

## **An Exploration of how Work Study Techniques can Optimize Production in Zimbabwe's Clothing Industry**

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### **ABSTRACT**

*Work study has received important clothing industrial acclaim due to its effect on productivity, quality, and competitiveness of an entity. Work study techniques raise the efficiency of production and can be used in all manufacturing as a scientific approach. In this study, a qualitative approach has been employed where in-depth individual interviews were used to tape in the intricate issues. Six clothing companies were purposefully sampled, and from within each company, designated managers were randomly chosen because of their experience, proficiency, and knowledge of the topic. The study revealed lack of work study implementation, resistance to change, and negative perceptions employees attach to work changes. Overall, this research managed to highlight the inefficiency of the clothing manufacturing companies without work study techniques. For the clothing sector to achieve success, implementation of work study techniques is highly recommended to increase production capacities for the firms and clothing manufacturing business.*

*Keywords: work study, clothing, competitiveness, manufacturing, cost*

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### **Introduction**

All manufacturing companies aspire to succeed in their operations, and those in the clothing manufacturing business are no exception. Clothing manufacturing requires the implementation of innovative management systems in production processes in order to meet order deadlines, reduce lead times, and optimize material use, with the ultimate goal of being competitive. In business, organizations have to be constantly

aware of their competitors' products, prices, and quality output, as these are important success factors. Since these factors affect the outcome of the operations, Khan (2014) states that the strategy employed by an organization to gain a competitive edge is crucial. Strategies vary and may either lead to the maximum output through increasing the sales volume or increasing the maximum profit by reducing cost.

Paneru (2011) asserts that traditionally-operated clothing industries face problems such as low productivity, longer production lead times, high re-work and rejection, poor line balancing, and low flexibility of style changeover, among numerous other problems. Such is the case of Zimbabwean clothing manufacturing businesses, which are facing many challenges, resulting in poor performance and, in turn, downsizing by some, and closure of operations by others. The gap left by these local manufacturers allows for an increase in clothing imports, especially from Asia.

Nyoni (2017) has reported that secondhand clothing continues to flood the Zimbabwean market, taking a significant share of the clothing market, presenting serious competition to local manufacturers, and leaving local clothing manufacturers with no option but to close operations. The major source of these second-hand clothes is United States of America, Canada, and the United Kingdom. Another problem cited by clothing manufacturers is the failure to access funds to re-capitalize their operations. Due to the dollarization of the Zimbabwean economy in the year 2009, operational costs have soared, giving rise to higher priced products. The locally-produced apparel products are usually priced above the competing imports, such that consumers prefer to buy the cheaper imports.

In order to improve the efficiency in productivity, clothing manufacturers in Zimbabwe have to carry out an analysis of their operations to see where the overall costs incurred in the production line can be reduced. This should allow for the manufacture of a competitive product that can penetrate the international market. Several methodologies have been tried and tested in improving manufacturing processes. These include the Kanban system, lean manufacturing, just in time (JIT) and Toyota production system (TPS). Work study had also been found to be a solution to manufacturing challenges, as evidenced in

the success stories of Bangladesh, India, China and South Africa (Ramdass, 2007).

According to Khan (2014), China is the largest producer and exporter of clothing and textile products in the world. Its success is attributed to the work study movement, which was initiated by Shizeing in 1908 intending to transform the Chinese into informed citizens. The Chinese were compelled to go and work in France, where they formed the nucleus of the future skilled working class there. Their return marked the diffusion of the industrial skills of European civilization to which they had been exposed (Démurger, 2010). China has achieved great rewards by using work study techniques and has set standards that other countries, world over, are emulating. Fouts et al. (1997) attributed the growth and success of manufacturing in China to the fusion of work study into their school curriculum and the fact that they placed more emphasis on labor. In the view of the Chinese, work study serves not only an ideological purpose but also meets a vocational need.

