Inspection methods and impact on Quality Level of final Products

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Abstract:
The main process of inspection in home textile Factory affect greatly the final product, this the effect of this inspection is that all bad products & defecated products will not be seen unless the final product released, & at this stage the cost of maintaining & correct the defected products & re- produce the product will costing the company a lot of money & time. Therefore, the present study aims to Study the effect of multi – inspection processes at different areas, & the effect of these processes on the quality of the final product and to examine the kind of defects resulting from the inspection process and whether final inspection process is enough for avoiding defects & raise the quality of home textile
The significance of the study comes from studying of different ways of in section at different stages & Identifying the advantages & disadvantages of each process & selecting the suitable process in each stage during process, which improve the performance & increase productivity in home textile Factory which reflect export level & develop the economy

Introduction:

The Textile Industry considered one of the most Valuable industry in Egypt, & Home Textile Industry one of the most Important Sectors in textile Industry in Egypt, that shows the importance of this industry in Egypt, this industry also absorb the majority of Labor Force & is one of the Important solutions of Unemployment problem in Egypt, Home Textiles also produce very important product to human being, studies of marketing & management shows that the international marketing & Exporting starts form High quality products, thus to obtain customer satisfaction, & fulfill Customer needs you must raise the quality of the products, starting inspection of raw material till final product.

So the study aims to classifying all kind of inspection at all stages of production & the effect of every process of them on the quality of the final product.

Quality is defined as the level of acceptance of a good or service. It is a very essential requirement for any kind of product. Every product should maintain the standard quality level. In this 21st century of globalization market are becoming more and more complex, that's why every industry are facing a high level of competition for their business. So the product must fulfill the customer requirement. For this reason every product should maintain the quality level. For the textile industry and apparel industry, product quality is calculated in terms of quality standard of fiber, yarn. Fabric construction, color fastness,

design and the final finished garment. Nowadays buyers are very much quality conscious. If it is possible to maintain a high Quality system of inspection policy, the buyers shall be motivated and more quality products can be made. The fitness for use concept can be applied to garment.

For a garments to be fit for use provided its style acceptable. 1. It must be free from defects such as stain, material defects, open seam, loose hanging thread, misaligned buttons and button holes, defective zipper etc. 2. Must fit properly for the labeled size. 3. It must perform satisfactorily in normal use, meaning that a garment must be able to withstand normal laundering / dry cleaning / pressing cycle without color loss or shrinkage, seams must not come apart, fabric must not tear and so on. But maintaining an adequate standard of quality also costs effort. From the first investigation to find out what the potential customer for a new product really wants, through the processes of design, specification, controlled manufacture.

Quality Control

Quality is of prime importance in any aspect of business. Customers demand and expect value for money. As producers of apparel there must be a constant endeavor to produce work of good quality."The systems required for programming and coordinating the efforts of the various groups in an organization to maintain the requisite quality". As such Quality Control is seen as the agent of Quality Assurance or Total Quality Control. [17]

Terminology
Quality Control:
Quality control is the synthetic and regular control of the variable which affect the quality of a product. The operational techniques and activities that sustain the quality of a product or service in order to satisfy given requirements . It consists of quality planning, data collection, data analysis and implementation and is applicable to all phases of product life cycle ; design, manufacturing, delivery and installation, operation and maintenance. [19]

Home Textiles
Home textiles can be defined as the textiles used for home furnishing. It consists of a various range of functional as well as decorative products used mainly for decorating our houses. The fabrics are used for home textiles consists of both natural and man-made fibres. Sometimes we also blend these fibres to make the fabrics stronger. [20]

Quality:
Quality means customer needs is to be satisfied. Failure to maintain an adequate quality standard can therefore be unsuccessful. But maintaining an adequate standard of quality also costs effort. From the first investigation to find out what the potential customer for a new product really wants, through the processes of design, specification, controlled manufacture and sale. [19]

Quality Control in Garments:
Quality Control is the main process in Garments Manufacturing to achieve a Quality Standard Products. The Process begins from Inspection of Fabrics & Accessories Prior to Production Starts. [22]

Quality Cost:
Preventing, detecting and dealing with defects cause costs that are called quality costs or costs of quality. Quality costs can be broken down into four broad groups. [21]

Quality control in Garment Manufacturing Process:
Quality is a relative term. It means customer needs is to be satisfied. Quality is of prime importance in any aspect of business. [19]

Ready Made garments (Apparel)
Humans often wear articles of clothing (also known as dress, garments) on the body. In, clothing includes coverings for the trunk and limbs as well as coverings for hands (gloves), and head (hats, caps). [22]

The research problem:
The main process of inspection in home textile Factory on the final product, this the bad effect of this inspection is that all bad products & defecated products will not be seen unless the final product released, & at this stage the cost of maintaining & correct the defected products & re- produce the product will costing the company a lot of money & time, so the study aims to:

1- Study the effect of multi – inspection processes at different areas, & the effect of these processes on the quality of the final product
2- What are the kind of defects resulting from the inspection process
3- Does the Final inspection process is enough for avoiding defects & raise the quality of home textile

Aim of the study:
1- Studying different methods of inspection during production in home textile Factories
2- Studying the effect of inspection at different processes on the Quality of the final product
3- Study all kind of defects found during inspection & its Effect on the final product
4- Issue Inspection plan during production processes to decrease defects in final Inspection

Importance of the research:
The importance of the research come from studying of different ways of in section at different stages & Identifying the advantages & disadvantages of each process & selecting the suitable process in each stage during process, which improve the performance & increase productivity in home textile Factory which reflect export level & develop the economy

Research methodology:
The study follows Descriptive & Trial methodology

Research boundaries:
The study the comparison of inspection processes in different processes during production

Research tools:
Site visit – interview with site managers

Study sample:
One of home textile Factories in Alexandria free zone, & the study implemented on 4 production Lines in the factory, all kind of defects monitored & before & after proposed inspection processes during production.

