Quality Improvement Applications for Leather Handbag Manufacture

PhD. Selmin Özkaya[1]*, Prof. Dr. Altan Afşar[2], Prof. Dr. Ziynet Öndoğan[3]

[2] Ege University Leather Engineering Department, İzmir, Turkey

[3] Ege University Textile Engineering Department, İzmir, Turkey

*Corresponding author

E-mail: selmind@gmail.com

Leather handbag, as an outcome of the labor-intensive sector due to handcraftsmanship and customers' high expectation, is classified as a luxury article of apparel. The purpose of this study is to eliminate problems which may occur before or during leather handbag production, to raise customer satisfaction as well as productivity and to preserve handbag quality. Also, leather handbag production is explained, quality problems are determined using statistical quality control methods during handbag manufacture, quality teams are organized and customer quality criterions are formed and these criterions are ensured to be adopted by employees to solve quality problems. With the statistical quality control methods, success of production is measured and short term solutions of most important problems are presented.

Introduction

Handbag, which was used only for carrying stuff before 19th century, has become more important with the industrial revolution and fashion trends by the beginning of 1900's (1). Leather Handbag is considered as a luxury product not because only delicate and intense workmanship is needed to make it but also leather and components used to make it are expensive, difficult to repair and leather handbag making takes a long time. Nowadays famous brands and designers are concentrated to create new handbag designs because customer demands have grown. Leather handbag has a high cost so customers' quality expectations are high, too (2). To reduce the cost for the production of their designs, famous companies work with other companies abroad, where labour cost is cheaper and the quality is good. Although Turkey is suitable for this cooperation, number of leather handbag manufacturers that can produce high quality products are very few.

Leather handbags are commonly made by traditional handcraft methods. Recently, leather handbags were being made at small workshops by craftsmen and their apprentices. Nowadays, handbag manufacturers need to preserve their quality and at the same time they need to raise their productivity. For these reasons, they have changed their production methods. Large and medium capacity manufacturers continue their production by combining traditional handcraft style and industrial production methods.

As a limited description, Quality is product quality, as a larger description quality is the summation of workers quality, engineers' quality, managers' quality, system quality, company's quality and purposes' quality (3). Handbag quality can be described as *the compatibility to customer expectations* (EQO) (4). At this point, it is important to be known clearly the customer expectations. Deciding for product quality, especially which includes several variations like leather character, handcraft work, can be subjective. Because of this, handbag quality and customer quality view should be defined clearly.

This study is made at a handbag manufacture which had several quality problems. However the handbag manufacturer had its own quality focused vision and mission, customer detected more fault than manufacturer's. And also total detected fault rate were too high. It is aimed to detect reasons of quality problems, to solve quality problems, to degrease total fault and repair rate and to ensure customer satisfaction. For these purposes, quality project was occurred by quality improvement team and the quality project was supported by general manager of the manufacturer. The team activated the quality improvement applications with using statistics quality control methods. With quality activities and team work, customer satisfaction and quality concept was accepted by all members of the manufacture.

2. Materials and Methods

2.1 Material

The manufacturer where this study was made produces leather handbags for several foreign and important companies. The company was founded in 2009 and 80% of their workers have more than 5 years of experience in making leather handbags. The owner and most of the managers in the company have 5 to 10 years textile production experience. This study was started in 2010.

The work-flow in the factory is explained below:

- When the samples, which are made by the design department of the factory, are approved by the customer, planning department orders components and other

materials for the production of the approved sample. A production method is prepared for this model and it is adopted for production.

- There are 5 production lines in the factory. Materials like components and leather for production are received by warehouse. Materials are sorted as batch for each model's production and these batches are transferred to production lines. Leathers are also transferred to cutting-preparation department and they are cut with press cutting machines. Then cutting, skiving, gluing, applying reinforcement, edge inking operations are done with following operation method. All applications at this stage are made for construction operation.
- After construction and sewing operations, completed bags are cleaned and corrections are made by quality control operators. Handbags become ready for shipment after customer's final quality approval.

Daily handbag (output) quantity depends on model's difficulty and detail level.

2.2 Methods

2.2.1 Formation of the Quality Project Team

Because of the high percentage of errors and the differences between the reports of manufacturer's quality team and the producer, a project quality team is needed. This team focused on the differences between the error rate reports and by using the "brain storm" method they presented the problems and the ways to solve them. When an action plan was being made, it is needed to widen the scope of the quality project team. Then that bigger team is divided into smaller teams which are called "quality improvement teams".

The Quality Project Team are consisted of 11 members; Production engineer from Product & Design department, logistic manager, purchasing responsible, production responsible, human research responsible, education responsible, responsible of quality department, customer representatives and customer's quality control responsible. With this large number of members the Project team is expected to distribute information effectively and fast. Project team was supported by general manager of the factory.

