

Business Process Improvement Strategies For The CMT Clothing Manufacturer: A Case Study In Kwa-Zulu Natal

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ABSTRACT

The global economy is pressurizing organisations to improve productivity of their business processes. Competition is forcing organisations to focus their energy on "core competencies." Like many industries, the clothing industry is witnessing changes in technology, diversification of labour, managerial implications while competing on the global market. The South African clothing and textile industry has the potential to create jobs, but this potential has been steadily diminishing over the last ten years (Mamoepa, 2007). In this context, the clothing industry is regarded as a powerful engine for economic and employment growth. Nevertheless, the performance of the clothing industry, whether in terms of efficiency, working conditions or degree of social protection, is unstable. This paper aims to highlight some of the problems experienced by manufacturers' through a semi-structured questionnaire and provide suggestions for improvement of the clothing industry. The research methodology employed in this paper is qualitative and exploratory in nature making use of applicable literature and appropriate case studies. The research highlights some of the issues affecting the SA clothing industry and recommends the application of process improvement methodologies.

Keywords: South Africa, improvement, clothing industry, business process, improvement

1. BACKGROUND

The SA clothing industry shed over 67 000 jobs in the past three years (Bell, 2006). There is a possibility that more jobs may be shed in Durban (Kwa-Zulu Natal). The Alexander Report mentions that between July 2006 and May 2007 there was a drop of 5275 in employment figures (Palmi, 2007). The cut, make and trim (CMT) industries find it difficult to negotiate wage increases as production costs escalate beyond proportion. If the lay off of workers continues in the clothing industry, it would increase the unemployment rate, thus impacting on the economy (www.southafrica.info).

The Chinese clothing and textile industry has approximately 15 million workers and 300,000 factories. This means low cost garments for the global consumer but on the other hand pain and suffering as millions of jobs are lost worldwide (Paton and Bissek, 2005).

2. TRENDS IN THE SA CLOTHING INDUSTRY

2.1 CLOSURES OF CLOTHING ORGANISATIONS

Clothing and textile organisations in South Africa that are unable to cope with the changes in industry sought closure as a resolution. According to the Inggs (2006)

approximately thirty clothing and textiles companies closed since July 2002. Many of these organisations sought legal advice on the process of liquidation. Chinese imports proved to be an intimidating force for the entire clothing value chain.

2.2 PARTIAL CLOSURES OF ORGANISATIONS

Organisations that are involved with standard products found the competition stifling. These organisations (especially textiles) are pressured to shut certain parts of the operations only (Barnes et al. 2004).

2.3 PERFORMANCE OF THE INDUSTRY

The clothing industry in SA is performing in the region of 85% labour efficiency. Capital expenditure on new assets averaged approximately 1.4% of sales (Basdeo, 2006).

3. DESCRIPTION OF THE INDUSTRY

The clothing industry is dispersed throughout South Africa, but is condensed in the provinces of KwaZulu-Natal and the Western Cape. In Kwa-Zulu Natal, the clothing and textile facilities are found in and around the Durban Metropolitan area with pockets in the north and

south coasts, Newcastle, Ladysmith, and Qwa-Qwa. In the Durban metropolitan region (only) there are about 300 organisations employing over 15000 workers. The major part of the South African clothing industry is dominated by small and average sized organisations, i.e. those employing less than 200 employees which make up the majority of CMT manufacturers (Edwards and Schoer, 2001).

The majority of CMT manufacturers, as well as micro-manufacturers receive their customer orders from the larger independent organisations (Bennet, 2003).

4. SURVEY EVIDENCE THROUGH CASE STUDY APPLICATION

The survey focused on a qualitative approach of gathering information through questions based on the current experiences of the industry. Information was gathered through telephonic discussions, personal discussions with groups and individuals and direct observation. The survey only covers a few selected questions due to space limitations.

4.1 OWNERSHIP

In the sample investigation 36% of the organisations are affiliated to a "larger" South African organisation, 2% are part of an international organisation, 42% are privately owned (i.e., independent) companies, 18% are managed in-house as family organisations, and 2% are an experiment conducted by international organisations as a joint venture. The majority of the sample (86%) mentions that there is no transformation in their change in ownership over the past twenty years, but this does not mean that ownership would not change in the future. (Edwards, 2001).

4.2 AGE

Of the 146 organisations, 60% are over 20 years old, 25% are over 10 years, and the remaining 15 % organisations are between 2 and 9 years. The age of organisations ranged from 2 years to 50 years. The age of the organisation is important because the older organisations that failed to improve their profitability were eventually liquidated while other organisations that re-invested in technology and human resources were able to maintain their status.