Kanaway (1992) averred that work study is a management tool that can be applied in manufacturing formulation. Its essence lies in seeing operations done procedurally, in the best way possible, timeously and by the most skilled individual(s). Masson et al., (2007) asserts that manufacturers are still seeking ways of reducing costs and maintaining or improving profit margins. Fredrick Taylor introduced scientific management in 1910 intending to develop a science, promoting specialization, ensuring work is done according to principles and balancing operations (Turan, 2015). Work study improves an entity's competitiveness and the entire production process through techniques that optimize production (Chary 2009, Tanvir & Ahmed, 2013). Singh and Yadv, (2016) also opined that work study results in increased production by improving efficiency, workflow, work layout and the quality and time standards that are applied in the processes involved.

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The exploration for greater manufacturing efficiency has become vital for the continued operation of clothing manufacturing companies in Zimbabwe. Chandra (2013) has emphasized that work study fosters good organizational skills, promotes flexible production systems with renewed ideas and eliminates the traditional working culture of performing work. In a study on clothing companies in Zimbabwe, Mpofu (2013) asserted that most manufacturing entities closed down and some were operating below capacity during that operating period due to a lack of work study knowledge. Singh and Mahmood (2014) opined that manufacturing process efficiency could be achieved through processing speed, cost, flexibility, and reliability which influence business performance. Irrespective of its benefits, work study has rarely been used by organizations trying to address competition in this increasingly globalized economy. This study seeks to find how work study could be a solution to the problems facing Zimbabwean clothing manufacturers, making them more competitive.

### **Statement of the problem**

Clothing manufacturing companies are faced with the dual challenges of producing at full capacity and remaining competitive. They cannot withstand the pressures emanating from the local market or, worse still, international markets. Such clothing entities have resorted to downsizing, operating below capacity, and working on selected number of days a week, while some have closed down completely (Nyoni, 2016). Closing and downsizing have destroyed investor confidence, resulted in job losses for the majority of Zimbabweans, and has ruined the country's economy. Locally-produced clothing items have become very expensive on the market when compared to imports, prompting consumers to prefer the latter. This study proposes work study as a means of investigating the challenges faced by manufacturing companies, and ultimately turning around their fortunes by reducing waste, removing winding procedures,

improving production systems, and managing excess time to achieve lower production costs.

### **Research Objectives**

This research seeks to:

- Examine how work study can be applied to improve production in Zimbabwean clothing companies
- Assess the manufacturing strategies currently being employed by clothing companies in Zimbabwe
- Evaluate the extent to which clothing companies are using lean principles in their organizations.

### **Literature Review**

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The clothing manufacturing industry is forced to seek work simplification, job design, and value analysis techniques to improve production, reduce production costs, and produce products of the expected quality to survive in today's competitive business environment. For the economic advancement of the country, products must be manufactured in the shortest possible time with the fewest possible inputs without compromising quality and wasting resources. Work study brings with new dimensions of techniques which help produce goods at a faster and more reasonable cost (Kanaway, 1992). Moyo et al. (2014) have asserted that work study allows for improvements in cases where companies are characterized by cost and time overruns. Thong (2014) in the same vein has highlighted the need to understand the benefits of work study in order to define organizational strategies and set strategic moves. Work measurement is the application of techniques to determine the amount of time taken to do effective physical and mental work producing units in specific tasks (Patel et al. 2014). Kulkarni et al. (2014) have pointed out that the strength of this application lies in its ability to measure work value. The relationship between work study, method study, work measurement, and time and motion study is shown in fig1.

## Method Study and Work Measurement

Method study is a technique employed to gain an understanding of how a task can (should) be accomplished. Through method study, a logical recording and critical analysis are carried out of existing and suggested methods of carrying out operations to develop and effective methods and reduce costs. The improved efficiency is achieved through improved layout and workplace design, improved and efficient work procedures, effective utilization of human resources, machinery, and materials, and generally improved design or specification of the final product. Within the garment industry, there are certain repetitive actions, which could be reduced through method study, smoothening material flow with minimum backtracking (Rathod et al., 2016). Work measurement, meanwhile, is the application of techniques to determine the amount of time taken to do effective physical and mental work producing units for specific tasks (Moyo et al. 2014). Patel (2015) has pointed out that the strength of this application lays in its ability to measure work value, its measuring abilities where work value is assigned. Singh and Garg, (2011) have affirmed that without work measurements, there can be no effective management, since work measurement sets down allowed standard times for operations in the clothing industry, confirming its reliability as a measuring tool.

