Identification of Defects in Various Processes of Spinning: A Case Study of Kotri, Sindh, Pakistan

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Abstract

This research paper is focused on the identification of defects at the various stages of Spinning (Yarn Manufacturing) process in the ABC textile spinning industry of Kotri, Sindh, Pakistan. The defects data was collected and all defects were coded. The frequency of each defect was collected from all the seven stages of Spinning (Yarn Manufacturing) process.MS Excel is used for the calculation, construction and presentation of percentages, frequency diagrams and graphs. The results indicated the top defects in each Spinning (Yarn Manufacturing) process. The top defects include D6 i.e. 36(15%) in blow room; D17 i.e. 15(60%) in carding; D19 i.e. 53(80%) in drawing process; D22 i.e. 9(35%) in combing process; D26 i.e. 13(40%) in roving process, D32 i.e. 56(40%) in ring process and D35 i.e. 10(30%) in winding process. The production defects cost the firm in terms of product, labor, overheads, and transportation (from one process to an additional). Therefore, it is needed to identify the defects and reduce/eliminate them. Since, the defects are revealed along with number of occurrence; therefore, in the future studies, the defect reduction methodologies i.e. DMAIC, six sigma, lean manufacturing and lean six sigma can be applied to reduce/eliminate the production defects.

Keywords
Defects, textile, ring, winding, roving, carding.

1. Introduction
Although humans` first articles of garments as well as furnishing were probably animal skin covers, in some cases sewn with each other utilizing bone needles and animal sinews, he soon attempted to adjust coarse materials right into fabric fabrics, motivated by experience acquired from intertwining branches, leaves and also grasses in the manufacturing of primitive shelters (Gebru 2014). Sewing process is among one of the most vital phases in garments production (Gopalakrishnan 2020). In nowadays, garments 'deformity is probably the main components of the attire making industry considering that it makes a negative influence on authentic productivity (Akbar et al. 2020). Quality is defined as the level of acceptance of an items or service. It is a very crucial need for any type of item (Mridha et al. 2015). Quality and defects have been the key issue in manufacturing industries and the textile industry is no exception (Khan 2018, Kumar et al. 2020b, Mughal et al. 2020). In garment production, it is typical that there may be few declined garments after freight (Tahiduzzaman et al. 2018). Gebru (2014) observed fabric problems are needle-line, hole, lycra dive, oil discolor, sinker mark; as well as this problem has led to high rejection rate (7.87%) which is accounted to a loss of 150,101.5 birr monthly and also it likewise damages the image of the organization (Gebru 2014). The increasing trends of

published case studies is the evidence of the growing awareness and increasing scope of lean manufacturing in the major industrial sectors of Pakistan to minimize the defects and improve the quality (Khan et al. 2020c). The rapid changing business conditions such as international competition, decreasing revenue margin and also customer demand for top quality item at low cost push the makes to minimize their production expense without compromising quality in order to endure in service sector (Uddin and Rahman 2014).

The amount of defects and waste in the fiber content plays an important role in the spinning process. If the fiber is not well cleaned of defects in ginning plants, it is possible to get poor quality yarn from it. Therefore, first of all, it is necessary to pay special attention to the cleaning of cotton fiber from defects (Kushimov et al. 2021). Manufacturing the quality product is obligatory to maintain in this global open market (Mridha et al. 2019).The most important task in spinning production is to control and test the defects of products and determine the causes of their formation. Defects in spun yarns and threads are mainly due to poor cleaning of cotton in ginneries and the use of low-quality and dirty raw materials in spinning mills, failure of machinery and poor maintenance of machines(Kushimov et al. 2021). Different types of quality defects/ problems are observed in garment products during its manufacturing. These defects/ damages originate throughout textile production and also throughout its garment conversion. These defects/damages decrease the quality of the garment, which ultimately creates a substantial effect on the profit portion (Choudhary et al. 2018). Quality is eventually an issue of client fulfillment (Uddin and Akter 2018). The quality of the garments any type of vary relies on the cost market they are being produced so for that reason purchasers anticipate makers expect manufacturers to adhere to various techniques of inspection strategies all through the production as well as prior to delivery launch from factory (Mia et al. 2018). Given that there are numerous factors associated with identifying the quality of product, possibility for events of flaws is likewise extremely high. In order to accomplish optimum productivity as well as effectiveness in sewing space, it is very important to manage as well as reduce the issues in stitching process (Gopalakrishnan 2020).It was located that the most usual issue for all items is due to human-related concerns and secondly on the techniques which are additionally set by a human (Iqbal et al. 2020).

