The operations of bata

An introduction to the problem and its relationship to operations practice in the organisation

1. 1 Introduction

This report is on the operations of Bata, a leading shoe manufacturer and retailer with operations spanning across five continents (bata. com, 2010). It will focus on its factory that produces ladies fashion shoes in Zimbabwe. Bata adopted a low cost leadership strategy in which it uses its economies of scale in gaining a market competitive advantage (Heakal, 2010). The company focuses on cost advantage by delivering the lowest possible costs of production (marketingteacher. com, 2010). The main characteristics of the Bata system include continuous innovation, integration, quality improvement, profit-sharing, worker participation and team self-management (Zeleny, 2010).

MISSION

To be successful as the most dynamic, flexible and market responsive organization, with footwear as its core business

VISION

To grow as a dynamic, innovative and market driven domestic manufacturer and distributor, with footwear as our core business, while maintaining a commitment to the country, culture and environment in which we operate

Figure 1 Bata Shoe Company Mission and Vision Statement (Source: bata. com, 2010)

The factory has four main sections, namely: cutting, stitching, bottoms, assembly and dispatch. In the cutting section all the different components of a shoe are cut from animal leather or synthetic material. The bottoms section deals with the preparation of soles before they are attached to the bottom of the shoes. In stitching all the upper components of a shoe are sewn together. The stitched upper and the treated soles are joined together in the assembly section. The completed shoes are warehoused in the despatch section. Table 1 shows some of the operational goals in each section. More information is given in section 2 of this report which looks at process mapping.

Table 1 Operational Goals

Cutting
Check status of cutting devices before beginning of shift
Cut leather and synthetic upper components
Prefabrication of components prior to stitching
Record outputs per operator per hour
Stitching
Sewing components together
Record outputs per operator per hour
Bottoms
Assembly
Dispatch

Chemical treatment of soles

Produce 800 pairs/day

Rejects not more than 3%

Record outputs per hour

Dispatch finished shoes every Friday

Meet all deliveries on time

1. 2 Low productivity

The main problem the ladies fashion shoe factory faced was low productivity. This resulted in late deliveries. Productivity is affected by the following factors: technology, management and quality as shown in Figure 2. Figure 1 is a fishbone diagram showing a cause and effect analysis of the problem of low productivity (Ishikawa, 1990).

Poor manpower

Frequent equipment failure

Bottlenecks

Too wide product variety

Multiple products on same production line

Technology

Management

LOW PRODUCTIVITY

Poor Quality

Figure 2 Fishbone diagram for Bata shoe factory

1. 2. 1 Poor quality

Poor quality manifested in the form of large numbers of reworks and rejects thereby limiting the production outputs. In a bid to meet customer needs and demands the factory had to produce a wide variety of shoes. This meant at any given point in time there would at least two different shoe designs on the production line at the same time. This was done to ensure that the production line was running at full capacity. The other challenge was frequent introduction of new shoe designs on the production floor. This meant the operators were perennial learners struggling to master the production of ever changing shoe designs on the production floor. This undoubtedly resulted in the operators becoming sloppy and making shortcuts in order to keep up.

1. 2. 2 Technology

This was further compounded by frequent equipment failure which resulted in a lot of bottlenecks. A machine breakdown meant a lot work will pile up at a selection of workstations thereby presenting management with huge problems of reloading and rescheduling the production runs. This increased waiting times between operations. It was common to see the under-utilisation of manpower with some pockets of the workforce being idle. Machine breakdowns were prevalent and they were partly due to them being very old. Zimbabwe was experiencing foreign currency shortages so it was difficult to buy spare parts for some of the machines.

1. 2. 3 Management

The aids pandemic caused seriously absenteeism amongst the workforce. Management seemed helpless in dealing with the situation.

An explanation of the process(es) under consideration (ideally incorporating some form of process map)

This section describes the basic processes involved in the manufacturing of ladies shoes. There are four main sections namely cutting, stitching, bottom preparation and assembly. The process maps below give a snapshot of the key operations and how they are interconnected. The process maps show a sequential order of operation which is not always followed in cases where reworks have to be done.

2. 1 Cutting section

The cutting section had a cell layout and this is where all the different upper parts of a shoe were cut and prefabricated before the parts were stitched

together (Singh & Divakar, 1996). Figure 3 shows key operations in the cutting section. Pattern making involves laying out upper materials according to designs in preparation for cutting. Stamping puts markings such as shoe size and company logo. Stitching guide marks are then put on the shoe upper material.

