

Benefits and Barriers to implementation of Total Quality Management in Polytechnic Clothing and Textile Production Units in Zimbabwe

Queen Satiya^{1*} Lois, Ranganai Mberengwa (PhD)²

1. Department of Applied Arts and Sciences, Gweru Polytechnic, P.O. Box 137 Gweru, Zimbabwe
2. Faculty of Education, Midlands State University P Bag 9055 Senga Road, Gweru, Zimbabwe

* E-mail of the corresponding author: mumbiwa.q@gwerupoly.ac.zw

Abstract

The study sought to establish the benefits and barriers of implementing Total Quality Management in polytechnic Clothing and Textile Production Units. Systems Theory of management and Resource Based View formed the theoretical framework of the study. Purposive and stratified sampling were used to select thirty-two National Diploma students, six lecturers, three polytechnic principals and three PMU officers who participated in the polytechnic CTPUs. The study used questionnaires, focus group discussions, interviews, document analysis and observation to collect data. The qualitative data collected was coded, categorised and synthesised through the inductive thematic approach. The results of the study revealed that proper implementation of TQM ensures production of high quality products, reduces rejects, increases productivity, increases sales and profits thereby ensuring survival and growth of the CTPUs. The major challenges that hinder the successful implementation of TQM were use of old machinery, lack of skill, late purchase of raw materials, lack of motivation and poor remuneration system. The overloading and inflexibility of the Clothing and Textile syllabus was found not allowing students and lecturers to participate fully in production activities. The study recommended that the polytechnics provide Clothing and Textiles students with 21st century state of the art equipment and quality management skills that will enable Zimbabwe to revive the clothing industry and attain its Vision 2030 mantra. Polytechnics should provide timely remuneration payments to CTPU participants and improved procurement systems. The government policy makers in the education sector may play a supportive role by granting the CTPUs the desired structural and institutional support to induce their willingness to implement TQM through increased funding, grants, incentives and educational programs.

Keywords: Total Quality Management, Clothing and Textile Production Units, quality tools and techniques

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1. Introduction

Polytechnic Clothing and Textiles Production Units (CTPUs) in Zimbabwe resemble ideal clothing manufacturing industry set up where mass production of clothing and textile items is done. The CTPUs came up as a result of the introduction of Education 5.0 philosophy which emphasizes production of quality goods and services in tertiary institutions. The products and services created by staff and students in the CTPUs compete in terms of quality with services. The products and services created by staff and students in the CTPUs compete in terms of quality with quality management during their course of their training, their lack of experience might hinder their ability to produce high quality products.

Contemporary educated clientele focus on finding clothing and textiles products that are balanced in terms of style, quality and price, manufactured under the highest possible ethical standards (Hossain, 2013). The growth and success of CTPUs depends on the quality of the products and services they provide. Products or services without best quality will not be accepted by customers (Raaz, 2016). Failure to maintain an adequate quality standard can therefore adversely affect the business. In addition, the right means of production with appropriate designs and aesthetics can also attract diverse customers in their market domains (Beraki, Tessema, Plecka & Abdourrahmane, 2022).

Industrialists feel that students are not competent in practical aspects, probably as a result of inadequate training due to lack of appropriate equipment, facilities and infrastructure or lack of trained staff to operate and train

students on specialized equipment or advanced techniques (Nguku et al., 2012). The quality of supervised work for students was lowered by limited machinery in polytechnics (Mupfumira & Mutsambi, 2012). Polytechnics established CTPUs to enhance skills development (Satiya & Chiweshe, 2017) and to raise the quality and competitiveness of the students and staff by providing opportunities to acquire new skills as well as upgrading old ones Kuipa et al. (2016). However, challenges such as resource constraints, poor stakeholder communication, and high TQM implementation costs persist (Basera et al., 2019).

The major challenge of business entities in Zimbabwe remain the ability to supply products at the right time in the right quantities at the right level of quality and at a competitive price (Madanhire et al., 2013). In addition, small clothing companies including CTPUs face stiff competition and challenges locally and internationally, which include failure to adhere to continuous improvements and effort to do the right things at the right time and place. It is against this background that the study sought to explore the challenges that polytechnic CTPUs face when implementing TQM practices.