## Time Study and Motion Study

The time study technique seeks to measure how long the average worker takes to finish a task at a normal pace. Originally proposed by Frederic W. Taylor in 1881, the classical

stopwatch study is still the most widely used time study method. Using an experienced or trained person, the time study procedure involves timing a sample of the worker's performance and using it to set a standard for the particular task (Heizer & Render, 2000). Within the garment industry, it is important to determine the average time it takes a person to complete a task. The experience of the person carrying out the time study is a key variable as it can affect the whole production system, and according to Paneru (2011), this is one of the major problems usually faced in time study. Motion study is designed to determine the best way to complete a repetitive job. Motion study improves production methods as it measures the distance one has to move to do a job, and how much one gets done within a certain period of time. In contrast to, and motivated by, Taylor's time study methods, the Gilbreths applied scientific perceptions to inculcate a method of study based on work motions. The filming of the workers' activities provides a visual record of how operations are done and assists in training workers about how best to perform work. The Gilbreths aimed to improve work practices, reduce costs, clear schedules or plans, and improve the safety of workers (Price, 1989). Time and motion studies are used together to achieve rational and reasonable results and find the best practice for implementing new work methods. Within the garment industry time variation is a must since the garments are made by different machine operators. For this reason, Khatun (2014) emphasizes the need to set a standard target for different products, thereby making time and motion studies mandatory. The conceptual model of the relationship between work study and productivity is given in fig 1.

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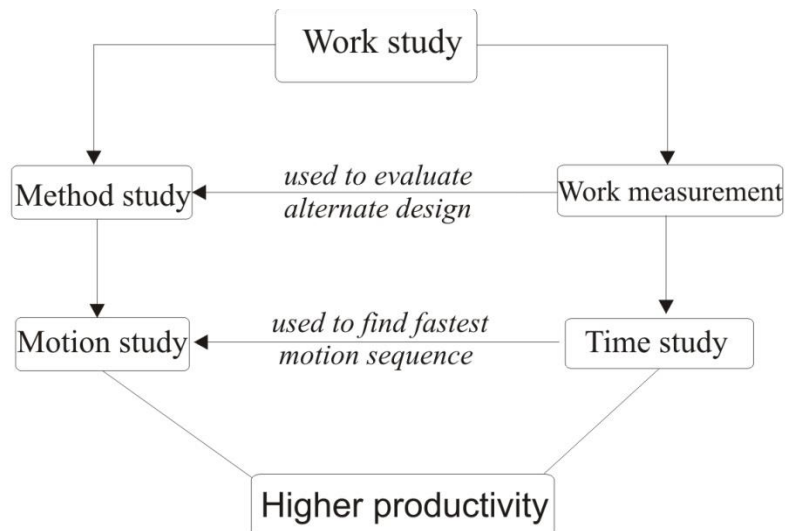


Fig1 Conceptual model: Relationship between work study and productivity

### Lean Production

Lean manufacturing, also known as the Toyota Production System (TPS), is a pull approach established in the 1970s by Taiichi Ohno and Shigeo Shingo at Toyota Motor Company (Becker, 1998). The lean concept in the garment industry can reduce the operational costs by eliminating waste, empowering people with greater understanding pertaining utilization of time and resources, thereby increasing productivity. The lean approach focuses on two major things: optimizing production and reducing waste. Garment manufacturing is an assembly-oriented process with a great range of raw materials, product types, production volumes, supply chains, retail markets, and associated technologies (Pandey 2015). The manufacturing process in an ideal garment factory starts from fabric inspection, spreading, cutting, sewing, product finishing, product inspection, and finally packing. Lean manufacturing is often applied to an assembly-oriented, labor-intensive industry and the garment industry is an example of such an industry. According to Hodge et al. (2011), lean manufacturing principles have been implemented in many different industries for a number of years, although application in the textile and garment industry is still very low. According to Seifermann et al. (2014), lean production

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systems can be used in place of work study. Lean manufacturing is a strategy that can be implemented in both large and small companies as it does not require a large investment in automation or information technology. The main benefits of the lean approach are lower production costs, increased output, and shorter production lead times.