Pattern Making4ommunitynt g stakeholders: ch a way that they he bata e 2s hops or customers are done in the dispatch seaction. at the same time.

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Upper Marking

Upper Cutting

Figure 3 Cutting section operations

Other prefabrications operations such as attaching buckles or eyelets for threading shoe laces were also done in the cutting section.

2. 2 Stitching section

The stitching section had different sewing machines used in different operations. These machines were arranged in a process layout (Groover, 2007). Figure 4 shows the main sewing operations.

Stitching Outer Uppersg nsclor themes for diiferent ing terms such as roughing, etc.)

Hand Stitching

Thread

Clipping

Stitching Inner Linings

Figure 4 Stitching section operations

2. 3 Bottoms section

Soles and other bottom components of shoes were chemically treated in the bottoms preparation before they were attached to the stitched upper components.

2. 4 Assembly section

The assembly section involved attaching the soles to the upper parts of the shoes (see Figure 5). The ‘ lasting’ operations give shape to the stitched upper of a shoe. Roughing involves rubbing the bottom of the ‘ lasted’ with sandpaper to enhance adhesion of the ‘ lasted upper’ to the sole. The stitched upper is then joined to the sole. Heat setting ensures that the shape and form of the shoe conforms to that of a human foot. Inner socks are then fitted to make the shoes comfortable.

Shoe Lasting

Roughing

Gluing Uppers

Heel Lasting

Joining upper with Sole

Stitching of Upper with Sole

Glue Activation

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Gluing Soles

Chilling

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Heat Setting

Placing Inner Socks

Cleaning and Polishing

Figure 5 Assembly section operations

2. 5 Dispatch section

The final operations before the shoes are delivered to retails shops or customers are done in the dispatch section. Figure 6 shows the dispatch section operations. The total production output is measured just after the packing operation.

Quality Checking

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Warehousing

Dispatch to Shops

Packing

Figure 6 Dispatch section operations

2. 6 Input-transformation-output model

According to the input-transformation-output model (Slack et al, 2010) the inputs and outputs can be represented as shown in Table 2.

Table 2 Bata operations described in terms of their processes

Operation	Some of the operation's input	Some of the operation's processes	Some of the operation's output
Shoe manufacturing	Operators	Processing technology	Component preparation facilities
		Stitching process	
		Assembling process	

Source raw materials

Produce bottom components of shoes

Produce upper components of shoes

Produce inner lining of shoes

Sandals, leather shoes, tennis shoes, etc.

The process maps show the internal users and customers. They also show the processes that added value or simply cost money. Figure 7 shows the process chains and the internal and external customers for the Bata shoe factory (Bart-Jan Hommes, 2004).

Stitching

Cutting

Bottom Prep

Assembling

Dispatch

Final deliverable shoes

EXTERNAL CUSTOMERS

INTERNAL CUSTOMERS

Figure 7 Process Chains and internal and external customers

2. 7 Stakeholder Analysis

The Bata operations shown above are done in such a way that they contribute to satisfaction of its stakeholders (Wild, 2002). This is espoused in Bata's mission and vision statement in Figure 1. Table 3 shows a list of the stakeholders considered.

Table 3 Internal and External Stakeholders

Internal Stakeholders	
No	
External Stakeholders	
No	
Customers	
1	
Central Government	
3	
Investors	
2	
Local Government	
3	
Trustees	
4	

Government Agencies

3

Staff

5

Community

6

The stakeholders listed in Table 1 were mapped onto an Influence-Interest Grid (see Figure 8) based on the level of their influence in the performance of Bata (Mitchell et al, 1997).

4

1

5

6

2

3

High

INFLUENCE

Low

Low

INTEREST

HighKEEP SATISFIED

MANAGE CLOSELY

MONITOR

(MINIMUM EFFORT)

KEEP INFORMED

Figure 8 Influence/Interest Grid for Internal and External Stakeholders

Bata strives to meet and exceed its customer needs. The investors are made up of the owners and other finance providers to the business. The government impacts on the business through legislation such as tax and control of foreign currency transactions. Bata runs a charity foundation which is at the heart of the business. Bata takes its corporate responsibilities

serious and it engages the community through sponsoring sporting events, etc.

A discussion of relevant Operations theory (make sure that you consider other theory as well as TQM, and that you demonstrate a critical approach to the theory);

Various theoretical principles are described in this section. The section covers the theory on four V's (Slack et al, 2010), the total design process (Pugh, 1991), Theory of Constraints (Goldratt & Cox, 1984), Total Quality Management (Jablonski, 1992) and performance objectives (Slack et al, 2010).