Collecting Data & Information:
2 ways used in collecting information:
First: Theoretical Data form masters & PhDs, & Arabic & English references
Second: collecting information during site Visit to the Factory from Practical study during factory tour & review quality reports in the factory & form interviews with factory responsible.

The site study data including kind of defects & classifications of these defects according to production processes, & comparing these defects with the production line, & reflection of the quality level of the exporting amount & reporting quality reports to top management.

Previous studies:

Samia Mohamed El Tewaishy 2008:

Studying of some Inspection methods & their effect on the final products in Ready-Made Garments, the aim of the study is to define different types of inspection methods in Ready Made Garments factories & the advantages & disadvantages of each of them & the effect of Inspection time during production & number of inspection processes needed the way of dealing with different kind of defects & the reflection of this on the quality of the final product, the main study results are the effect of different kind of inspections processes on the quality of the final product in ready made garment industry & the relation between inspection time & final product quality level [1]

Aly elsayed Zalat 1991:

"The possibility of developing new scientific & technical methodologies to reform common defects reasons in Cotton textiles & their effect on the quality level of the products"

The aim of the study is raising the quality of textile fabrics to remove weaving defects to decrease its effect on the quality level of textile fabric & therefore raising the quality level of textile productions, & raising the quality of the productions means cost reduction & increase efficiency, the study results found that the main reasons of fabric defects happened because of unprofessional inspection & lacking of quality control & lacking of quality measuring tools & testing equipments, therefore this affecting the quality of the final products & decrease textile industry level.[2]

Mamdouh Mabrouk 2000

" modern quality systems & their effect on raising productivity & marketing in ready made garments industry in Egypt", the aim of the study is to recognize modern & different systems in inspection & quality & trying to reach weak points quality level in ready made garments industry & discover the effect new modern the effect of quality systems in all production processes which raising the productivity & marketing level of ready made garments industry in Egypt, the way to achieving this aim by creating scientific methodology for developing productivity, through developing quality systems & d eveloping the

productivity by applying quality forms, which measure the quality level of the product in a regular basis & define defects & root cause of these defects & analyzing these reasons statistically [3]

Fatma Metwally 1998:

" establishing system to evaluate the quality in designing & producing ready made garments in Egypt to raise competitiveness" the aim of this study to provide scientific solutions which help ready made garments in Egypt to reach competitiveness in international markets with other products from other countries , the main results of this study is to develop computerized quality program to detect defects before producing final inspection process of the products [4]

Aly younus 2000:

" decrease cost of Bad Quality using six sigma methodology to decrease defects" the study aim to determine clear definition for 6 sigma & quality goals achieved form decreasing time & cost of defected production because of applying this methodology, & the relation between 6 sigma, standard deviation & cost of the quality [5]

Sawsan A Rezk, Azza Sallam 2002:

" Comparative study for production processes Quality level in Ready Made Knitted garments"

The study aim to analyzing quality level for different production processes in ready made garment of knitted garments within methodology of quality control in production system to detect the main factors affecting quality level of production inside some Egyptian factories (study boundaries), study results is to determine these main factors affecting the production processes which increase quality level. [6]

Tarek Saleh 2001:

" suing computer system in designing quality system in evaluating quality level in Ready made garments"

Study aim to designing quality system depending on computer to evaluate the quality level of ready made garments to accelerate reporting of inspection processes, the system depending on automatic calculations through specific equations linked with each others to provide accurate results, the system is flexible to access users to change the level of accepted quality level according to the customer requirements, this system build based on Excel 2000, & based on the detecting different kinds of defects including fabrics defects, spinning, dyeing, weaving, seam ,finishing defects & packaging defects. [7]

E. Gohar, H. Heikal, A. Ghoneim" studying the elements affecting the productivity diminution in in Ready-Made garments factories" the study aim

to studying different technical factors which decrease the productivity of ready made garments factories, through studying production planning, work environment, handling tools, modern technology inside production lines & the quality of raw materials, & all other technical aspects affecting the productivity of workers which reflecting on factory outputs in textile & readymade garments industry in Egypt, & trying to develop scientific fundamentals to increase productivity & apply applicable production plans. [8]

M. Elsayed El Meleigy 2000
"studying the effect of proposed Quality systems on product development in in Ready-Made garments factories" the study aim to establishing quality forms which can evaluate & develop productivity of the production lines of readymade garment industry, in addition to measuring the quality of the products on a regular basis & detecting defects & the root cause of defects & statistical analyzing these reasons to take the needed corrective action to eliminate defected products. [9]

Maged saleh 2007
"studying the relation between quality factors & product requirements" the study aim to strength the importance of quality & its effect, & analyzing the relation between quality & product requirements, studying total quality management & ISO International standards, the study aim to define relation between quality factors & product requirements based customer needs [10]

Conclusion form previous studies:
All previous studies were selected because of the relation of these studies & the research study in studing the effect of quality on the quality level of the final products in readymade garments industry & its main effect on decreasing defects & cost & wasting time because of bad products or low quality level, that therefore increase the value of textile products like readymade garments & home textiles & other textile products, the previous studies reinforce the importance of quality in raising productivity & increase exporting level,
The study of Samia El Tewishy recognized different kinds of inspection inside readymade garments & advantages & disadvantages of each kind of inspection & the effect of time of inspection during production process, on the other hand study of Elsayaed Zalat studied trying of the researcher to raise the importance of Quality through eliminating textile defects & decrease their effect on the quality of production, the study of Mamdouh Mabrouk aims to recognizing different & modern methodologies of quality &

trying to reach the reasons of weak points in modern quality methodologies in all production processes to raise the productivity, & marketing of textile & readymade garments, the study of Fatma Metwally gave some Scientific solutions enable Readymade garments in Egypt to reach the international Markets & compete in this markets, the study of Aly Younes provide the benefit od applying 6 Sigma on reducing the cost of the Quality, Sawsan Rezk & Azza Sallam Study syudied comparative study for analyzing quality of different production processes suing computer in Knitted Textiles at the same time Tarek Saleh provide system for evaluation the quality of readymade Garments, some studies studied the reasons of low productivity in textile Factories from many points of views such as production planning, work environments, materials & final products handling & modern technology inside production lines, these studies provide also relation between quality aspects & product quality
It is clear form previous studies the target for all production facilities is to reach high quality product, & our study studied one of textile product as an Examples Home Textiles