Currently, Pakistan is in the acute need of industrial and technological revolution to stay competitive in the international market. The manufacturing industry in Pakistan must also look to leverage its advantages, its large domestic market, good conditions in terms of raw materials and skilled labor, and the quality focus (Khan 2018). As textile industry contributes a major portion of the economy of Pakistan, it needs to adopt more promising technologies like LM to achieve functional and high performance characteristics (Khan 2018). The spinning industry of Pakistan is facing challenges with the global community. In order to stay competitive with global yarn providers, there must be some changes in the way that products are manufactured. These changes may include reducing cycle times, reducing lead times and reducing waste (Khan 2018). Khan (2018) mentioned that textile sector of Pakistan is suffering the main issue as cost. Asif and Jarral (2010) conducted as case study in the spinning mill of Pakistan and performed the production Analysis. They found raw material as the most critical factor which affect the defects and productivity of the spinning mills. Kumar (2014b) emphasized the technology and automation in his book to reduce the defects in spinning mills.

2. Literature Review

Quality stands for enterprise track record as well as purchaser satisfaction. So every market attempts to make certain top quality of item (Ferdous et al. 2020). Defects play a vital role in the efficiency of the garments factory. If a flaw is spotted in the final assessment, the defective piece has gone a long way before the fault is found. The cost of the manufacturing procedure for a faulty garment is entirely squandered as the product cannot be exported. Occasionally the faulty pieces can be made exportable with changes, yet it sets you back even more cash, which has no worth to a manufacturing facility proprietor (Uddin and Rahman 2014). Embroidery damages/defects are caused when fabric limits the infiltration of the stitching needle. This not only depends upon the spaces in the textile but additionally on needle account, needle dimension, stitching maker setting as well as sewing thread (Choudhary et al. 2018).

Khan (2018) conducted the case study in textile industry about the seven wastes of lean manufacturing and the applications of lean manufacturing practices. The author used the Gemba, Waste Relations Matrix, Cause & effect analysis, ranking and statistical techniques to identify and analyse the seven wastes of lean manufacturing. The seven deadly wastes of lean manufacturing are investigated and defect is identified as the most significant waste in the textile manufacturing industry. The author suggested most relevant lean practices to eliminate /reduce the defects (Khan, 2018). Bukhsh et al. (2021) conducted the case study research at Printing machine in a leading textile industry of Pakistan. The lean practices of Gemba, VSM, 5S, Single minute exchange of dies (SMED) and time & motion study are used to improve the changeover time, minimize the defects and improve the quality of the end product (Bukhsh et al. 2021).

Rafsan et al. (2020) exposed number of faults in their study, defects consisted of; skip fasten 151(10%), tension free/close 53(4%), label/size botch 20(1%), oil spot 46(3%), damaged line 109(8%), open crease 169(12%), box/plate skewed 48(3%), sewing dismissal 58(4%), pleat 166(11%), tag askew 26(2%), raw-edge 111(8%), tuck missing 78(5%), unclean spot 128(9%), part up down 170(12%) and also hole 105(7%) (Akbar et al. 2020). Gebru (2014) goals to attend to the above quality problem of knitting area by identifying the 80% reasons for quality defects and also proposing the feasible service for the critical ones. In taking care of the quality trouble, straight monitoring, meeting, check sheet & records were used to gather information and these data were likewise evaluated using Pareto technique, as well as focus group conversation. After the information is evaluated, the four essential fabric deformities (Needle line, Opening, Thread variant and Lycra jump) are attained as well as these textile flaws require to be remedied to reduce the rejection price by 80%. The result of the study suggested that the existing 7.87% denial rate can be minimized to 1.574% which resulted in the internet difference of 6.296. This suggests that the internet regular monthly decrease in material denial price is about 5533.6 kg which truly impacts the overall manufacturing in the section. This research study has located results with a set of referral, counter steps and basic operation treatment (SOP) that are suggested to be carried out by the organization (Gebru 2014).

