of the machines and the operation and repair of broken circuits to help worker in the performance of their required tasks efficiently and quickly.

Improving the circulation of raw materials by not entering any yarn inside the operating rooms, except in accordance with the operating order, and thus reducing the actual yarn balances inside the operating rooms so that only the yarn, under operation, remains whereas withdrawing the finished yarns immediately after the end of the operating order, and then recording its movement from the operating rooms to the store by using the yarn regression form, filtering each yarn message once it is finished, and determining the percentage of the damages of each to know the extent of its conformity to the target and therefore, taking corrective actions in case of increasing the percentage of loss over the target. Accordingly, identifying an individual from the follow-up department to follow up with the circulation of yarn and fabrics inside the operating rooms, and to choose the matching handling facilities and exclude the defective ones.

6-4 Reduction of labor absenteeism and increasing labor stability in the factor:

- Declaring the factory's objectives and policies and the participation of employees of each department in setting these goals and the presence of a meeting that brings all workers of each department on a regular basis in order to discuss the issues of the department and to participate in solving them.

- Existing of an incentive for quality, regularity and commitment added to the workers' salary while the salary is first determined according to productivity and rate of production quality as well as the extent of regularity and commitment of the worker and his effectiveness in participating in raising the efficiency of productive performance.

- Creating accurate descriptions of the tasks of each team within the factory and working on raising the efficiency of workers through training courses.

- Repairing damaged machine doors has been done mechanically and electrically so as to provide the worker with safe handling of the machine.

- Increasing the number of basic production labor and reducing the loading rate of each worker (2: 3 machines instead of 4 machines) and finding a catalyst for every 2 main workers to reduce the loads of the basic labor

7. Post-Optimization Measurements stage: (May: June 2019)

Comparison measurements stage:

- 1.The production efficiency of the first rosary before the improvement was 80% and became 89.3%, the production efficiency of the second rosary before the improvement was 70.1% and became 87.8%, the efficiency of the production of the third rosary before the improvement was 77% and became 92%, where the total production efficiency improved from 75.7% to 89.7% after performing the stages of improvement.
- 2.The amount of decay due to the defect of holes was 500 meters and after improvement was 210 meters, the defect of vertical lines was 312 meters and became 112 meters, floating stitches were 280 meters and became 114 meters, cut thread was 144 meters and became 87 meters, spots were 98 and became 44 meters, Where the total loss was 1334 meters and became 567 meters.
- 3.The average absenteeism of the month for workers before the improvement was 132 days almost 4.5% and the average absenteeism of the month after improvement became 52 days almost 1.7%.

Recommendations:

- The necessity of senior management's belief of knitting factories in the continuous development of performance and involvement of different department
- The need for creating organizational appropriate culture and knitting culture in order to apply the international quality system
- Increase the adequacy and efficiency of available resources in knitting factories either material or human resources.
- The need for increasing the interest of factories in strategic planning and the sound analysis of internal and external environment.

Results:

- 1.It has been proved that the system is highly effective in improving the performance in knitting factories in Egypt through improving the work environment.
- 2.The system helped improve production and eliminate economic inflation and deficits
- 3.The system contributed to raising the efficiency of the production stages and reducing the loss resulting from both defects and poor circulation of raw materials within the production rooms, therefore, increasing the profitability of the factory.
- 4.The system has contributed in improving the work environment, stability and dedication of workers in performing their tasks.

References:

- 1/ Hanimbinti Ab. Rahman, Waheeda. Quality Improvement in Manufacturing Industries. National Technical University College Malaysia, Faculty of Manufacturing Engineering. December, 2005.
- 2/ El-Aref, Magdi, Guide for Textile Quality Control, Director General Textile Consolidation Fund.Part 1. Forth edition .2001.
- 3/ Laureani, etal, Alessandro, Lean Six Sigma in a call center , International Journal of Productivity and Performance Management, vol. 59 , No 8 , 2000.
- 4/ J Besseris , George . Applying the DOE toolkit on a Lean and Green Sigma Maritime - Operation Improvement Project , International Journal of Lean Six Sigma , vol 2 , No 3 , 2001.
- 5/ Gijo ,E.V. & Perumallu ,P.K., Quality Improvement , Reducing Variation: A Case Study, TQM & Business Excellence, Vol.14 No.9 , Journal Of Quality. 2003.
- 5.6/ Mackinnon , I ., Post-University Training Challenges Small Firms . People Management, Vol 2 , No 1 , pp.39: 45 , 1996.