Theoretical Framework:
What is the Quality means:
Usually quality is known as Customer satisfaction, & can be defined form different point of views of producer & customer, but the product must fulfill acceptable level form producer & customer satisfaction to achieve its purposes, thus there was a need for general definition for the quality" quality is reach acceptable level of product characteristics of product or service based on product ability & customer needs" [11]

Quality of product & services one of basics & fundamentals for companies to success or fail, so companies trying to provide high quality product & services with competitive edge fulfill customer satisfaction, quality also is the fulfill the product or service needs, requirements & satisfactions, & the compatibility of product specifications for Technical designs
So quality can be defined as:
1- The quality form customer point of view is to fulfill the products & services to customer needs & requirements
2- Quality form producer point of view is the Quality of Conformity products characteristics for technical requirements
So Bad Quality come from 2 reasons:
A- unconformity the product to the customer requirements & customer expectations
B- unconformity of the product specification &

planned specification, which known as unsymmetrical quality deviations. [13]

Quality levels:

Companies trying to maintain quality levels form fulfilling product specifications with product planned specifications, with acceptable level of tolerance & acceptable level of deviations, but practically, there are actual deviations such as:

1- general deviations: happened by chance, which happened without reasons, which is random devotions, & this devotions is accepted & under control

2- special deviations which happened because of known specific reasons, & which is un-random devotions, & if these deviations happened, the production processes is out of control

3- All Companies trying to avoid these specific deviations un-random deviations from remove the root causes of happening, & companies trying to avoid other random devotions which need good product designing & well process. [14]

To detect different kinds of deviations, we need some measuring tools to measure quality, & if these devotions within the acceptable quality level or not, there are different kind of these measuring tools to measure quality level of the products, & if deviations within acceptable level or not, the quality of companies depends mainly on the quality level of the products, such as (PPM) "part per million", the percentage of good productions to the total produced products, percentage of defects, damaged products, reproducibility, Customer feed back, statistical tools (11)

The main factor to evaluate companies is to evaluate the quality of its products, through customer feedback & customer satisfaction on the quality level of company products, & through continues improvement of quality level of its products to maintain economical success, in these high technology race time within the global market affecting the quality level of the products, thus was the need of controlling products & reduce detected products, so quality control system become the main fundamental to increase productivity, including different kind of production process from raw materials to final product including all other production processes [9]

The main Quality basics:

4 quality basics can be considered as below:

1- Quality is fulfilling Customer requirements

2- Quality is preventing defects & mistakes not only detecting defects

3- Quality is the methodology to reach Zero defect

4- Quality can be measured by reducing cost, which means the cost happened from defected products, & the cost of repairing these defected products to fulfill customer requirements [9].

Economic quality

The quality can be measured by the quality cost, in some cases this cost reached 20% of sales products, & this cost considered a good chance for improvement if company management applied quality methodology in all production sectors to increase profitability, quality cost not only limited to production areas, but also includes all other areas, accounting, marketing, product designing, purchasing, & the factory management should put many efforts to control quality cost, quality cost can be classified as: correcting & preventing defects, internal failure, & external failure [9]

Quality in home textiles

Quality in simple definitions is fulfill customer requirements, & if the product fulfilled customer needs, then it can be considered high quality product, quality in textiles depends on the quality level of planning of the factory, control of the product in all production process form preliminary sample, planning, cutting, production, reaching final product, & inspection of the final product, quality of the final product can be anticipated form the quality of production processes, as there should be no defects in the final products if all production processed run on the proposed quality levels [9]

The meaning of production processes is all the processes witch the product go through till reaching the final product with in the factory form fabric till final product through different kind of processes such as cutting, sewing, ironing & packaging [17]

The new quality system classified as

First: the quality of Design:

This is a revision that the designed products can fulfill customer requirements & client expectations form the product, this is the job of research & development departments & market research

Second: quality of product conformance:

This is the level of conformity of the final product to product design as per customer needs before production starts, that means the final product should fulfill all product specifications received from the customer

Third: Quality of performance:

Which defines quality of designing, quality of product specifications, & classified as:

1- Online quality control which take care of production & product specification & Design

& include production quality control & the quality of marker & Pattern

2- Off line quality control which include designing the product as per customer requirements & designing & developing production processes to achieve planned products Characteristics [9]

Practical application:

Practical application of the quality methodology in home textile Industry, applied in One of home textile Factories in Egypt, Form visiting & applied practical study in the factory the actual & meeting the the factory management the researcher found that inspection in the factory applied only on the final product, so this inspection do not give the chance to the factory to avoid defected products until it come to the final product, & even the defect was at the raw material, the only point the factory can detect these defects in the final inspection stage, this cost the factory a lot of money to re-produce the defected products & wasting a lot of time in product delivery to the consumers & importers, & this also costs the factory a lot form its reputation & his ability to fulfill consumers needs on time,

Also the researcher found during his visits to the factory that there are many defected products that cannot be re-produced because the cost of re-producing will be more than the cost of producing a new product so these the factory do not benefited from these products any way

All of defects found in during pre-study reported as a measuring tool to for aim of the study & will be reported after the study application completed to measure the progress before & after the study So the researcher developed a way to inspect all kind of materials & design different kind of reports to control the process at all stages the researcher also apply inspections at different stages & listed all kinds of defects may be found in every stage,

Practical study implemented on four production Lines in the factory, all kind of defects monitored & before & after proposed inspection processes during production.