Mughal et al. (2020) reviewed previous studies and mentioned that there is the tremendous potential about the applications of Six sigma (DMAIC) & Lean Six Sigma (LSS) in Production Systems to reduce/elimiate the production defects. There are remarkable advantages of applying Six sigma (DMAIC) & Lean Six Sigma (LSS) to reduce/elimiate the production defects (Mughal et al. 2020, Kumar et al. 2020b). Gopalkrishnan (2020) located that faulty garment made in the sewing room varies according to the garment style as well as it varies from 7.3% to 27.5%. Out of the numerous deformities occur in garments, textile hole as well as oil stain represent 18 to 43% for different styles. Thus by adopting a watchful textile evaluation prior to sewing will help to decrease defectives considerably (Gopalakrishnan 2020). Uddin and Rahman (2014) discovered the use of DMAIC technique of six sigma to minimize the deformities rate in garment manufacturing facility. This is an organized method in the direction of defects reduction via 5 phases of DMAIC technique named specify, determine, analyze, enhance as well as manage. Various six sigma tools were used in various stages. Pareto evaluation was done to determine the major sorts of flaws. Origin of those flaws was identified by cause and effect evaluation. Finally some potential services are recommended to overcome those causes. The outcome found after execution of the services is very considerable. The deformity percentage has been decreased from 12.61 to 7.7 and consequently the Sigma level has actually been boosted from 2.64 to 2.9255 (Uddin and Rahman 2014). Weseley and Poojitha (2010) intended to streamline the skip stitch discovery setup to ensure that maybe used in the market as an extra add-on in existing makers and also provide operator-friendly work processes at a reduced expense (Samuel and Poojitha 2010).

Mridha et al. (2019) complied with the DMAIC approach of Six Sigma to figure out the significant flaws, their root causes and afterwards suggests sensible services to minimize those deformities. This research study determined some flaws (busted stitch, skip stitch, raw edge, unequal stitch, down stitch, process missing out on, tightening and also joint stitch) those was in charge of more than 80% of complete deformities happening in the sewing section of the garment factory for the thing of a polo shirt. After discovering the significant deformities, conceptualizing tool was utilized to identify the likely causes and afterwards we identified possible origin by online examinations and also source analysis (Mridha et al. 2019). Sharifuzzaman and Islam (2018) investigated as well as observe 2 weaved garment industries few days for stitching mistakes, which are commonly taking place during production procedure by worker. In our analysis we discovered some faults like damaged stitch 8.91%, skip stitch 16.80%, open seam 15.78% as well as various other sewing faults at Suprov composite knit ltd. and likewise when we observed at Amantex ltd. we found damaged stitch 4.81%, sign up with stitch 4.39%, uncut thread 20.33%, up-down 17.31%, dust cloth edge 7.28% as well as others. Lastly we found total 6.38% garments are defective reasons for stitching issue for a solitary computation for two industries (Sharifuzzaman and Islam 2018). Islam and Ahsan (2018) explored 17 different deformities in their research however optimal varieties of mistakes are Skip stitch 30%, Broken stitch 8%, Needle reduced 9%, Uncut thread 25%. as well as others 30% flaw (Islam and Ahsan 2018). Tahiduzzaman et al. (2018) evaluated the garment stitching flaws making use of lean tools: Pareto graph, cause-effect layout, 5S execution, PDCA cycle for minimizing flaws as well as resulting enhancing quality and making even more profit. The Pareto graph showed that the major advancing flaws are others (19%), broken stitch (36%), slip stitch (48%), the open seam (59%) and so on (Tahiduzzaman et al. 2018). Uddin et al. (2014) utilized Pareto evaluation to identify the top occurring defects. After recognizing the significant defects, conceptualizing tool was used to identify the potential reasons and after that potential origin was determined by on-line inspections and source evaluation. The result discovered after execution of the approach was extremely considerable. The deformity percent was minimized from 11.229 to 7.604 as well as the Sigma level was improved from 2.714 to 2.93 (Uddin et al. 2014).

Kumar (2014b) mentioned that due to low operational costs and geographical advantages, Asian countries are poised to contribute most to the segment. China, India and Pakistan account for more than 60% of the world fiber consumption. Pakistan is among the largest producers of cotton with leading spinning capacity in Asia. In fact Pakistan contributes 5% to the global spinning capacity after China and India. At present, other than spinning there are 1,221 ginning units, 425 other small units that produce textile products. All these things have made it possible that now contributes about 55% to the country's total exports Memon (2015). Pakistan developed its textile industry over the years in terms of size and currently is one the leading exporters of yarn Memon (2014). Average annual production of Pakistan's yarn is calculated 3,000 million kg (Federal Bureau of statistics, Government of Pakistan).

3. Research Objectives

The aim of the present research was to reveal the type and number of defects at the company and this aim could be achieved by the following objectives.

- Identify the frequency of each of the defect at the company
- Rank each of the defect as per the various processes separately

4. Research Methodology

4.1 Data Collection

Data was collected from the ABC textile spinning industry of Kotri, Sindh, Pakistan. The yarn manufacturing process of ring spinning consists of six manufacturing processes. i.e. Blow room process, Carding Process, Drawing Process, Roving Process, Ring Process and Winding Process. The additional process of combing can be included in the case of combed yarn which makes the count of seven stages of yarn manufacturing process. The data includes the description of defects at the various processes of the industry. For the concise presentation of the defects, each defect was given a code and across the whole analysis. Moreover, frequency of each of the defect was collected from all the seven processes at the industry.