1.1 Research Objectives

Examine the benefits of implementing TQM in polytechnic CTPUs.

Explore barriers hindering effective implementation of TQM in polytechnic CTPUs.

Propose actionable solutions that align with the unique environment of polytechnic CTPU.

2. Theoretical framework

Systems Theory and the Resource-Based View (RBV) were adopted to facilitate a analytical and comprehensive evaluation of the benefits and barriers to implementation of TQM practices in polytechnic CTPUs. Systems Theory was formalized by Ludwig von Bertalanffy in the early 1950 and it asserts that an organization is a single unified system of interrelated parts of subsystems with a cohesive collection of resources, activities and information (Shridharan, 2022). The theory's emphasis on inter-connectivity implies that any breakdown or inefficiency within one part of the system inevitably impacts the performance of the whole. In the context of TQM implementation, Systems Theory provides a valuable lens through which the alignment of institutional subsystems, curriculum, human resources, procurement, production, and customer feedback, can be evaluated to ensure coherence in delivering value. It also supports the holistic view required to drive continuous improvement and customer satisfaction, as it recognizes that quality is not an isolated function but the outcome of a synchronized system of activities (Nguyen et al., 2022).

Resource-Based View (RBV) theory assumes that an organization is a bundle of tangible and intangible resources that enable the organization to conceive of, develop and implement strategies that improve its efficiency and effectiveness (Barney, 1991). Mkwanazi and Mbohwa (2017) emphasize that consistent quality demands adequate resources to support all activities related to quality control and management. In the context of CTPUs, such resources include modern sewing equipment, skilled labour, standardized quality assessment procedures, pre- and post-production quality checks, and clearly outlined sewing processes.

Flynn et al. (1994 in Habib et al., 2021, p. 2009), define Total Quality Management (TQM) as "...an industry-wide philosophy strategy in which employees are equipped and encouraged to perform tasks correctly the first time and to continually analyse their performance to identify opportunities for improvement". Quality, in this regard, becomes a shared responsibility. In the context of CTPUs, both staff and students should assume the responsibility to ensure quality at every stage of the production process. As a clothing and textiles manufacturing entity, a polytechnic-based CTPU can adopt various TQM practices to enhance production standards and deliver high-quality outputs that exceed customer expectations.

2.1 Benefits of TQM

TQM focuses on increasing customer contentment by improving the quality of products, service and overall quality of the establishment to deliver the best product or service solution to the customer (Mncube et al., 2022). Successful implementation of TQM practices and principles has numerous benefits to an organization. Some of the benefits may be tangible whilst others may be intangible as summarized by Labh (2017, p. 5) .

Tangible benefits include improved product quality, improved productivity, improved product quality, reduced quality costs, increased market and customers, increased profitability and reduced employee grievances. The intangible benefit include, improved employee participation, improved team work,

improved working relationships, improved customer satisfaction, improved communication, enhancement of job interest, enhanced problem solving capacity, and better company image. Furthermore, due to the increasing demands to achieve a high quality product products and services, organizations have realized the importance of applying TQM practices to the production process in order to minimize costs and to create products with high quality characteristics (Al-Qahtani et al., 2015). TQM aims to improve the relationship between customer satisfaction and the existing resources, (Reis, Matias & Azevedo, 2014; Phan, Nguyen, Nguyen & Matsui, 2019). TQM helps the organization to retain its customers by providing excellent quality services with minimum or no defects, (Rashid & Taibb, 2016). It also enables the company to gain long term sustainability and competitive advantage.

Bayazit (2003) noted that the most important achievements after implementing TQM are an increase in customer satisfaction, quality improvement, a decrease in prices, on time delivery, an increase in profitability and market share, an increase in work satisfaction, workforce quality, work harmony and a decrease in defects. TQM practices also prevent rework to reduce redundant steps in the production process (Phan et al., 2019). TQM enhances the company's competitiveness and market share, cost reduction, enhanced productivity, improved product quality and output. Syduzzaman et al. (2016) revealed that production improved as total alters and rejections had been considerably reduced.