Stages of measuring the Quality of the product on 4 steps:

1- Inspection of raw materials (fabrics & accessories)
2- Inspection of the fabrics after cutting
3- Inspection of the product during production
4- Inspection of the final product

This inspection stages divided final inspection to 4 stapes, which can find the defects at every stage & avoiding this defect in the final inspection stage, & thus the production become more faster & better

in its quality

Estimated defects are as below:

First: Inspection of raw materials (fabrics & accessories)

In this stage we inspect the following items:

- Color Degree in the raw materials
- Selvage alignments & selvages defects
- Holes & cuts in the main Fabrics
- Yellowish of white Fabrics & accessories
- Number of defects in Fabric & accessories
- Weaving defects in fabrics
- Dying defects (leveling & uneven defects)
- Fabrics skewness or Spirality
- Any other defects in the fabric & accessories

Second: inspection of raw material after Cutting process:

In this stage we inspect the following items:

- Color Degree of fabric after cutting
- Selvage alignments & selvages defects after cutting
- Yellowish of white Fabrics & accessories
- Number of defects in Fabric & accessories
- Weaving defects & cutting defect of the fabrics
- Fabrics Spirality after cutting, & affecting of cutting on Spirality
- Cutting defects of fabric after cutting
- Foreign materials or oils after cutting
- Any other cutting defects

Third: product inspection after sewing:

In this stage we inspect the following items:

First: Human defects:

- Uneven stitching
- Double stitching
- Wavy stitching
- Irregular stitching, or Unmatched join stitching
- Loose stitching
- Over stitching
- Bar tack defects
- Missing stitch
- Uneven seam length

Second: Fabrics defects:

- Weaving faults-(Neps)
- Weaving faults-(Slub)
- Weaving faults- Broken yarn- Missed yarn
- Weaving faults- Thick place - Thin places
- Weaving defects double yarns
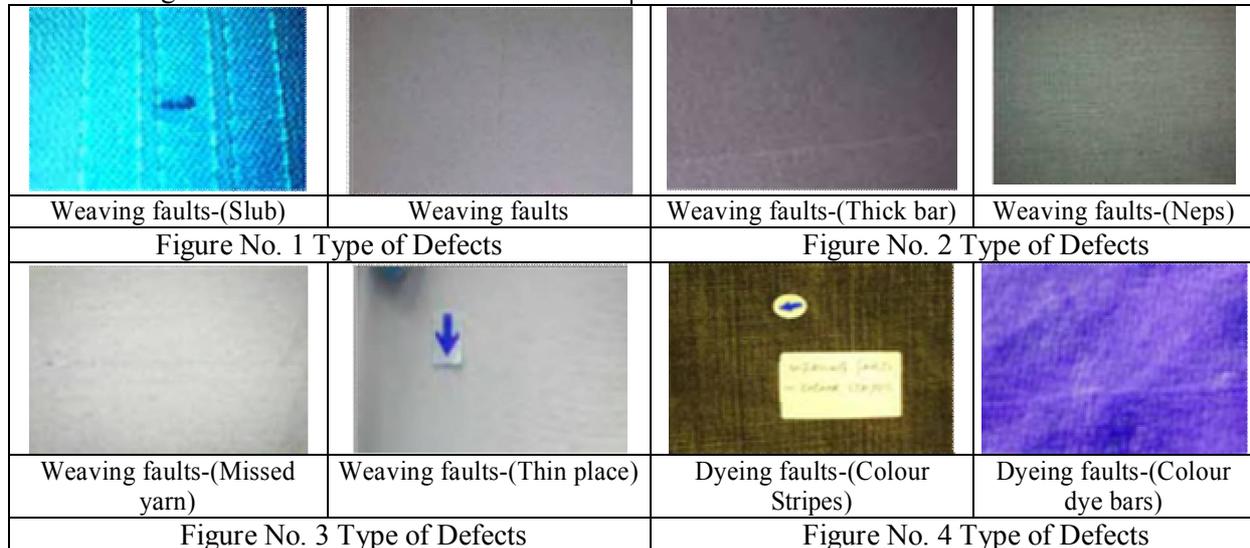
Fourth: Final product

- Dirt & dust
- Oils & grease
- Product pollution form un cleaned floors
- Untrimmed threads

- Rust (from different sources)
- Product do matching planned design
- Wrong size
- Wrong measurements

Fifth: Final product after packaging
  - Wrong barcode

- Wrong product size inside the carton
- Wrong product inside the carton
- Bad Packaging (defected carton)
- Wrong product distribution inside the carton

Weaving faults-(Slub)	Weaving faults	Weaving faults-(Thick bar)	Weaving faults-(Neps)
Figure No. 1 Type of Defects		Figure No. 2 Type of Defects	
Weaving faults-(Missed yarn)	Weaving faults-(Thin place)	Dyeing faults-(Colour Stripes)	Dyeing faults-(Colour dye bars)
Figure No. 3 Type of Defects		Figure No. 4 Type of Defects	

Kind of defects found during pre-study
During pre-study tour in the factory the researcher listed the defects on four production lines within the factory & these defects are as below tables:
Kind of defects & their percentage during pre-study visit

(Table No.1) Kind of Number of defects & their percentage in Production line A

Kind of defect	Number of detects	Defect % of total defects
Production defects	١٠١	٢٢,٢%
Machine defects	٣	٠,٧%
Weaving defects	٣	٠,٧%
Untrimmed threads	٢٨٣	٦٢,٣%
Wrong size	١٣	٢,٩%
Dirts	٢٦	٥,٧%
Neps	٦	١,٣%
Other defects	١٩	٤,٢%
Total	454	

Comment: defects in production line A
Production defects are 9.8% of total production line
Inspection defects are 12% of total production line

(Table No. 2) Kind of Number of defects & their percentage in Production line B

Kind of defect	Number of detects	Defect % of total defects
Production defects	١٠٦	٢٢,١%
Machine defects	2	٠,٤%
Weaving defects	1	٠,٢%
Untrimmed threads	٣٦١	٧٥,٤%
Wrong size	١	٠,٢%
Dirts	٩	١,٩%
Neps	5	١,٠%
Other defects	٢	٠,٤%
Total	٤٨٧	