4.2 Data Analysis

After the collection of data, it was then put into the MS Excel for the calculation of percentage of each of the defect. Furthermore, all the defects were ranked as per their frequency and percentage at the various processes. For the graphical representation of defects, their frequency, percentage and ranking combo (column and line) charts were plotted in MS Excel.

4.3 Codes of Various Defects

The description of defects and their codes are presented in table 1 shown below.

Table 1. Defects and their codes at the various processes

Process	Code	Defects in yarn manufacturing
Blow room	D1	Miss shaped laps
	D2	Split laps
	D3	Poor cleaning efficiency
	D4	Neps formation
	D5	Ragged Laps selvedges
	D6	Lap licking
	D7	Conical laps
	D8	Dirty laps
	D9	Thick & thin places or patchy laps
	D10	Holes in lap
	D11	Soft laps
	D12	Stringiness of cotton tufts in laps
	D13	Laps splitting
	D14	Disturbed tufts in laps
Carding	D15	Neppy web
	D16	Cloudy web
	D17	Irregular sliver
Drawing	D18	Fine sliver
	D19	Irregular sliver
Combing	D20	Neppy web
	D21	Long fibers in waste
	D22	Irregular sliver
	D23	Curls
Roving	D24	Slipping coils
	D25	Soft bobbins
	D26	Irregular roving
	D27	Count & hank variation
Ring	D28	Foreign fibers

	D29	Twist variation
	D30	Slough off
	D31	Ring cuts
	D32	Improper bobbin build
	D33	Low cop content
Winding	D34	Stitching on cone
	D35	Ribbon wound cone
	D36	Soft build bobbin
	D37	Bell shaped cone
	D38	Nose bulging
	D39	Collapsed cone

5. Results

Results is consisted on the frequency, percentage and ranking of various defects at various processes of the selected industry.

5.1 Frequency Distribution of Defects According to Process

There were seven process at the study area i.e. blow room, carding, drawing, combing, roving, ring and winding process. There were number of defects coming out of these mentioned process while production. So each of the defect was collected in terms of their description and frequency; moreover, their percentage was calculated and graphs were plotted for their graphical presentation.

5.1.1 Frequency Distribution of Defects at Blow Room Process

Blow room is the initial stage in spinning process. The name blow room is given because of the "air flow" And all process is done in blow room because of air flow. Blow room is consisting of different machines to carry out the objectives of blow room. In blow room the tuft size of cotton becomes smaller and smaller. Mixing of cotton is done separately as well as in blow room. Compressed layer of bale is also open in blow room with the help of machine. Figure 1 represents the frequency and percentage of the defects occurred in the mentioned process. D5 was the most occurring 36(15%) defect.

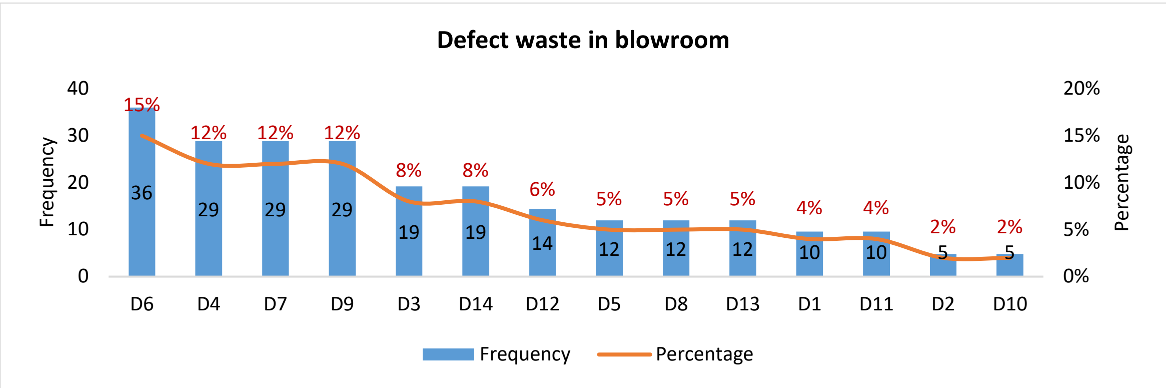

Figure 1. Frequency Distribution of Defects at Blow Room Process

5.1.2 Frequency Distribution of Defects at Carding Process

Carding process is very important role in spinning mill. It helps us both way to open the tuft into a single fiber and to remove the impurities and neps. Textile experts are convinced for the accuracy of following statement. "The card is the heart of spinning mill" and "well carded is well spun".