The activities at this stage,

- All processes were listed and by following this list quality problems for each step are determined.
- Methods to solve the determined quality problems are found.
- Related issues for solving quality problems are grouped and "quality improvement teams" were created (QIT).
- Leaders of QIT were chosen from the Quality Project team and they had quality training (courses) about problem solving methods.
- QIT leaders chose members from workers and managerial staff for their team.

2.2. 2 Establishing Customer Quality Criterias

Although the factory has a document of quality criteria of the customer, it is needed to have more information because of the variations during production and the situations where quality can't be measured objectively.

Firstly, Quality Project Team aimed to collect information about customer quality criteria and expectations for improving quality.

These improvements have possible benefits listed below;

- Helping "Make it right at the first time" principle work for the producer.
- Helping the quality problems occur less.
- Decreasing production losses.
- Increasing the workers' motivation.
- Having a positive effect on the business image of the company.
- Helping the company to be preferable by understanding the Customer's expectations and applying them on the products.

Activity plan which was aimed to understand customer orientated thinking was started in 2010. Members of the project team were from; Design department, logistic department, customer responsible, production responsible and customer quality team.

Customer quality criteria were understood by manufacturer when the fault rate which was detected by Factory Quality Team (FQT) was higher than fault rate which was detected by Customer Quality Team;

Systematic of The plan included:

- The main issue was determined: Constructing a customer based quality criteria.
- Sub headings were determined: quality criteria obtained from customer as documents, faults on handbags which were rejected by customer were considered as customer quality criteria, determined faults during the production were photographed or faulty pieces were collected for the fault catalog.
- Analyzing present status: The factory analyzed fault rates for the last two months. Conditionally accepted components and faulty components collected as swatches with explanations.
- Problem Analysis: fault rates which were determined by the customer and the factory for two months, were analyzed and compared. Reasons for quality problems were detected using Brain Storm method.
- Preventing action: Photos of faults were grouped according to fault types, photos of faults were hanged with the correct status photo. Producing quality is production team's responsibility firstly. Because of this, teams should be trained about quality. Workers should learn quality vision of the company which they work for. The factory/company should have training programs about quality(3). For this reason, the factory had trainers about vocational educations and quality concept.
- Pilot appliance: solutions for quality problems were distributed in the factory. Effects on the Project were measured for two months.
- Measuring-Comparison: Fault rates of the factory's quality team and customer's reports were compared before and after the Project. Measuring always continued and the results were presented one year later.

3. Results

3.1 Distribution of Customer Quality Criterias in the Factory

Quality control reports of the factory's quality team and customer's quality control team's monthly fault reports between August 2010 and October 2010 were calculated and compared as percentage on Table 1.1

Table 1.1 Fault reports and fault rate comparison determined by FQT and CQT in between August-Oct 2010

	Quantity of The controlled bag by FQT	Quantity of determined fault by FQT	Quantity of The controlled bag by CQT	Quantity of determined fault by CQT	Fault rate(determined by FQT)	Fault rate(determined by CQT)	Total Fault Percentage
Agust 10	2724	1028	796	489	61,43%	37,74%	99,17%
Sept 10	1828	849	273	562	206, 23%	46i44%	252,67%
Oct 10	4432	1881	1400	430	30,71%	42,44%	73,16%

Fault percentage which was detected by CQT was higher than FQT's reports before October. The difference between CQT's report and FQT' s was at maximum level on September. According to the Brain Storm which was done on October, reasons of quality problems are listed below:

- Cutting operators cut leather without knowing customer quality criteria,
- Production team didn't know enough about the customer's quality criteria.
- Component and leather suppliers based raw material problems occurred.
- Usage of faulty components.
- In summary, common point of detected reasons is there was not enough comprehensive information and customer's quality criteria were not known enough by workers.

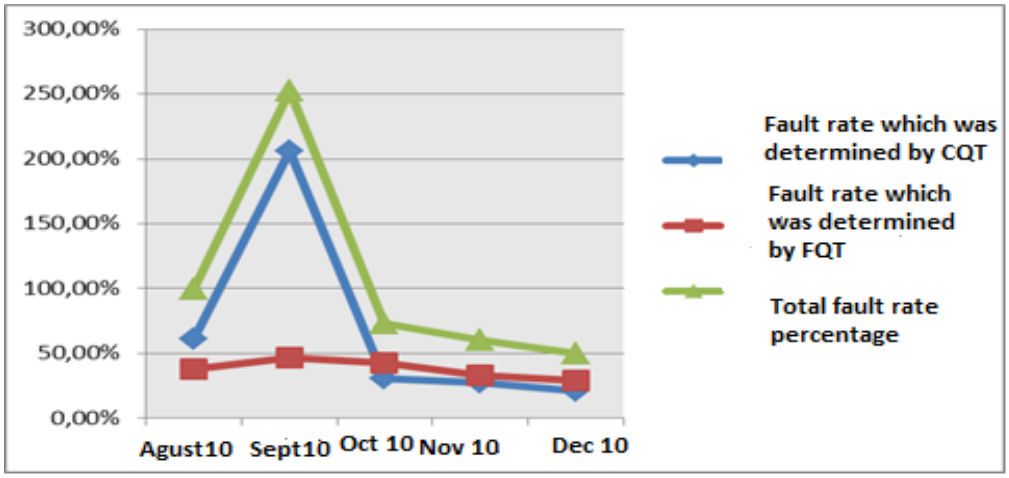
Two months after starting The Quality Project on October, FQT's fault reports and CQT's fault reports were calculated (Table 1.2) and compared on Picture 1.1.