Comment: defects in production line B
Production defects are 9.8% of total production line
Inspection defects are 12% of total production line

(Table No.3) Kind of Number of defects & their percentage in Production line C

Kind of defect	Number of detects	Defect % of total defects
Production defects	١٩٣	%٤٤,٣
Machine defects	٢٩	%٦,٧
Weaving defects	2	%٠,٤
Untrimmed threads	١٨٦	%٤٢,٧
Wrong size	1	%٠,٢
Dirts	٢٣	%٥,٣
Neps	2	%٠,٢
Other defects	٥	%١,١
Total	٤٣٦	

Comment: defects in production line C

Production defects are 10.2 % of total production line

Inspection defects are 7.5 % of total production line

(Table No. 4) Kind of Number of defects & their percentage in Production line D

Kind of defect	Number of detects	Defect % of total defects
Production defects	٢١٦	%٥١,٦
Machine defects	١٦	%٣,٨
Weaving defects	3	%٠,٧
Untrimmed threads	١٢٨	%٣٠,٦
Wrong size	٤	%٠,٩
Dirts	٤٤	%١٠,٥
Neps	2	%٠,٥
Other defects	٥	%١,١
Total	٤١٨	

Comment: defects in production line D

Production defects are 17.1% of total production line

Inspection defects are 12.6 % of total production line

Based on the pre study & inspection done during the pre study we can say that the above listed defects are the main reason of the defected products & the cost of the quality & wasting time of the factory, so if we can reduce number of these defects, then we can improve the quality of the products & save the time wasted in re-producing the defected products & improve the profitability of the factory,

But the aim of the research is to reduce the number of these products at the time it happened not at the final stage of the production (Final product), these defects cost the factory a lot of time & money in re production, but these defects have negative impact on the factory costumer loyalty, as these defects in case it have not been discovered early during final inspection, then the products will be sold to the consumers having these defects, & this will give bad impact on the factory reputation, so it is very important to the factory to raise the quality of his production to maintain the loyalty of his customers & gaining more new customers & export more products & at the same time avoid the cost & time of re-production of the defected products

To achieve these goals, the researcher designed number of forms aiming to inspect the product at different stages, to discover the main reasons of the defects & reduce the defects products

These forms applied at different stages as below:

1. Inspection of raw materials (fabrics & accessories)
2. Inspection of the product after cutting
3. Inspection during sewing process
4. Inspection of the final product before packaging

Note: these forms in appendices form Appendix No. 1 to 4

The main Technical reasons of bad quality products in the factory

1. Bad machines
2. No programs for periodical maintenance
3. There is no assistance equipments in production
4. There is no modern hi technology in production & quality aspects
5. Low quality of the raw material & accessories
6. Missing of good handling of raw materials & finished products in the factory
7. Missing of well trained of production & quality Supervisors
8. Wasting time in un important work
9. Bad organizing of production lines & other departments

Technical parameters affecting the quality of the products

Form the above mentioned tables which specifying different reasons for defects we can say that the problems on the Production lines & inspection of the finished products (specially untrimmed threads) are the main reasons of defects found the final products as they are the most repeated defects, & these two defects affecting severely in decreasing the quality of the final products in home textile & the productivity of the factory, as the first repeated defect is the production defects inside production lines that have been inspected during the research visits in the factory, the main reason for this defect is lacking of training for all workers working on the production machines & missing of maintenance programs, & missing of well supervision in production lines, & bad handling of raw materials & products in the factory.

The second defect that affecting the quality of the production & productivity that untrimmed threads in the final product, & the reason of this defect is lacking of good supervision of workers working in finishing departments, & the limited time to complete this process before packaging & shipping, as the factory management concentrate on the productivity of the production lines not the quality of the products. So there is no enough space area for finishing process & there is no enough tools, & mixing of production processes with the finishing processes and missing of well supervision of finishing & inspection processes

Administration reasons affecting the quality of home textiles in the factory

Form tables No. 1 to 4 the researcher found that there are administrative reasons affecting the quality of the production in textile factories, & these reasons such as establishing separate departments for different processes such as production, maintenance, Quality, planning & supervision & follow up, as the factory focusing only on the Production & neglecting other departments which are very important for home textile products, that concentrating only on production & neglecting other processes may affecting on the short term & increase sales & increasing the income of the factory, but on long term it will not satisfying the customers & will loosing customer loyalty on the long term

For example the importance of maintenance Department is to plan to make regular maintenance for factory production machines & assistance Machines as a preventive maintenance plan to avoid the sudden stopping of the machines, & machines defects which will affect products in

defected products, dirts, oils come out from the un-cleaned machines because of un-planned maintenance of the production machines

The importance of establishing separate department of supervision & follow up in hiring a group of high specialized & well trained Engineers & supervisors who have the responsibility of planning & follow up all production from receiving the raw materials till shipping the final products to the customers including finishing & inspection, & concentrate on detecting defects at the time of occurring & maintaining these defects instead of waiting till final product, because these defected products cost the factory a lot of time & money to repair these defected products.