Deming's Chain Reaction (1990) cited in Knowles (2011, p. 22) illustrated that implementation of TQM "improve quality, reduce costs because of less waste, productivity improves, capture market with better quality and lower prices, and stay in business and provide more and more jobs". in the same vein, Ramford (2022) comments that implementation of TQM makes sure that less and less mistakes are made in production, quality costs are lowered, better utilization of machinery, time and materials to speed up and increase output volume which results in higher productivity, competitive pricing market share expansion.

Walde and Sangode (2019, p.130) reported that benefits that were observed by using TQM tools and techniques by firms were customer satisfaction, improved quality of product, and increase in production, defect reduction and increased financial performance of the organization. Kareska (2023, p. 10) also added that the benefits of TQM are " reduced waste, improved product quality, increased customer satisfaction, cost saving, increased market share and improved reputation". Effective and efficient implementation of TQM in polytechnics CTPUs can yield to all the mentioned benefits.

2.2 Barriers to effective implementation of TQM

Despite the fact that many researchers have noted benefits of implementing TQM practices, most researchers have noted that there are a number of factors that hinder successful implementation of TQM practices. TQM is a philosophy with practices, models, tools and techniques which are unfamiliar to a huge number of institutions, supervisors and workforces (Al-Qahtani et al., 2015). Quality should be the responsibility of every person in the organization meaning to say that, in the CTPU, both staff and students should be responsible for quality.

Dhieu (2019) evaluated the effects of TQM practices on performance of manufacturing firms in Nyeri County, Kenya and recommended that production equipment ought to be maintained well according to company maintenance schedule and that organizations should establish complaint processes and guidelines recording complains properly. Mosomi et al., 2022 also found out that outdated training and delivery methods, maladaptive and non-modernized syllabus in the colleges and universities, low collaboration between schools and training leaders and lack of structured internship and apprenticeship programs affected the quality of training in clothing and textile institutions .

Ntombekaya (2010) established that in South African clothing manufacturing SMEs there was lack of employee involvement in decision making, miscommunication and dissatisfaction of employees, lack of technology investment and lack of quality management systems. This indicated that for any clothing manufacturing company to be able to produce quality products and be competitive, they need to consider employee satisfaction and invest in industry 4.0 technologies

Mpofu (2013) revealed that the major challenges in the clothing sector in Zimbabwe were cheap imported clothing from Asia and second hand clothing coming through charity organizations. Furthermore, Basera, Mwenje & Rutiri (2019) noted that industries in Zimbabwe with high interest in implementing TQM faced obstacles that included lack of capacity and resources, lack of skills and expertise, poor communication with stakeholders, poor raw materials, evolving customer preferences, lack of top management commitment and cost of TQM systems.

Kanyati (2022) highlighted the major thirteen challenges the textiles and apparel firms were facing which were growth, cost of capital, government policies, wage bill, management skills, technical skills, market share, imports, technology adoption and diffusion challenges, work experience, export challenges, firm size and management commitment. In addition to the above-mentioned factors Labh (2017, p.6) also identified the following: lack of faith in support to TQM activities among management personnel; failure to appreciate TQM as a cultural revolution; misunderstanding about the concept TQM; ineffective measurement and techniques and lack of access to data and results; non-application of proper tools and techniques; and inadequate use of empowerment and team work.

On the other hand, some studies report that failure of TQM programmes is not due to the practices of TQM, but is because of the ineffective implementation of management approach (Shaquif, 2011). This clearly illustrates that implementation of TQM practices is the most crucial aspect of the success of any TQM programme. However the unavailability of a universal definition and ambiguous nature of TQM philosophy may also create problems for the successful implementation of TQM practices. CTPUs are not an exception, they may also face challenges when trying to implement TQM practices. There are limited studies conducted in Zimbabwe on TQM implementation in polytechnic CTPUs. Therefore, this research seeks to fill that gap by evaluating the benefits and barriers to implementation of TQM practices in Zimbabwean polytechnic CTPUs.