3. 1 The Four V's Model

The four V's model describes the differences amongst operations processes (Slack et al, 2010). The four V's are volume, variety, variation and visibility. Volume gives the quantity of products or services produced by the operation. Variety gives the size of the different types of products or services produced by the operation. Variation gives a measure of the change in demand over time. Visibility gives a measure of the contact frequency with customers.

3. 2 Design Process

Pugh (1991) introduced the concept of total design which he defined as process beginning with the identification of customers needs and then developing satisfiers to meet those needs. The emphasis in the design process is to focus on the customer needs throughout the process in order to ensure that the end result is according to the specifications derived from the project brief based on customer feedback. At the heart of total design is the bringing together of all aspects of the design process thereby doing away

with the previous ad hoc design process in which some designers had no link with other designers or customers. Ignoring customer needs and other design factors to do with resources of an organisation can lead to commercial failures. Basically a design process can be represented in six key stages as shown in Figure 9 (Pugh, 1991). The double arrowheads show that the process is not strictly unidirectional but it can iterate as necessary in order for the design to converge towards customer’s needs.

Market

Specification

Design Brief

Concept Design

Detail Design

Manufacture

Sell

Figure 9 Stages in the Design Process

Customers are increasingly demanding higher quality shoes at lower costs and places higher demands on the part of the likes of Bata. In order to cope with this additional pressure cost and quality have to be designed into its shoe products. This is achieved by adopting the concepts of design for manufacture and assembly (Boothroyd, 1980). Design for manufacture and assembly involves changing designs and assembly procedures and

sequences in such a way that manufacturing and assembling becomes easier (Gerhardt, 1991). A product with fewer components takes less time to make thereby reducing manufacturing costs. If the features of the components make them easy to handle during manufacturing this also reduces manufacturing time and costs (Boothroyd, 1980).

3. 3 Theory of Constraints

The Theory of Constraints (TOC) is a continuous improvement approach that can be applied to any process (Goldratt & Cox, 1984). In the applying the TOC a bottleneck is identified in a system and then solutions are developed to fix it and this is done in a continuous fashion. Fixing of bottlenecks improves the performance of the system. The TOC does not advocate for the optimisation of non-bottlenecks so as not to create waste in the system. Figure 10 shows the various steps of the TOC. The TOC approach involves identifying and focusing on the constraint and then follow it through (focusedperformance. com, 2010).

Identify

Improve

Exploit

Elevate

Subordinate

Figure 10 Theory of Constraints (Goldratt & Cox, 1984)

3. 4 Total Quality Management

Total quality management (TQM) is a management philosophy that ensures long term prosperity of an organisation through adopting continuous improvement in all facets of its operations (Jablonski, 1992). TQM ensures that all stakeholders (see section on stakeholders) benefit from the organisation’s operations (Chartered Quality Institute, 2010). TQM goes beyond product quality, it also deals with the attitudes, culture, practices, processes, systems, etc. Thus it deals with all functions of an organisation such as finance, purchasing, marketing, distribution, etc. The implementation of TQM requires that quality conformance is measure against well defined specification. This ensures that a product or service is provided to a particular design specification.

Figure 11 shows the interconnection of various parts of the TQM ecosystem. At the heart of it is the customer-supplier interfaces. It also shows the importance of communicating quality issues, commitment to quality and the role cultural changes play in achieving and maintaining total quality.

Figure 11 Total Quality Management [Source: DTI, 2000]

3. 5 Performance Objectives

This gives a measure of performance. Table 4 shows a list of objectives and measures used to assess performance.

Table 4 Performance Management

Performance Objective

Some examples of the measures

Quality

Number of defects per pair of shoes

Amount of reworks

Amount of scraps

Number of customer returns

Speed

Order lead time

Delivery frequencies

Dependability

Measure of delivery rates

Proportion of shoes in stock

Flexibility

Range of shoe designs

Average batch size

Average capacity/ maximum capacity

Time to change schedules

Cost

Cost of reworks/ rejects

Deviation from budget

A comparison of the theory with the practice;

4. 1 The Four V's Model

Figure 14 shows a typology of Bata operations showing the four V's. The volume of shoes produced is high due to the customer demands. A wide shoe variety caters for demand of different styles by the customers. Variation is high to suit the different seasonal demands and visibility is low since customer contact is very little.

Low

High

High

High

High

Low

Low

Low

Volume

Variety

Variation

Visibility

Figure12 A typology of Bata operations

High variety and high variation results in high unit costs. On the other hand, high volume and low customer contact result in low unit costs. The positioning of the four V's in Figure 12 is dictated by the nature of customer demands.