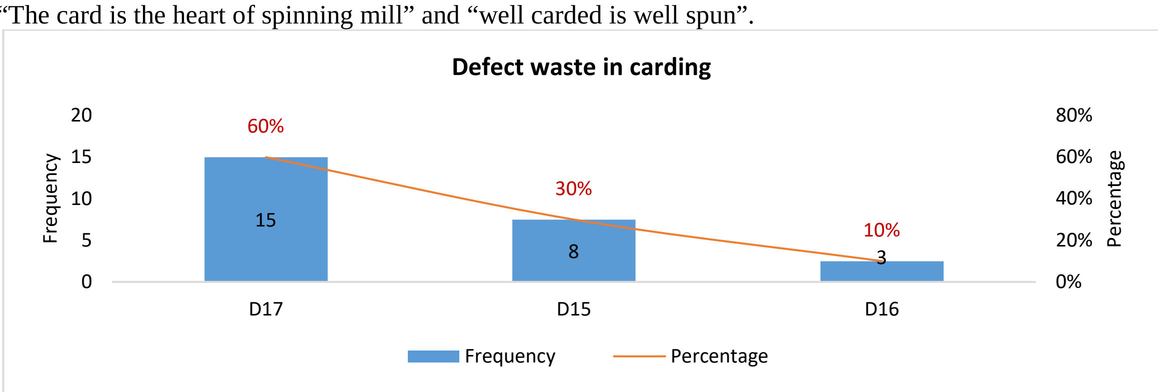

Figure 2. Frequency Distribution of Defects at Carding Process

Figure 2 represents the frequency and percentage of the defects occurred in the mentioned process. D17 was the most occurring 15(60%) defect.

5.1.3 Frequency Distribution of Defects at Drawing Process

Draw frame is simple and cheap machine. In spinning regarding to quality point of view it play very important role .If its setting is not done properly then it affects yarn strength and elongation. Draw frame play very important role for the quality of yarn. Without it participation quality can never be improved. Figure 3 represents the frequency and percentage of the defects occurred in the mentioned process. D19 was the most occurring 53(80%) defect.

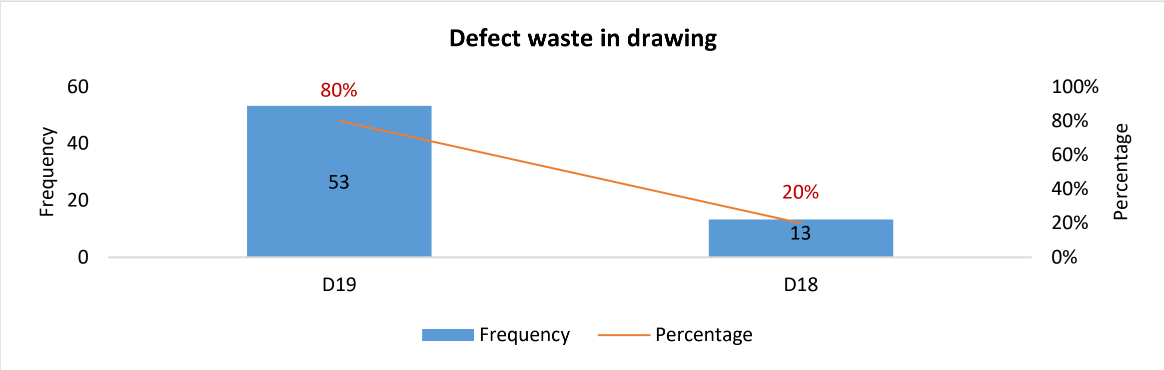

Figure 3. Frequency Distribution of Defects at Drawing Process

5.1.4 Frequency Distribution of Defects at Combing Process

For getting high quality of yarn, one extra process is introduced which is called combing process. Combing is an operation in which dirt and short fibers are removed from sliver lap. Short fiber which we remove is called comber noil. The comber noil can be recycled in the production of carded yarn. Yarn which is get from comber sliver is called comber yarn. Figure 4 represents the frequency and percentage of the defects occurred in the mentioned process. D22 was the most occurring 9(35%) defect.