3. Methodology

The study used the interpretive research paradigm which focuses on understanding the meanings and experiences of participants through provision of rich qualitative data that can reveal how students, lecturers and PMU officers in polytechnic CTPUs engage with TQM practices. Through this lens, the researchers were able to gain insight into the attitudes, behaviors, shared meanings, and experiences of participants as they engaged in CTPU operations (Cohen et al., 2018; Wellington, 2015). The qualitative research approach provided in-depth experiences of the staff and students who participate in the CTPUs. Case studies of three polytechnic CTPUs were done to enable the researchers to compare and contrast the perceptions and experiences of students and staff from different sites.

The sample derived from three polytechnics comprised of the following: six (6) clothing and textiles lecturers/supervisors responsible for supervising students in the CTPUs, three (3) procurement management officers who were responsible for purchasing of CTPUs raw materials and equipment as well as selling of the CTPU's products, twenty (20) National Diploma 3 (ND3) students who participated in the CTPUs and ten (10) ND2 students attached in the CTPUs. The codes that were used for the participants/respondents are as follows:

Semi-structured interviews and a self-made questionnaire was given to six CTPUs lecturers in charge/supervisors from the three polytechnics code named A, B and C, two from each polytechnic. The lecturers/supervisors were identified as PAL1, PAL2, PBL1, PBL2, PCL1 and PCL2. Focus Group Discussions (FGDs) done with Clothing and Textile students (ND2 and ND3) from two polytechnics lasted for 40 to 45 minutes. Polytechnic C had no students attached in the CTPU. Focus Group Discussions were carried out at different times and settings with students from polytechnic A and B. Fifteen to twenty minutes telephone interviews were conducted with eight students from polytechnic C and the students were code named PCS - PCS8. The Clothing and Textile syllabus was analyzed to verify the assessment requirements.

4. Findings

Findings and discussions were based on the themes which emerged from the research questions.

4.1 Benefits of TQM in Polytechnic CTPUs

The responses gathered through the focus group discussions and interviews from clothing students who participated in Polytechnic CTPUs revealed that strict adherence to use of TQM tools and techniques facilitates production of high quality products and services whereas non-adherence gives room to deviation and production of inferior products. One student highlighted two issues, one of producing faultless products and the other one of satisfying customers. The heart of TQM is concerned on production of quality products that meet or exceed customer satisfaction. The student commented that "Use of TQM tools and techniques determines that products will be faultless and will be accepted by customers" (FGB2).

Another student in support of the above view brought in the issue of strictly adhering to standards set on the

quality specification sheet without deviation as one measure that will guarantee no defective products and reworks;

Whenever we strictly follow the standards set on quality specification of a product, we always produce quality products. However, when we deviate from the quality specifications we end up unpicking seams and doing reworks that will affect the general appearance of the end product and at times this will result in defective products (FGA3)

Concurring with the above view another student further revealed that TQM tools help in early stage error identification and eradication giving room to production of faultless garments;

The use of these tools help in error identification and eradication as errors can be identified at an early stage before the full garment is produced, thus the use of in line Quality Checks (QC). Checking patterns allows one to identify areas of correction as the missing of some pattern markings can end up reducing or adding up some measurements on the required size of a customer (PCS6).

In addition to what the students identified, one lecturer commented that proper implementation of TQM tools and techniques assist not only on satisfying customers, but also on survival and growth of the CTPUs:

Proper implementation of TQM tools and techniques reduce quality costs, increased productivity, less rejects, satisfied and happy customers, more sales and more profit, survival and continuity of CTPU. Data collected is used to make accurate and informed decisions (PAL2).

On the other hand, another supervisor noted that improper implementation of the TQM tools and techniques may result in increased quality defect percentage which can contribute to increased cost of failure:

“Doing it right the first time” always produces high quality products and improper use of the tools and techniques will result in a higher quality defect percentage that contributes to cost of failure. (PBL2)

The data collected from both students and lecturers through the questionnaires, FGDs and interviews revealed that the use of TQM tools and techniques had positive impact on the quality of products produced from CTPUs. Proper implementation of the TQM tools and techniques ensures production of high quality products, reduce rejects, increases productivity which leads to more sales and more profits. This in turn will enable the CTPUs to collect TQM data timeously and make informed decisions that will ensure survival and continuity of the CTPUs. On the other hand, if the CTPUs do not use the TQM tools and techniques properly they may produce substandard products, make less sales, less profit and at the end loose customers. Effective and efficient implementation of TQM tools and techniques in the CTPU reduces the cost of quality.