The importance of establishing Quality Department in the factory is to detecting the defects at the place of occurring & repairing defects at the time of occurring, & inspecting of raw materials & accessories before receiving, also the responsibility of Quality department is establishing programs based on statistics & analytical figures about the repeated defects & in which areas of production, aiming to take the needed corrective & preventive actions to avoid these reasons in the future, & so to avoid the defected products & save factory time & money, at the same time planning to improve the Quality within the factory in all departments not only detecting defects in the final products or within the production areas

to avoid the defects found in the final product & to detect these defects at the time & place of occurring the researcher designed some forms for inspection in all Factory in different production departments to control & register different kind of defects which affecting the final products

the researcher design 4 forms to control products defects in the 4 production lines in the factory during the following process:

- Receiving of raw materials
- Inspection of the material before cutting
- Inspection of the Fabric after cutting
- Inspection after sewing & production
- Inspection of final product after Packaging

1- First: form of Receiving & inspection the raw material:
  - Color of the fabric & accessories (raw material)
  - Selvage defects
  - Torn & holes in fabrics
  - Fabric yellowish
  - Number of defects in meter
  - Fabric defects
  - Uneven Dying defects (color leveling)

- Fabric skewing
- Any other defects of fabrics & accessories
2- Second: inspection of fabric after cutting
  - Fabric color after cutting
  - Selvage defects
  - Torn & holes in fabrics after cutting
  - Fabric yellowish
  - Number of defects in meter
  - Fabric defect after cutting
  - Fabric skewing after cutting
  - Uneven Dying defects (color leveling)
  - Other cutting defects
  - Foreign matters after cutting
3- Third: inspection of product after sewing
  - Human defects:
  - Wavy stitching
  - Double stitch
  - Uneven stitch
  - Loose stitch
  - Irregular stitch
  - Rejected stitching
  - Un matched join stitch
  - Spinning & Weaving defects
  - Weaving faults Broken yarn
  - Weaving faults missing yarn
  - Neps, thick places, thin places
4- Four: Final product inspection (on production lines)

- Dirts & dusts, stains, & rust
- Oil spots & grease
- Dirty product form un cleaned floors & machines
- Untrimmed threads
- Rust on the products from different sources
- Product do not match its design
- Wrong size (product measurement is not correct)
5- Fifth: final inspection after Packaging
  - Wrong product inside the carton
  - Wrong barcode
  - Wrong number of pieces in the carton
  - Defected carton, bad package
  - Wrong distribution of products in the carton

Note: all inspection forms are in Appendix No. 1

After study results:

The researcher found that the results of quality of the products become much better after applying the designed forms of inspection on the 4 production lines in the factory during the production of research study of 3 months January, February & March, within all production process & this improvement reinforced by applying the needed corrective & preventive action at specific production area

(Table No. 5) Kind of Number of defects & their percentage in Production line A

Kind of defect	Number of detects In January	Number of detects In February	Number of detects In March
Production defects	١٠١	٦١	٣٣
Machine defects	٣	٢	١
Weaving defects	٣	٠	٠
Untrimmed threads	٢٨٣	٦٤	٥٣
Wrong size	١٣	٣	٣
Dirts	٢٦	٦	٥
Neps	٦	١	١
Other defects	١٩	٤	٤
Total	٤٥٤	٢٧٥	١٤٣

(Table No. 6) Kind of Number of defects & their percentage in Production line B

Kind of defect	Number of detects In January	Number of detects In February	Number of detects In March
Production defects	١٠٦	٨٨	١٤
Machine defects	2	١	٠
Weaving defects	1	١	٠
Untrimmed threads	٣٦١	٣٣٢	١٣٦
Wrong size	١	٠	٠
Dirts	٩	٧	٤
Neps	5	٤	٢
Other defects	٢	١	١
Total	٤٨٧	٣٩٦	١٥٧

(Table No. 7) Kind of Number of defects & their percentage in Production line C

Kind of defect	Number of detects In January	Number of detects In February	Number of detects In March
Production defects	١٩٣	١١١	٧٠
Machine defects	٢٩	١٦	١١
Weaving defects	2	١	١
Untrimmed threads	١٨٦	١٠٩	٧٧
Wrong size	1	٠	٠
Dirts	٢٣	١٣	١١
Neps	2	١	١
Other defects	٥	٣	٢
Total	٤٣٦	٢٥٤	١٧٣

(Table No. 8) Kind of Number of defects & their percentage in Production line D

Kind of defect	Number of detects In January	Number of detects In February	Number of detects In March
Production defects	٢١٦	١٤٢	٤٠
Machine defects	١٦	١١	٣
Weaving defects	3	٢	٠
Untrimmed threads	١٢٨	٦٦	٢٤
Wrong size	٤	٢	١
Dirts	٤٤	٢٢	٨
Neps	2	١	٠
Other defects	٥	٣	١
Total	٤١٨	٢٤٩	٧٧

(Table No. 8) Comparison between the 4 production lines for the study period (Jan. Feb. March)
For production process & Inspection

Percentage % of production defects within 3 months			
	January	February	March
Line A	9.8%	6.0%	3.2%
Line B	12.4%	10.2%	1.5%
Line C	10.2%	5.9%	3.7%
Line D	17.1%	11.3%	3.2%
Percentage % of Finishing defects within 3 months			
Line A	12.0%	2.7%	2.3%
Line B	7.7%	7.1%	2.9%
Line C	7.5%	4.4%	3.1%
Line D	12.6%	6.5%	2.3%
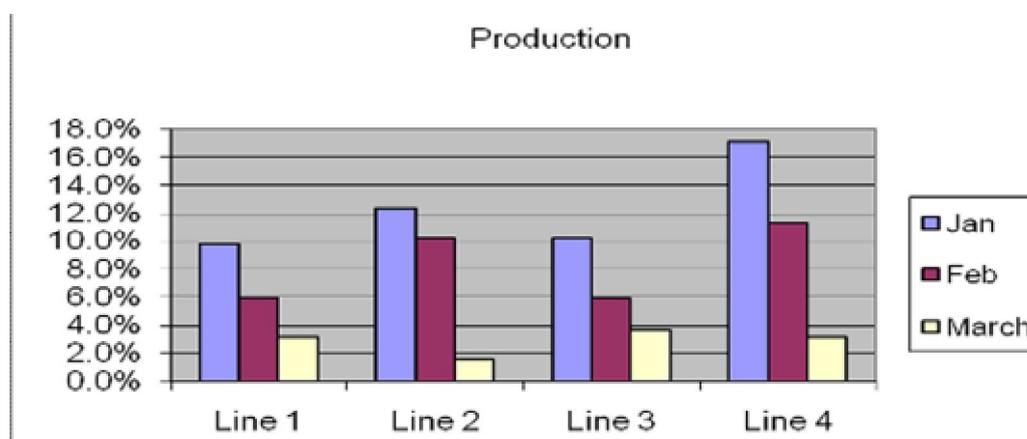
Percentage of defects of Production % of Selected Samples
Figure no. 5 Defect percentage