### The just in time Concept

The just in time (JIT) concept implies producing the right part in the right quantity at the right time, thus reducing manufacturing waste. JIT was first developed and perfected within the Toyota manufacturing plants by Taiichi Ohno as a means of meeting consumer demands with minimum delays (Goddard, 1986). It is for this reason that Taiichi Ohno is frequently referred to as the father of JIT. JIT forms part of the lean concept as it is focused on efficiency, while lean manufacturing is focused on using efficiency to add value for the customer while reducing "muda" or waste in the course of the manufacturing process. JIT can be implemented on its own or as one step in the lean manufacturing process. The JIT system comprises the kanban system, production leveling or "heijunka," the single minute exchange of dies (SMED) and cellular manufacturing (Hodge et al. 2011). As the

global apparel industry is confronted by the era of fast fashion, implementing JIT can be the best response that an organization can make in its efforts to remain competitive, as JIT enables the internal processes of a company to adapt to the sudden changes in demand patterns that are characteristic of this era. The kanban system seeks to harmoniously control and indicate what must be produced at what time and in what quantity. JIT reduces the amount of money stuck in inventories of direct material and finished goods, as these are liabilities and need a lot of investment to maintain. It also helps to minimize the storage costs of finished products and reduce the cost of reprocessing of defected inventory (Khan 2014). A number of authors agree that there is a significant correlation between an organization's level of JIT implementation and its level of financial success (Inman & Mehra 1993; Callen, Morel, & Fader, 2005; Duarte et al., 2011). Implementing JIT in the garment industry implies that it is possible to change the physical plant layout and make some organizational changes. The physical aspects will relate to issues of ergonomics and the implementation of cell manufacturing and group technology.

## Methodology

The research problem was addressed using the qualitative in-depth individual impact assessment protocol (QUIP) in order to stimulate in-depth responses, vivid individual perspective, experiences, and beliefs. The paradigm relates to the understanding of some intricate issues that give a human face to research problems concerning the implementations of work study in the clothing industry. In-depth interviews provided an opportunity to interviewees to freely express themselves with an open-mind (Adams & Cox, 2008). This method provides useful and detailed information about any situation without barriers. The interviews attempted to achieve open, distinction in expression, rich explanations of different facets of the interviewees' background. The in-depth interviews helped to expose

interviewees' perspectives through their verbal expression and gestures as they responded to the sub-questions. The study targeted the clothing manufacturing companies in Harare regardless of their line of production. The sampling frame was defined as clothing manufacturers. The study used purposive sampling to extract useful data from the occupants of designated posts such as managerial posts for sound judgments (Etikan et al., 2016; Palys, 2008). For the purposes of this study, six (6) companies were used, with three respondents occupying designated managerial posts being purposively sampled from each. These included production managers, quality assurance managers, technical managers, operation managers, garment technologists, and designers by virtue of their knowledge, information, and experience rich cases. The assumption in this study was that selected respondents were proficient and well versed in the work study phenomenon and that they were able to communicate their experiences and opinions pertaining to the subject.

## Results and Discussion

### *Work study-knowledge and training*

Of the eighteen respondents, nine indicated that they had some knowledge and understanding of work study. On further probing, it was revealed that despite this understanding, they were not sure of how the work study technique could be implemented to improve productivity. Some of those who cited knowledge of the work study concept associated it mainly with setting targets for the floor operatives. When asked how these targets are set, most of the respondents referred to the figures currently being used within their specific companies.