4. 2 Design Process

The design process is done in an ad hoc manner at the Bata ladies fashion shoes factory. The design office is situated at the main Bata factory which is in a different town; this means the designers have to travel a lot to test their designs in the factory. The front end of the design is done at the main factory. The concept of designing for manufacturability and assembly is not in use (Boothroyd, 1980). This goes against what Pugh (1991) advocated for through his concept of total designing in which all aspects of the design process are integrated. The designers have very little contact with the market thereby making the design process less customer-focused. The concurrent engineering concept allows various tasks to be handled simultaneously (Rosenblatt & Watson, 1991). This means bringing together designers and production personnel together throughout the design process. Besides reducing time to market for new products it reduces quality problems related to manufacturability.

4. 3 Theory of Constraints

Constraints were identified in Figure 2, namely poor quality, equipment failure and shortcomings on the part of management. These three factors all contribute to the low productivity in the factory. The key constraint is poor quality which leads to a lot of reworks, repairs and rejects. Once the key constraint (poor quality) is identified then measures have to be taken to improve quality of work. Poor quality should be the main focus of the factory and all the other constraints become subordinate to this until the required standard has been achieved. Once this is done the next top constraint should be identified and the same approach is repeated. The TOC speeds up process improvement by eliminating waste in the system (Goldratt & Cox, 1984).

4. 4 Total Quality Management

Figure 6 showing a quality control activity being carried out before shoes are packed in boxes. At the end of the operations in Figures 3, 4 and 5 there are no quality control activities. This shows that quality control is not prioritised. Materials are passed from section to section without thorough checking. It is one thing having quality control points and it is quite another to get the people involved in ensuring high quality processes and products. There is general culture indifference to quality and this explains why operators pass on and accept defective parts. There are information boards with information on quality issues but the message does not seem to reach the operators. As a concept TQM is not a way of life in Bata although some parts of the organisation seem to have embraced it.

4. 5 Performance Objectives

Figure 15 is a polar representation of performance objectives for Bata. It shows a measure of the relative importance of performance objectives (Slack et al, 2010). The closer the line is to the common origin the less important is the performance objective to the operation. In this case it can be seen that all the objectives are very important to the operations at Bata.

Cost

Flexibility

Dependability

Quality

Speed

Figure 13 Polar representation of performance objectives

Consideration of changes which will improve quality and/or customer focus; and

5. 1 Range of quality

The TQM concept applies to all aspects of an organisation. Table 5 shows three aspects of the manufacturing process, namely: quality of design, material and products. Quality should be built in right from the designing stage right up to the finishing stages of manufacturing.

Table 5 Range of quality

Quality of Design

Quality of Materials

Quality of Shoes

Design Quality Shoes

Production Quality Shoes

Planning Quality Processes

Buying Quality Material

Receiving and Inspecting Quality Material

Manufacturing Quality Parts and Shoes

Inspecting and Testing Quality Shoes

Delivering Quality Shoes

5. 2 Processes

The designing process should focus more on the needs of the market and reduce the range of designs to manageable levels consistent with the capacity and resources of the manufacturing process. The narrowing of product range by increasing customer focus in the designing process will ensure that quality problems related to having too many changes in the setup of processes are eliminated. In Figure 12 the variety and variation dimensions are associated with high costs; if shoe range is narrowed these will move to left of the typology indicating lower process costs. From the cutting section to the sewing section work is moved in small boxes with no outside labels with information on the batch. Labels are found on the

components which are bundled together using rubber bands. Time is wasted checking boxes between shifts.

5. 3 People

Finished shoes are checked before they are boxed (see Figure 6). There are no other points within the process at which components are checked. Besides individual operators are not required to inspect any work they handle and they are not accountable to anyone for poor quality work. This means they can work on defective components resulting in increased costs due to material losses and labour costs. The culture of indifference to quality issues need to be addressed. The operators don’t see the link between the work they do and the resulting defects detected in finished shoes.

5. 4 Systems

Design for manufacture and assembly (DFMA) can drastically reduce costs and improve quality through reduction of reworks, repairs and rejects. Concurrent engineering principles could be adopted thereby bringing together designers and production personnel during the design stages. This allows the latter to inform the former about issues to do with production capacities and capabilities. Designers would bring their knowledge of using appropriate fixtures and tooling so as to reduce manufacturing costs. A customer-focused system can be created by linking key business processes and continuous improvement projects. It is critical to have information management system that allows documentation, measurements, monitoring, and controlling of processes (Wurtzel, 2006).