Table 1.2 Fault reports and fault rate comparison determined by FQT and CQT in between August-Dec 2010

	Quantity of The controlled bag by FQT	Quantity of determined fault by FQT	Quantity of The controlled bag by CQT	Quantity of determined fault by CQT	Fault rate(determined by FQT)	Fault rate(determined by CQT)	Total Fault Percentage
Agust 10	2724	1028	796	489	61,43%	37,74%	99,17%
Sept 10	1828	849	273	562	206, 23%	46,44%	252,67%
Oct 10	**4432**	**1881**	**1400**	**430**	**30,71%**	**42,44%**	**73,16%**
Nov 10	3823	1263	2126	577	27,14%	33,04%	60,18%
Dec 10	4906	1430	712	148	20,79%	29,15%	49,93%

Along with the distribution of the customer's quality criteria in the factory, FQT started to determine more faults than CQT's.

There should be two main reasons for rejected bags by the customer; faults went unnoticed or/and information about the customer's quality criteria were not distributed or understood enough because it was not visual. Andragogy methods were used to teach adults. Quality production view was aimed to teach workers in an informal and friendly atmosphere. Subjects of the course were; quality, product quality, customer satisfaction, customer quality view, vision of the factory, mission of the factory, factory's targets, professional and technical issues. Fault photos were shown, fault rates were explained and possible reasons for high rate faulty reports were asked them. All replies from the workers were noted and this information would be considered on IQT projects.

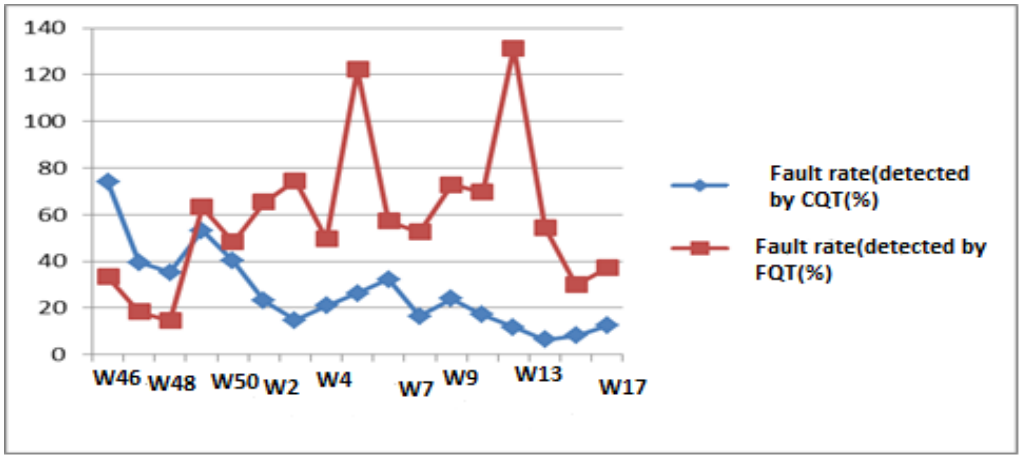


Picture 1.1 Monthly comparisons of fault percentage rate of FQT-CQT and Total Rate in between August-Dec 2010

FQT fault reports and CQT fault reports were continued to be calculated and compared weekly for following the quality Project success and preserving customer satisfaction. (Table 1.3)

Table 1.3 Weekly comparisons of fault percentage rate of FQT-CQT and Total Rate in between Nov 11-May 2012

	W46	W47	W48	W49	W50	W52	W2	W3	W4	W5	W7	W8	W9	W11	W13	W15	W17
Fault rate (determined by CQT)	73,95	39,53	35,12	53,23	40,09	22,95	14,67	20,96	26,13	32,24	16,3	23,91	16,93	11,71	6,31	7,99	12,26
Fault rate (determined by FQT)	33,18	18,36	14,38	63,26	48,25	65, 28	74,48	49,5	122,1	57,12	52,58	72,76	69,51	131,4	54,49	29,89	37,08
Total Fault Rate	107,13	57,89	49,5	116,49	88,34	22,95	89,15	70,46	148,3	89,36	68,88	96,67	86,44	143,1	60,8	37,88	49,34