The following excerpts highlight the level of knowledge among the respondents. As one respondent stated, "*I joined the company in 2006 and found these target sheets in place and have been using these ever since.*" Another respondent pronounced *that they give a task to three (3) more experienced operatives to do a sample and use this as the*

*average time for one to produce that single design.* The interviewees acknowledged a lack of training amongst the clothing manufacturing personnel. Only one organization of the six considered in this study had the position of a work study officer. In one organization, it was indicated that the position had existed, since the person who occupied it had left, and no one could do his job, the position no longer existed. Based on the responses, one can conclude that a management effort in training and upholding sound production systems has been slowly dying.

There is need to develop skill transfer within the companies so that when an experienced employee leaves their job, someone equally capable can replace them. Training allows one to acquire knowledge, strengthen skills, have a greater understanding of one's responsibilities within the role(s) one plays, and instill confidence that benefits the company in its overall performance. Moreover, competent employees contribute to company strength and competitiveness within the industry. On the other hand, industry needs to establish links with educational institutions offering training programs pertaining to work study, productivity, lean, and quality assurance so that productivity can improve. Training and development constitute an additional company benefit because they are enriching, sharpen skills, work study concepts, change employee attitudes, and enable the acquisition of more knowledge, thereby enhancing employee performance (Ilyas et al., 2016). This study establishes that there were few dedicated institutions in the country that offered training for the clothing industry especially in the areas of work study and production management. The study also established that there were the inadequacies within the Zimbabwean education system that produces academically qualified people lacking the skills required in clothing industry (Chiripanhura, 2008; Ncube, 2015). Chimhowu et al., (2011) have posited that the "system is topsy-turvy," implying that the system is not demand- but supply-driven.

There has been a decline in skills training in the country, although a certain level of academic knowledge admittedly makes one more easily trainable. Previously, the government and some clothing manufacturing employers used to engage some school leavers in apprenticeship to equip them with requisite manufacturing skills for the particular industry and prepare them to spearhead the manufacturing sector.

#### *Machine Breakdowns*

The study found that most respondents believed machine breakdowns were a major factor in their failure to achieve order deadlines. It was revealed that most of the firms did not have qualified and experienced technicians. They relied on hiring in technicians from around Harare, which took a great deal of time, resulting in loss of production time. If, for example, a machine breaks down and takes three hours to repair, if there are two breakdowns per week, six hours will be lost, which will be a considerable loss in terms of production. Clothing manufacturers are supposed to ensure that machine maintenance timetables are followed religiously to avoid loss of production time and meet order deadlines. In some cases, it was observed that after a machine breakdown, the operators were instructed to leave the broken-down machine and make use of a functional machine in a different line set-up thereby creating a layout and scheduling problem. One respondent indicated that shifting operatives created problems as product mixing usually occurred, especially if there were similar products of different sizes on the production line.

#### *Work in progress and order completion*

The study established that the companies were failing to meet their order deadlines due to poor planning. From the respondents' view, this was attributable to a number of factors as customers are always registering their displeasure pertaining to failure to meet lead time on time and failure to reduce lead time limits. Deadlines are important as they help to make work manageable and maintain

smooth production flow within organizations. In some cases, it was indicated that organizations had large amounts of work in progress that had been suspended due to shortage of trimmings such as zips, which had been overlooked during the planning phase. Reducing the amount of work in progress translates to more money not being tied down in stocks. Firms fail to execute their plans when supplies of the raw materials affect their orders, as in the case of consignments of fabric and some accessories that are ordered from abroad. Such consignments can take time to reach their destinations, thereby delaying potential buyers in the chain. To remain viable and competitive in this fast fashion era, clothing manufacturers need to adopt quick business solutions. In the specific case of Zimbabwe's clothing industry applying principles like JIT could be problematic, since the country is facing other macro-economic problems that are detrimental to JIT. For JIT to be applicable, there should be a smooth flow of communication and payment systems among organizations. By employing the method of multiple suppliers as a stop-gap measure JIT system is helpful, but fabric batch color differences can also become another issue to deal with thus making the problem magnified to some extent.