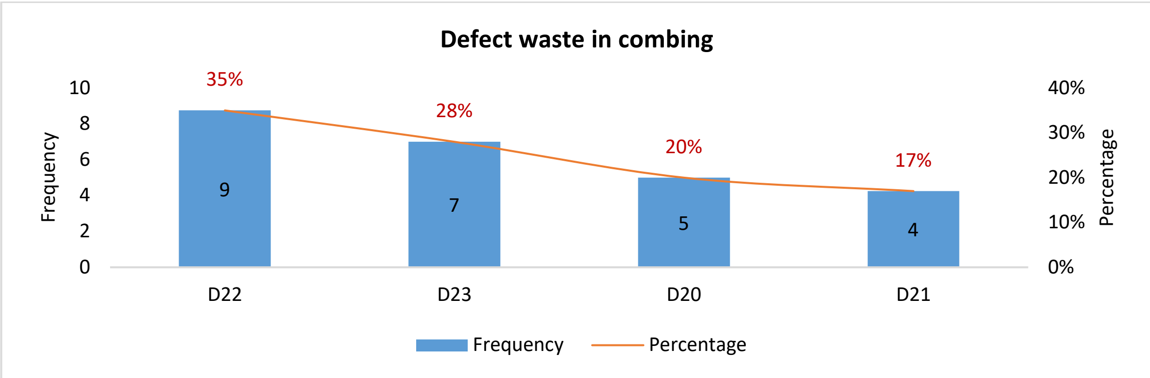

Figure 4. Frequency Distribution of Defects at Combing Process

5.1.5 Frequency Distribution of Defects at Roving Process

It is an intermediate process in which fibers are converted into low twist lea called roving. The sliver which is taken from draw frame is thicker so it is not suitable for manufacturing of yarn. Its purpose is to prepare input package for next process. This package is to prepare on a small compact package called bobbins. Figure 5 represents the frequency and percentage of the defects occurred in the mentioned process. D26 was the most occurring 13(40%) defect.

5.1.6 Frequency Distribution of Defects at Ring Process

Ring Spinning machine is used in textile industry to twist the staple fibers into a yarn and wind on a bobbin for storage and also input for the winding section for more precise the yarn to minimize the defects of end yarn. Ring machine is very important due to yarn quality. Ring Spinning is the most costly step to convert fibers into yarn and approximately 85% yarn produced in ring spinning frame all over the world. Figure 6 represents the frequency and percentage of the defects occurred in the mentioned process. D32 was the most occurring 56(40%) defect.