Picture 1.2 Weekly comparisons of fault percentage rate of FQT-CQT and Total Rate in between Nov 11-May 2012

According to Table 1.3, fault rate which was determined by CQT was more than FQT's during 3 shipments (3 weeks) from week 46. Final quality control step was added to the work flow on week 49 for preserving customer satisfaction. Two experienced quality controllers were responsible at that point. Final control was applied 100% for four weeks starting from week 49, then it was made with using Acceptable Quality Level (AQL, 2,5). With this operation, faults on bags were being detected before they were received by the customer control and fault rate was decreased.

4. Conclusion

Although there are several variables such as handcraftsmanship, heterogenic leather character, limited time for production and the dependence on raw material quality, the encouragement of the management that embraced total quality principles made improvement studies possible. It

is understood that voluntary participation and cooperation with the customer for quality improvement projects helped detecting reasons of the problems, and distributing the solutions in the company.

The Quality Project was followed with systematic activity plan. That plan allowed everybody related to be able to observe the purpose and current state of the project, possible preventions and the profits of the project. It has been reached a conclusion that quality improvement activities can be done better with team-work.

Fault rate detected by CQT was more than FQT's. That caused the customer not being able to make inspection under suitable conditions, the repair quantity increase, irreparable bags and material losses, delay on shipment date, longer work hours for repairing and reproducing, occupational fatigue and possible faults depending on that.

According to the Project; Result of that represents faults and quality criteria. Customer quality criteria project started on October 2010. Fault reports were measured and compared for Two months before and two month after October, The fault rate detected by FQT at the beginning term of the Project were compared with inspection ratio and calculated average as 41 %. At the same term, faults detected by CQT were compared with their inspection ratio and calculated average as 60, 02%. At the end of the project, that rates were measured again; fault rate detected by FQT increased to 34 %, fault rate detected by CQT decreased to 27,25%. It is understood that, FQT started to understand the customer's quality view and total fault rate started to decrease. Trainings for workers and meetings are critically important for this enhancement.

Comparisons between fault reports of quality teams were continued weekly after the project. At the comparison made one year after the project, it is noted that the fault rate detected by CQT was more than FQT's fault rate and total fault rate increased as well. Final quality control point was formed to avoid customer complaints, to preserve acceptable quality for shipments and to avoid delays for shipment dates. A 100% percentage of inspection was done for one month starting from week 49, then inspections were made with AQL (2,5) method. Due to the forming of the final quality control operation, fault rates detected by CQT were decreased. As a result of weekly measurements and comparisons, at week 4 and week 11 of Nov11 and May 12, it is noted that fault rates were at the peak level. At that period, small numbers of special models were made. It is observed that, high fault percentage was because of workers' adaptation on new models, complexity level of the model and low quality tolerance for these models. Customer's quality criteria and tolerances can change according to

new models. Because of this, customer satisfaction should always be the measure and new criteria should be shared with workers immediately.

Changes in models, new criteria, changes in persons can affect the quality level of the manufacturer. With the continuous improvement principle quality improvement projects were implemented at the manufacturer for preserving quality standards. New internal quality control operations were added as a quality assurance activity; operators made 100% raw material control at the warehouse. After cutting and pre construction operations were finished, there is a control point and the operator sends the approved handbag pieces to the assembly line. Control before shipment is the last step before the customer's quality control operation. Final quality control point forced quality control operation to make better controls, decreased total fault rate and helped preserving quality assurance.

References

[1] Pedersen**, S**., 2006, Handbags, 2006, What Every Woman Should Know, United Kingdom.

[2] Özkaya, S, 2013, Deri Çanta Üretiminde Kalite Sorunları ve Çözümüne Yönelik Uygulamalar, Doktora Tezi, E.Ü Fen Bilimleri Ensitüsü, p. 1

[3] Dikmen, M ve Dikmen A**.,** Her Derde Deva İksir: TKY, A.Ü. Siyasal Bilgiler Fakültesi, Maliye Bölümü Kamu Yönetimi Bölümü http://kamyon.politics.ankara.edu.tr/calismalar/belgeler/01.pdf adresinden (15 October 2010).

[4] Kayaalp, İ. D, 2007, Konfeksiyon İşletmelerinde Kalitenin İyileştirilmesi Amacıyla İstatistiksel Kalite Kontrol Yöntemlerinin Kullanılması Üzerine Bir Araştırma, Doktor Tezi, E.Ü Fen Bilimleri Enstitüsü, p.3