4.3 CAPITAL SOURCE

The source of capital of 38% of the sample organisations is provided by the holding company while owners of the remaining 62% of organisations finance their own companies through savings or financial institutions. 35%

of the owners of the CMT (cut, make, trim) organisations were retrenched from the larger organisations and set up their own businesses through pension payouts.

4.4 CUT, MAKE, TRIM (CMT) PRODUCTION

Of the 146 organisations visited, 58% concentrate on cut/make/trim production, and 42% focus on the design and development of fashion trends in the industry. Some of the cut/make/trim organisations manufacture their own "brand" of products.

Cut/make/trim organisations are inclined to be sole proprietors, while other organisations are usually a part of a larger organisation. The cut/make/trim industry is in a situation to outsource some of its operations to other organisations, such as embroidery. The outsourcing of production is considered as an effective means of evading the issues of labour and the elimination of overhead expenses. The CMT operations predominantly use the bundle system methodology and have satisfactory to poor working conditions. The profitability of CMT manufacturers (as indicated by personnel) correlates with the output performance and the profit margin.

4.5 PRODUCT RANGE

The organisations in the investigation are focused on a varied of products namely, men's and ladies fashion underwear and outerwear, children's wear, surf-wear, knitwear and a variety of other assortments.

For organisations manufacturing standard production, i.e. men's outerwear, work-wear, there is minimal emphasis on designer output. On the other hand, fashion-wear requires designers to travel around the world to obtain "fresh" ideas in the fashion world. The product profile of the sample is varied. The research reveals that men's and boys' trousers account for 20% of the sample. This is followed by ladies outerwear 40%. Formal wear account for 28% and the remaining 12% is leisurewear and sportswear.

4.6 SIZE OF PRODUCTION RUNS

The size of production runs varied from 50 to 10000 units per order and is changing on a day to day basis over all organisations. It is found that the CMT manufacturers are the ones that received the orders that ranged from 50 to 500 units and are pressurized for price and delivery dates.

4.7 PRODUCTION SYSTEMS

Four organisations (3%) use the overhead rail system for production manufacture. Units move from operator to

operator for completion of the respective operation. The bundle production system is used in 97% of the organisations. One organisation was forced to abandon the overhead system as their product profile changed.

4.8 INPUT SOURCES

75% of the organisations use local production inputs while the remaining 25% use imported materials. It all depends on the lead time and supplier links that an organisation has. With a longer lead time, an organisation has the ability to source fabrics through its supplier links anywhere in the world. This is more favourable to the larger organisations that have the ability to create relationships. The “smaller CMT” manufacturers bear the brunt of this as time is a limiting factor. Also, often CMT manufacturers are provided with the fabric that goes in the manufacture of the garment.

4.9 OUTPUT PERFORMANCE

The international labour organisation (2006) reported that “SA output dropped by 32.4 per cent over the 1999 to 2005 period, the outputs of Asia and the USA increased by 97.7 per cent and 76.3 per cent respectively. Figures show that SA’s share of world output fell from 53 per cent in 1980 to 29 per cent in 1995” (ILO 2006). 43% of the organisations reported that during the period 1999 and 2005 the clothing output performance was steady, and the remaining organisations (57%) complained that output levels deteriorated. Output performance determines the profitability of an organisation and while 43% of the organisation (especially the larger manufacturers) maintained their position, the smaller manufacturers (especially the CMT manufacturers) are the ones that failed to implement process improvement strategies to improve their competitive status.

5. RECOMMENDATION

5.1 WORK MEASUREMENT AND METHOD STUDY

Work measurement is concerned with the length of time it should take a person to complete a task. These are vital inputs for workforce planning, estimating labour costs, scheduling, budgeting, operator efficiency, line balancing, incentive schemes and so forth. A standard time is the amount of time it should take a qualified worker to complete a task, under normal working conditions, with the correct tools and equipment and material inputs, in an ergonomically designed workplace. Time standards can be developed in a number of ways, that is, (a) stopwatch time study, (b) historical times, (c) predetermined times – general sewing data (GSD), stamp system (d) work sampling (Stevenson, 2006).

The need for methods analysis can come from changes in tools and equipment, changes in product or service design, the introduction of new products, changes in methods or procedures, and from changes in government regulations or contractual agreements. Methods analysis involves studying a job with the objective of improving the way it is done. To the extent that this leads to increases in output and/or decreases in input, productivity would be increased.