Finishing

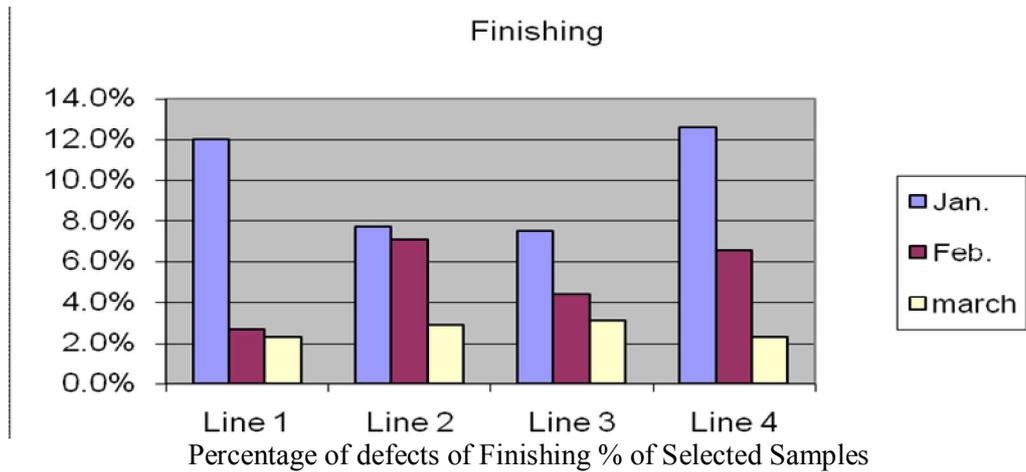Percentage of defects of Finishing % of Selected Samples
Figure no. 6 Defect percentage

Results of the study:

Based on the previous tables & pre-study the researcher found that there are many improvement in the quality of the products after applying the new inspection forms at different processes, that the percentage of defects of production & finishing processes decreased with great percentage, as a result of applying the new methodology in inspection at different processes in the 4 production lines inspected during the study time line of the research, this improvement reflected on the quality of the final product, this improvement noticed clear in the following:

Decrease the number of defects on the process of inspection of raw materials (fabrics & accessories) after applying raw material inspection form that the big decrease in Drits, Fabric defects, neps, weving defects selvage defects & color of the fabric (dyeing defects for the colored materials or Yellowesh of the white fabrics, the reason of increasing the quality of these area because of establishing a list of probable defects at receiving process enable the inspectors to detect the defects & concentrate mainly in discovering these defects in raw materials & accessories, & the routine work of the inspectors give them the professionalism of doing their work & they are fully dedicated for this job. In accepting or rejecting the raw materials, which are not conforming or defected

The percentage of improvement happened by decreasing the defects at this area by 100% as this area has not been inspected before so the defects in this area is new in inspection, so the slight improvement in this area considered 100% improvement.

On the other hand the production improvement increased very mush as production defects on the machines because of human errors & other reasons & cutting defects have decreased very much in all production lines the decrease in defects was noticed very high in production line B, the percentage reached 1.5% by the end of the 3 months of the study after it was 12.4 % by the beginning of the study,, this is because of the professionalism & dedicate efforts in doing his job. & follow up all kind of defects once discovered & search for the root cause of the problems once happened & apply the needed corrective action & training the workers on the production lines to avoid this defects in the future, also e modern machines & applying maintenance programs was very accurate on this line

At the same time production line A was at the last in development, as slight improvement happened from 9.8 % to 3.2 % because the bad condition & old Machines found in the production line & stopping some of them during production, also because un expected reasons such as absence of some well trained workers on the machines, & replacing them with low professional workers

Dust & dirts come from un-cleaned floors, grease, & oils on the machines decreased a lot, this pollution of the products happened during production & the reason of these dirts come from different sources, uncleaned floors, dirty machines, & production tools, oils after maintenance of the machines

Improvement in decreasing of dusts & oils were noticed in high percentage in production lines A & D this is because of the regulation taken by the factory management in cleaning all floors & cleaning machines after maintenance & remove rusts form machines, scissors & other production tools & follow up cleaning of production area by dedicated enough workers for this job.

The percentage of the this defect in production line A decreased from 5.7 % in January at the beginning of the study & before applying these new regulations to about 1 % in March by the study period in production line A

dirts & dusts decreased in production line D from 10.5% to about 2 % by the end of the study because of the regulations taken in cleaning of all production tools in the factory & handling tools & change any of these defected tools by new tools

untrimmed threads improved very much in production line A in comparison with other production lines that the number of untrimmed threads decreased from 12 % to 2.3 % by the end of 3 months (study period) this improvement happened because of the factory management arranged enough space for he workers at the end of the production line to complete this job in a good manner & to inspect the product before packing in addition to arrange enough workers to complete this job, at the same time there were many absence in the workers who are doing this job in the other 3 production lines, this lead to load other workers to compete the job within very limited time, this produce low quality of the inspected products & many untrimmed threads in the final

after packaging defects in the final product after packing in the cartons ex: wrong or missed parcode, wrong number of pieces inside the carton, wrong sizes improved in all production lines, it was very high in production line A by January about 2.9 % & decreased to less than 0.5 % by the end of the study, about production lines B, C, D the percentage was from 0.9% to 0.2 % and after the study this percentage decreased to about 0 %, this improvement happened as a result of the recommendation of the study that the factory management must concentrate & put more care to this critical point in the factory, so the factory management establish a team work, separate of shipping departments they are only dedicated to inspect this area in packaging, this team is high qualified to do this job, also the inspection of raw materials at the area of receiving samples, Fabric, accessories & packing materials reflected too much to decrease defects in cartons & packing materials,

form all of the above mentioned progress in quality of all departments in the factory & increasing of the quality of the products after applying the new methodology within the study time frame, we found that l the total defects in production lines line A de form decreased from 9.8% my at the beginning of the study to 3.2% by the end of the study, & in line B form 12.4% to 1.5%, & in line C from 10.2% to 3.7% & in line D form 17.1% to 3.2%,

on the other hand the decreasing in finishing defects decreased very much by the end of the study, as it decreased as follow: in production line

A, & D there was great improvement decreased from 12.0% to 2.3%, & in production line B form 7.7% to be 2.9% at the end of the study, in production line D the improvement was very high as said before that the defects in finishing defects decreased from 12.6% before applying the quality forms at different finishing area to be 2.3% after applying the new methodology in the quality.