#### *Scheduling and plant layout*

The respondents were also of the opinion that their plant layouts needed to be re-arranged taking away some machines or equipment that were no longer in use because they are obsolete. The layout design of any clothing manufacturing firm should be guided by the design of the products that will be produced on its production line. Moreover, when purchasing new equipment, such as a safety stitch machine, that can perform dual tasks, there is need to consider such investment in equipment that will be economical. In one interview, a respondent had this to say: "*if a machine breaks down, the operator switches to the next functional machine depending on the availability of spare machines in the production line.*" When asked how long they expected it to take the broken-down machine

to be repaired or attended to, the respondent indicated that a job card was issued for a technician to come and fix it the following day. Already, switching from one machine to the other is a waste of time so as the failure to attend to a broken-down machine promptly. Work study exposes loss of time due to unnecessary movements.

It was also reported, in the course of the study, that the scheduling of orders has changed within different entities as those clients who pay cash get preference. Thus, the first in first out (FIFO) has changed to the more loosely translated priority rule of *cash in first out* (CIFO), as firms seek to get more cash to pay for their overheads. Giving priority to cash customers gives a chance to some manufacturers to improve their chances of survival as they are able to remain viable in the short term. One of the interviewees was quoted as saying "*these machines have been here since 1976 in the same order and the company had been operating in profits till the economy went down around the year 2000.*" This view is also supported by Mpfu, (2013), who reported that the clothing industry had experienced negative growth since the year 2000. Katsaros et al. (2014) claimed that employee perceptions about organizational readiness to change may facilitate or hinder an organizational change intended to enhance its ability to deal with difficult situations. Factory re-arrangement or redesigns are synonymous with job loss and reassignment, resulting in routing and handling to become clear that the flow of work in progress may flow from one work station to the other without the assistance of a floater moving them. The automatic movement provided an excellent, visible, comfortable, and flexible working environment.

#### *Quality management*

Respondents did cite quality as one area that needs improvement if their firms are to be competitive. None of the companies visited had a quality management system in place. In one company, respondents indicated that products used to be certified by TUV-



Rheinland, but as the economy declined in the early 2000s, this had been discontinued. Sixty percent of the respondents agreed that most product returns were usually defects that could have been controlled at the quality checkpoint. Kanawaty (1992) reports that method study results improved quality of the product. Quality in clothing production is affected by inputs such as needles, threads and the type of fabric. Persistent thread or needle breakages result in many stoppages in the production line, and machine downtimes due to such disturbances do not only affect order completion but product quality as well. Through work study, one cannot look exclusively at methods of work and work measurement while overlooking quality aspects. There is a coincidence of quality expectations and work study expectations. To enhance organizational culture and allow the smooth integration of work study there is need for a comprehensive quality control approach in clothing companies. Management plays a pivotal role in increasing productivity by introducing innovations that are key to the development of the firm. Shuen & Siebers (2009) have opined that it is the duty of management to use management strategies such as information and Communication Technology (ICT), lean production, Just in Time (JIT), Total Quality Management (TQM) or other systems available that are likely to increase organizational productivity.

## Conclusion

This study found that there is need to incentivize clothing firms to offer apprenticeship training and engage vocational training institutions so that they enroll students up to higher levels. There is also need for the government to provide finance and grant schemes for the training of the skilled human resources for the clothing manufacturing, as was previously the case, in order to create a pool of people with specific skills. Capital requirements from the public and private sectors are needed to upgrade the clothing manufacturing industry through training programs that will better prepare

industrialists and improve business planning through work study initiatives intending to support the growth of the clothing industry. Vocational training institutions, colleges, and universities need to be encouraged to have a framework that underpins their skills development strategies, and this framework should be used to draw investors and entice them to come open clothing manufacturing companies and to instill confidence to nation at large in getting employment in the clothing industry. The government has the primary responsibility of creating a conducive environment to promote and enhance competitiveness through work study. Finally, there is a need for collaboration between the government, industrialists, and policymakers on issues that will promote development on a long-term basis.

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