5.2 STOPWATCH TIME STUDY

The most common methodology used in clothing manufacture is stopwatch time study. It is based on observations of one worker taken over a number of cycles. It can be applied to other workers performing the same task. The basic steps are:

- Define the task to be studied and communicate with worker, supervisor, and management.
- Determine the number of cycles to observe.
- Break the task into elements, example, pick up 2 pieces and align, sew pieces, place aside – try to separate handling from machining.
- Time the elements of the task and rate the worker’s performance.
- Compute the standard time taking into consideration the performance rating and the allowances.
- The requirements to conduct the study include the following:
 - A clip board is required to hold the time study sheet in position for recording data.
 - A time study sheet is developed to record information and stop-watch readings on the operation
 - A stopwatch, analogue or digital based on centi-minutes is used to read the time for each element of the operation.

5.3 METHOD STUDY

Method study, which is the second branch of Work Study, is concerned with finding easier ways of doing things, and eliminating wasted effort and unnecessary work (Stevenson, 2006). The following steps are followed:

- Decide priorities – look at the benefits and whether it is worthwhile. It may be a bottleneck operation, or a critical operation that, if evaluated could improve line balancing.
- Analyse existing method – use symbols and codes to describe every movement in detail.
- Develop better method – on analysing the method, a work-study officer would often find

better ways of doing the task. When the new method has been established, it should be communicated to the operator and supervision.

- Test and confirm – the new method should be tested with all human factors in mind.
- Implement new method – the new method needs to be implemented with the support of all stakeholders, that is, the operator, supervisor and management.

5.4 METHOD IMPROVEMENT

Garment Engineering – the operation itself must be questioned: is it necessary at all? Can it be eliminated by a pattern change? Can it be eliminated by changing the seam type? These questions form the basis of garment engineering, which achieves improvements in efficiency by changing the construction of the garment (Basdeo, 2006).

5.5 EQUIPMENT SELECTION

Once it has been established that the particular operation or seam is necessary and cannot be simplified, the next step would be to decide on the best equipment to achieve the desired result. This means considering specialised machines as well as the wide range of attachments such as folders, stackers and so forth which are available (Basdeo, 2006).

5.6 MOTION ECONOMY

When the machine and attachments have been selected, it becomes necessary to develop the most efficient motion pattern for the operator. This includes how the operator brings in the work, how the pieces of garment need to be aligned, how the sewing procedure needs to take place, how the garment is disposed. This requires the principles of ergonomics (Basdeo, 2006).

- The clothing machinist normally sits in one position the entire day. The hands and feet operate the machine during the sewing procedure. The layout of the components of work need to be strategically positioned to create a smooth flow and become rhythmic. Prevent reaching out for components, tools and machine operation for an extended period where fatigue can set in.
- Work surfaces should be adjustable to worker anthropometry.
- In general, work should be organized within the person reach without stretching.
- All controls of the machine should be placed within the normal working area.

- Use both hands during operation in symmetrical and opposite directions to reduce fatigue.
- Design operations so that all fingers are used to avoid overload
- Try to use gravity in the operation.
- Working in normal posture. Try not to bend parts of the body into awkward positions.
- Change posture when necessary.
- Locate all working tools in position.
- Have a place for everything and everything in its place. Use easily accessible bins for small parts.
- Provide training in the handling of equipment (Stevenson, 2006)

5.7 THROUGHPUT TIME

Garments passing through a factory from one operation to another can be considered as a "pipeline" (Basdeo, 2006). The total time garments take to pass through the pipeline is called the "throughput time." The total number of garments in the pipeline at any one time is called the "work-in-progress." Work-in progress and throughput time are related to each other quite simply, via the rate of production.

$$\frac{\text{Work-in-progress}}{\text{Production rate}} = \text{Throughput time} \quad (1)$$

As an example, if there are 8000 unfinished garments on the factory floor and the average production rate is 200 per hour, the throughput time would be $8000 \div 200 = 40$ hours, or almost a week.

5.8 ACTIVITY SAMPLING

Activity sampling has been used to study factory work for more than forty years (Ramdass, 2005). It is based on a principle of finding out how an operator spends her working time. The study is conducted by obtaining information by frequent short glimpses and recording what the operator does at a specific point in time. The number of operators that can be studied simultaneously range from 1 to 20. Thus if an operator spends 20% of her time waiting for work, then an observer who makes 100 random glimpses at her should see her working on 80 of those occasions, and waiting on the other 20 occasions.

5.9 THE M/A RATIO

The measured time-achieved time ratio (M/A Ratio) provides a simple and convenient method for assessing the overall effectiveness of a production line. It is defined as a ratio between the measured time per garment and the actual achieved time.

$$\text{M/A Ratio} = \frac{\text{Measured}}{\text{Achieved}} \quad (2)$$

The measured time is obtained by timing every operation in the section, to determine the average cycle time for each operation. These values are added to give the total measured time per garment.