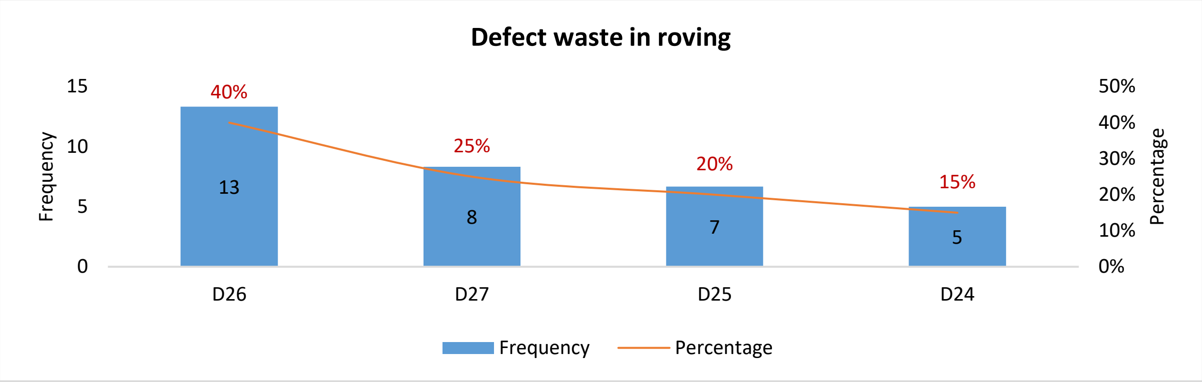

Figure 5. Frequency Distribution of Defects at Roving Process

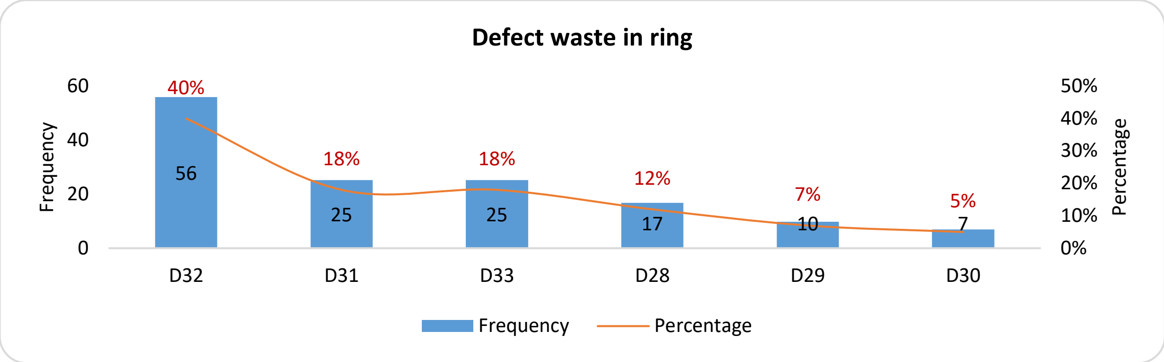

Figure 6. Frequency Distribution of Defects at Ring Process

5.1.7 Frequency Distribution of Defects at Winding Process

It is the last section of yarn manufacturing process where auto cone machines are installed and take an input material from ring spinning section as a yarn bobbin and give a yarn on paper cone after passing detecting instrument as an output. In winding section, there are lot of heads in auto cone machines use to wound the yarn from ring bobbin yarn to paper cone yarn. Figure 7 represents the frequency and percentage of the defects occurred in the mentioned process. D35 was the most occurring 10(30%) defect.

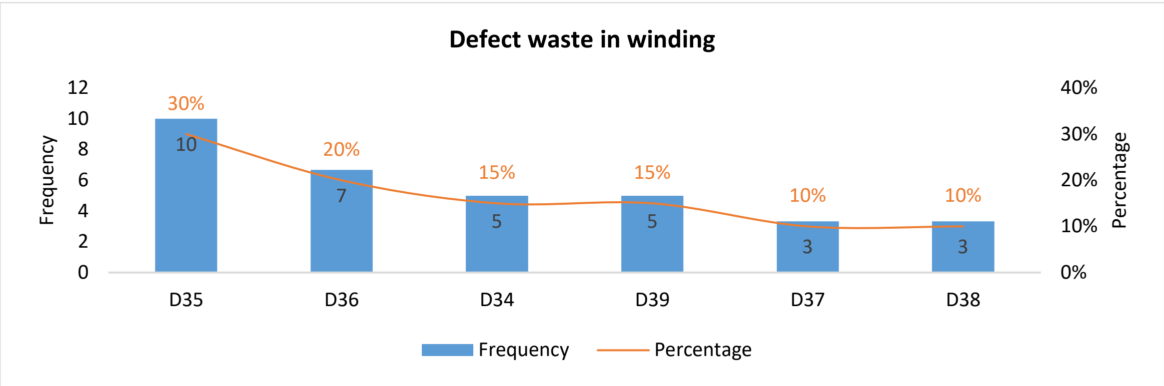

Figure 7. Frequency Distribution of Defects at Winding Process

6. Discussion

Quality is vital for any type of manufacturing or services market to guarantee adequate market share and meeting client demands there by to win customer commitment. In fact, in today's very open market, it can be stated that quality is the major consider identifying the success or failure of an organization (Gebru 2014). Rapid detection of a sewing flaw is considerable to optimization of the association in between quality and efficiency. Defects discovered after stitching adversely affect prices of the item (Gopalakrishnan 2020). Defects minimization is the very first condition of decreasing production expense and enhancing the quality. It will certainly likewise minimize the cycle time by minimizing reworks as well as finally result greater efficiency (Uddin and Rahman 2014).

The lean manufacturing has shown the great potential in various manufacturing sectors throughout the world to minimize the defects and improve the quality and like many other industries, lean manufacturing is the appropriate option also for textile industries to minimize the defects (Khan et al. 2020g, Zaidi et al. 2021). Initially, the textile industry was slow to adapt the lean philosophy as compare to automobile and pharma industry. But, during the last decade or so the textile industry has also shown the interest in lean philosophy & practices to minimize the defects and improve the quality (Khan 2018, Khan et al. 2020b). The garments sector of the textile industry is faster to adapt the lean philosophy & practices and has shown the proven benefits of implementing lean philosophy and many lean practices to minimize the defects and improve the quality (Khan 2018, Khan et al. 2020a, Khan et al. 2020d).