5. 5 Continuous improvement

The Deming Cycle is a four-step iterative process for managing changes in an organisation (Deming, 1986). It is not a one off process but a continued and sustained effort to drive continuous improvement within an organisation. The Deming Cycle as shown in Figure 14 involves the setting of quality goals and targets, implementing the changes, checking results against goals and targets and acting accordingly. The Deming Cycle provides a useful tool for implementing TQM in the Bata factory. It provides a platform for perpetual learning and continual change. The Deming Cycle and the TQM ecosystem shown in Figure 11 provide a framework for effectively and efficiently implementing and maintaining TQM.

Figure 14 The Plan-Do-Study-Act [Deming, 1986]

5. 6 Customer Focus

Bata can become more customer-focused by having a greater understanding of customer needs. These needs form the basis of what quality of shoes they want and expect from Bata. Shoes designed and produced according to customer needs are deemed to be quality shoes. The ‘ eight dimensions of product quality’ (Garvin, 1987) show that there are various quality attributes that can be used to appraise quality (see Table 6). There are implicit customer requirements that can only be captured via the ‘ eight dimensions of product quality’ since they go beyond the explicit needs found in a basic quality pair of shoes. These include reliability aesthetics performance and durability.

Table 6 The Eight Dimensions of Product Quality

DIMENSION

EXAMPLE

1.

Performance

Durable, comfortable, warm, waterproof, breathable

2.

Features

Lace up, high heeled, Velcro, canvas, athletic, sports

3.

Reliability

Stress tests used in design stage

4.

Conformance

Bata offers different sizes for both men and women and also produce orthopaedic shoes for disabled people

5.

Durability

Shoes are tested using standard international tests[1]

6.

Serviceability

Bata runs a defective shoes returns policy

7.

Aesthetics

Bata offered different upper finishes e. g. crocodile, nubuck, pig

8.

Perceived Quality

Bata brands e. g. Marie Claire, Weinbrenner, North Star, Power

5. 7 Technology and Manpower

Equipment failure and absenteeism also have an effect on productivity (see Figure 2). These have also been identified as constraints by the Theory of Constraints. The Zimbabwean economy has improved immensely after the dollarisation of the economy (Editor, 2010). This should allow investment in machinery since there is no more foreign currency limit on capital investments. Absenteeism is mainly caused by the Aids disease. Some companies have Aids workplace intervention programmes in which employees are encouraged to be counseled, tested and treated at work (SWHAP, 2010).

Recommendations as to how the process(es) could be improved.

6. 1 Deming Cycle (Plan-Do-Study-Act)

The Deming cycle is a useful tool in process improvement. It is crucial to develop a plan to manage the required changes. It is important to first identify and understand the problem(s) that need to be addressed (Deming, 1986). The Ishakawa diagram in Figure 2 helps to define what the problem is and what processes to focus on (Ishakawa, 1990). The plan should be carried

out initially on a small scale until the concept is proven before it is rolled out to cover all relevant areas. All observations should be documented for later analysis. The observations and feedback should be analysed and all data should be compared to predictions. The results should be acted upon. Some parts of the plan might need to be changed. If the plan is successful it should then be rolled out and the changes should be permanent pending a future review.

6. 2 Processes

The variety and variation dimensions of the four V’s should be reviewed so as to optimise them with a view to improve quality, reduce manufacturing costs and meet productivity targets.

Labels should be put on the outside of boxes containing work-in-progress in order to reduce set-up times and improve the flow of work

Quality check points should be set up at the end of each section. This prevents defective components being passed on to other sections. Various points should be identified within each section at which spot checks should be carried out randomly to ensure quality standards are being adhered to.

Bata should benchmark its processes against industry standards.

Some operations have to be scheduled to run overtime in order to stem bottlenecks. A proper scheduling involving advice from machine repairers should be done on those machines prone to breakdowns

6. 3 People

Each individual employee should be responsible for the quality of their work and they should not accept or pass on defective work.

There is need for a cultural shift towards continuous improvement. Management should ensure that there is a buy in from all stakeholders in order to achieve the changes required.

It is important that the message of quality is communicated clearly, unequivocally and consistently. Training should be an integral part of workforce development programmes.

An Aids workplace intervention programme should be run at the factory in order to stem absenteeism caused by the Aids pandemic. Flexible working patterns could also be implemented

6. 4 Systems

The following concepts should be adopted in order to reduce costs and improve quality: design for manufacture and assembly, total design process and concurrent engineering.

A customer-focused system should be created by linking key business processes and continuous improvement projects