The achieved time is defined as the total clock minutes worked by the operators in a typical day, divided by the average output of the line, in units. The higher the ratio, the more consistent and effective is the line.

5.10 OPERATOR CAPACITY

A time study can be used to determine an operator's individual production capacity or to establish a standard time for the operation (Stevenson, 2006). An operator's daily output may be influenced by a variety of factors, including work supply, bundle size, machine trouble, line balancing and so forth. It is sufficient to make a short study of less than 10 cycles to establish an average cycle time. The potential output can be calculated by adding 33% to the observed time and dividing into the number of minutes in the day. For example, if the average cycle time is 0.42 minutes per garment, the operator should be able to produce in an 8.5 hour day the following number of units:

$$\frac{8.5 \times 60}{0.42 \times 1.33} = 913 \text{ garments} \quad (3)$$

The allowance of 33% is intended to provide for tea breaks, personal and fatigue, and any disturbances. It is an approximate figure obtained from experience.

5.11 THE PRODUCTION STUDY

From time to time the work study engineer would find a problem with an operator whom he knows should be able to reach the required standard or output, but who does not do so. The work study engineer is then called in to perform a production study to determine the cause of poor performance. The procedure involves recording every cycle with a stopwatch for an hour or more as required. This would lead to finding the root cause of the problem.

5.12 LINE BALANCING

An assembly line is defined as a set of distinct tasks which is assigned to a set of workstations linked together by a transport mechanism under detailed assembling sequences specifying how the assembling process flows from one station to another. Balancing a line means that each operator should have an equal amount of time to complete a task. Since this is not so, a theoretical calculation is done using the following formulae:

$$\frac{\text{No of operators on the line} \times 60}{\text{Total standard minute value of the garment}} \quad (4)$$

$$\text{example } \frac{25 \times 60}{15}$$

Therefore the output rate of the line would be 100 units per hour. The operations on the line then need to be balanced at 0.60 standard minute per hour.

5.13 GARMENT COSTING

Profits are essential for the survival and growth of any business (Weitz, 2006). Profits must be planned and strategies established to achieve the profits desired. This means measuring, controlling, and managing the investment in materials and labour required to produce the products. Costing is the process of estimating in advance what the manufacturing cost of a garment would be so that the correct selling price can be determined. It is a very critical process as it will determine the organisations profitability (Edwards, 2001).

5.14 ENVIRONMENTAL CONDITIONS

Environmental conditions are a cause for concern especially in clothing manufacture. Manufacturers need to be aware of the conditions and strain that machine operator's experience.

6. IMPLEMENTATION SITE

The implementation of process improvement took place at four different clothing manufacturing plants in Durban.

6.1 ORGANISATION A

This organisation employed 150 people. One line (25) operators were chosen on the manufacture of blouses. The researcher evaluated the current status with the production of 75 units per hour. The researcher performed work measurement through the performance of time studies on all operations. Methods of operation and the layout of the workplace were evaluated to improve the handling of garments on all 25 operations. The operations were balanced to minimise time between operations. The layout was adjusted to improve the flow of products to improve work flow between operations. Over a period of two weeks the production rate improved to 120 units per hour. This was an efficiency improvement of 62.5%. Thus, through fundamental work-study practices (5.14) the output of the line improved by approximately 63%.

6.2 ORGANISATION B

This organisation employed 350 people and manufactures men's trousers. One line of 45 operators was chosen. The researcher evaluated the current status of the production line and observed the following:

- lack of performance standards;
- lack of line balancing;
- inefficient flow of materials;
- machinists waiting for work;
- Inefficient work layout and ergonomics.

The output averaged 80 units per hour. The researcher spoke to management and the machinists to inform them of the current status. With the application of work-study principles the researcher changed the following:

- changed the method of handling the garment with ergonomics in mind
- improved the flow of work
- balanced the operations
- eliminated wastage in the form of time, unnecessary movement of materials and non-value adding activities
- set time standards for each operation

The production output performance improved to an average of 145 units per hour. This was an efficiency improvement of 57% within 3 weeks.

The researcher addressed the above issues through the application of work-study principles and achieved a considerable improvement in productivity.

7. CONCLUSION

The researcher is confident that with the application of the framework of process improvement, the clothing industry could improve labour efficiency by approximately 30%. Management needs to take the initiative of getting in the required skills to implement these changes, which could almost double their current profitability.

In order to survive in the clothing and textile industry in South Africa and achieve manufacturing excellence, the proposed process improvement strategies need to be implemented. It would provide impetus in gaining competitive advantage.

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