The automobile sector is the leading industrial sector throughout the world to adapt and implement the lean philosophy and most of the lean manufacturing practices (Khan et al. 2020f). The large pharmaceutical industries are not far behind also throughout the world to adapt and implement the lean philosophy and most of the lean manufacturing practices (Khan et al. 2020e). Both sectors have shown the proven benefits of implementing lean philosophy and many lean practices to minimize the defects and improve the quality (Khan et al. 2020e, Khan et al. 2020f). Kumar et al. (2020a) and Rajput et al. (2020) conducted the case studies at the automobile assembling plants. The proposed lean teachniques of VSM, TPM, OEE & Takt Time have shown the remarkable improvement to minimize the defects and improve the quality at the automobile assembling plants (Rajput et al. 2020, Kumar et al. 2020a). Lakho et al. (2020) discussed the case studies about the implementation of Total Productive Maintenance (TPM) and Overall Equipment Effectiveness (OEE) in various manufacturing industries. The lean practices of Total Productive Maintenance (TPM) and Overall Equipment Effectiveness (OEE) have shown the remarkable improvement to minimize the defects and improve the quality in various manufacturing industries (Lakho et al. 2020, Virk et al. 2020). Sahito et al. (2020) conducted the case study at the pharmaceutical plant. The lean practices of Gemba, VSM, time & motion study and cause & effect analysis have shown the remarkable improvement to identify, analyse and reduce/eliminate the defects and improve the quality at the pharmaceutical plant (Sahito et al. 2020).

Several of the scientists have worked with the problem as Uddin and Rahman (2014) discovered that the stitching section of picked garment factory was running at an issue percent of 12.61. The rate was very high at this existing business context. After presenting the DMAIC Technique of 6 Sigma the portion of flaw is reduced to 7.7. There is additionally discovered a considerable renovation of the Sigma degree of the sector. It is moved from 2.64 to 2.9255. So, this approach is very effective to the reduction of problems. As the reduction of flaws is a constant process even more application of this technique will assist the company taking pleasure in more reduction on defect rate and renovation on performance (Uddin et al. 2014). Mridha et al. (2019) located a substantial enhancement in the Sigma level of the industry. So DMAIC approach is extremely personnel to the reduction of problems. If several garment factories in Bangladesh comply with the six sigma principle, then they can decrease the majority of the defects in the sewing section (Mridha et al. 2019). Khan et al. (2020) discussed the applications of Waste Relations Matrix (WRM) to investigate the relationship of defects with other wastes of lean manufacturing and its affect on the cost of production. Khan (2018) and Khan et al. (2020b) suggested most relevant lean practices for textile industry to eliminate /reduce the defect waste of lean manufacturing which include Lean Six Sigma (LSS) and (DMAIC) as well. Mughal et al. (2020) and Kumar et al. (2020b) presented the case studies about defects in textile & non textile industries. The applications of lean practices specially the Six sigma (DMAIC) & Lean Six Sigma (LSS) have the tremendous potential in Production Systems to reduce/elimiate the production defects (Mughal et al. 2020, Kumar et al. 2020b). Uddin et al. (2014) used Pareto evaluation to recognize the leading happening flaws. After determining the major issues, brainstorming device was used to recognize the likely causes and after that potential root causes were recognized by online assessments and source evaluation. The result located after application of the approach was very substantial. The issue portion was reduced from 11.229 to 7.604 and also the Sigma degree was enhanced from 2.714 to 2.93 (Uddin et al. 2014).

7. Conclusion

In the present research, results indicated that D6 was the most repeated defect 36(15%) at blow room; form carding process, D17 was maximally 15(60%) occurred defect; D19 was the most occurring 53(80%) defect at drawing process; D22 9(35%) was highest occurring defect at the combing process; D26 13(40%) was highest occurring defect at roving process; D32 was the highest occurring 56(40%) defect at ring process and D35 was the most occurring defect at the winding process. The defects are caused because of machine error and human error; in order to reduce machine error, the inspection of processes and machines is deeply required and when there is the question of the human error, it can be minimized to some extent by training the works and minimum absenteeism at the workplace. In the present research, the number of defects are caused due to the human error; in this regard, the workers and supervisors as well are immensely needed to be trained for greater good of the department and so the company. Tremendous amount of money and resources are wasted due to occurrence of defects and therefore, they affect the profitability of the company. In this regard, they must be eradicated or at least minimized by the use of technology. There are various techniques to minimize the defects. Defects can be minimized by just organizing the setup and little care during the production is carried out. The lean practices i.e. lean six sigma, TPM, OEE and DMAIC are also suggested to minimize the defects.

8. Future Implications

Since, the defects are revealed along with number of occurrence; therefore, in the future studies, the wastage reduction methodologies i.e. DMAIC, six sigma, lean manufacturing and lean six sigma can be applied for the production of defect free products.

9. Limitations

In the present research, only defects were focused to be taken out due to the shortage of time; in future researches, the methodologies of eradicating defects can be worked on at the study area.

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Conflict Of Interest

No conflict of interest was found among the authors of the present research paper.

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