So we can say that by the end of the study & as a result of applying the quality methodology & the new inspection forms designed to improve the quality of the products within the factory, that great improvement achieved in the final products in home textiles, this reflected economically of the factory income & profitability, because of reducing the defected products, which was produced before applying the quality methodology in the factory, as these defected products need to be re-produced & or rejected totally from the customer re-producing or maintaining the defected products cost the factory a lot of money & time, at the same time it affecting the loyalty of the customer to the factory

Study results:

1- There is great improvement in all production lines by the end of the study after applying the proposed quality forms which was created to control & decrease the defeated products

2- Inspection of raw material make great added value to the quality of the products

3- Inspection of raw materials reflected in decreasing the defects in the packaging area & reflected on the final products inside the cartons

4- There is different improvements in the quality is not the same in all production lines because of different reasons

5- Human resource affecting very high in detecting the problem at the time of happening

6- Cleaning machines & floor & closing all sources of dust & dirts improve the quality of the products & decrease the number of defects of all production lines

7- Applying Maintenance plan on time increasing the quality of the products very much

8- Follow up factory management of training worker on regular basis reflect very high on the quality of the product as the production lines have well trained workers have better quality products

9- Inspection at different points improve the quality of the products very much & discover the source of defects to avoid it form final product

10- Inspection of raw materials (fabric, color, accessories,.....) reflected in decreasing the defected products in the final products

11- Providing & supplying the factory with the needed tools & lighting & good work environment reflected on the final product

12- Assistance & handling tools is very critical as well as production machines

13- New & modern production machines & new technology provide high efficiency in working area

14- Use of new production studies within the factory & Referring to professional & qualified experts in Quality have high impact on the quality of the production in home textile

15- Using of modern kinds of ironing machines reflected on the quality of the final products

Study recommendations:

Factory management decision in handling solutions for technical problems in production lines has a great impact on the Quality level of the products & raise the productivity of production lines in home textile factories, some of technical issues such as:

- Well planning of production, & saving production time
- Segregation between products produced for different clients, with different specifications
- Employing high technical, & well trained engineers & supervisors in production line & in Quality

Bad products happened because of defected products which do not fulfill customers, which have bad impact on the profitability of the factory on the long run

Home textile Factories which concentrate on productivity & neglect Quality level of the products this leads to more cost & time to repair the defected products rather than loosing time & money, they will lose customers

Home textile factories should have statistical tools & statistical analysis to control the quality level of the production & expecting defects & defected products before happening & search for the root cause of the problems & take the needed corrective actions on time

Factory management must collect enough information about the cost of the Quality of the defected products & analyze this information to enable the management to determine the relative importance for Quality problems & follow up improvement through strategic plan

Follow up study results in using proposed quality methodology in home textile factories within all production process in the factory will enlarge the profitability of the factory & get more loyal customers

Using new technology & applying more training for all workers in production & quality departments in home textile factories producing high quality products

References:

1- Samia Al Teweishy 1995, fabric structure & its effect on its properties & production process in Ready-Made garments "

2- Aly Elsayed Zalat 1991 "The possibility of developing new scientific & technical methodologies to reform common defects reasons in Cotton textiles & their effect on the quality level of the products"

3- Mamdouh Mabrouk 2000, Quality systems & its effect in raising productivity & Marketing in Ready-Made garments factories"

4- Fatma Metwally 1998 " design system to evaluate quality in designing & producing ready made garments in Egypt have the ability to competition"

5- Aly Younes 2000 "decrease cost of Bad Quality using six sigma methodology to decrease defects"

6- Sawsan A Rezk, Azza Sallam 2002 " Comparative study for production processes Quality level in Ready Made Knitted garments"

7- Tarek Saleh 2001: " suing computer system in designing quality system in evaluating quality level in Ready made garments"

8- E. Gohar, H. Heikal, A. Ghoneim" studying the elements affecting the productivity diminution in in Ready-Made garments factories"

9- M. Elsayed, El Meleigy 2000 studying the effect of proposed Quality systems on product development in in Ready-Made garments factories"

10- Maged saleh 2007 "studying the relation between quality factors & product requirements"

11- Sawsan. Rezk, M. Ablulkareem 2001 "Quality in Ready-Made Garments Industry"

12- A. Elhaddad "Total Quality Management" 2009

13- Marie A. Haie, cost management for purpose of measuring the cost of production, Services, planning, & control" 2006, Alexandria, Egypt.

14- Gouda Mahfouz " Total Quality management" Fundamentals & Applications" 2004 ,Amman Jordan

15- A. M. Abdel Aal, Seouis Rateb, " Xix Sigma, Precision in Quality Management, Fundamentals & Applications, 2008 ,Amman Jordan

16- Bahaa Rafaat 1994, "Ready Made Garments Production"

17- Zeinab Farghaly 1992, studying human & environmental Factors affecting productivity in Ready-Made garments"

18- Ayda Nassar, 1974 problems & difficulties facing Ready-Made garments industry".

Internet Websites

19- http://www.assignmentpoint.com/science/textile/quality-control-garments-production.html

20- http://softwearbd.com/readymade-garments/quality-control.html

21- https://textileapex.blogspot.com

22- http://softwearbd.com/readymade-garments/quality-control.html

23- http://www.apparelsearch.com/definitions/clothing/apparel.htm