4.2 Barriers to successful implementation of TQM in polytechnic CTPUs.

The challenges had four categories- and five sub-categories. The data collected from both students and lecturers who participated in the CTPUs through Focus Group Discussions and interviews and observations was presented according to the categories: machinery, raw materials, motivation, work overload and supervision see Table 1.

Table 1: Factors that hinder successful implementation of TQM in CTPUs

Category	Sub-category	Respondents
Machinery	Outdated, inadequate, malfunctioning machines and lack of specialized machines	Twenty-two out of thirty students
Raw materials	Late procurement and delivery of raw materials	four out of six supervisors
Motivation	Lack of motivation and poor remuneration system	five out of six supervisors Three out of six (FGA3) three out of six supervisors
Work overload	CT syllabi overloaded and not flexible to allow full participation in CTPUs Lack of supervision	Four out of six supervisors.

4.2.1 Machinery

Both the lecturers and the students cited similar challenges. The main challenge was of machinery. Inadequate sewing machinery, old/outdated machinery, lack of specialized machinery, and malfunctioning machines. the researchers noted that some of the machinery at the Polytechnic CTPUs were very old to such an extent that soon after servicing and repair by skilled mechanics, the machines would break down. Some minor processes were taking longer to complete because some of the machines were not functioning properly. In some cases the lockstitch machine was used to elasticate tracksuits and graduation gowns because the elasticating machine had malfunctioned. The following are illustrative quotations from students interviewed: “Machines were inadequate” (FGB3) and “There was shortage of machines” (FGA3).

Data gathered through observations revealed that at Polytechnic C, they had two fully equipped workshops used for both learning and production. Their main challenge was lack of some specialized machinery and balancing learning and production time. One student remarked;

Some machines are not proper for the task. You would just use it because that's what is available so it will take time even if we meet the specification it will take time. The production time will be prolonged and you will not be able to get to the specification. (PCS3)

Lack of specialized machinery may prolong the Standard Minute Value (SMV) of a sewing process as well as affect the overall quality of a garment. Another student with a similar view also stated that the processes done without specialized machines will not be as perfect as expected. Student PCS6 from Polytechnic C commented “Challenges may arise if there are no specific machines so if an organization is short of such then some processes won't come out perfect” (PCS6). Supporting the same view, a supervisor from Polytechnic A, stated that there was “lack of proper machine to use for a specific process for example bar tack machine when sewing belt loops on a trouser” (PAL2).

Student from Polytechnic A lamented that “Machines are dead [old/outdated machine]” (FGA3). A supervisor from the same Polytechnic A, expressed that they had old machinery which required frequent servicing, but the servicing of the machines was not done timeously slowing down production. Reinforcing the same view two more students from Polytechnic A and Polytechnic C commented about the machines in the CTPUs were not working properly respectively: “Machines not working well and oil spill over” (FGA2). “Machines sometimes they are not working properly we will have problems with them as well” (PCS7).

In the same vein was another student from Polytechnic B who revealed that “there was lack of modern machines” (FGB3). Polytechnic B supervisor also confirmed what the students had noted:

Most students preferred going for attachment to other companies for them to learn to use other machinery which is not available. We had few specialized machinery. We do not have CAD. (PBS1)

Though the lecturers indicated that their institutions were willing to purchase modern state of the art equipment for the CTPUs, they lamented that this was being hindered by “lack of adequate funds and high cost of sewing machinery on the local market” (PAL1). Some of the machinery had to be imported for example the six head and eight head embroidery sewing machine Polytechnic A and C, the CTPUs had acquired were procured from China respectively. the researchers believes that adequate state of the art machinery and technologies are a prerequisite for effective implementation of TQM in Polytechnic CTPUs.

4.2.2 Raw materials

The second category which emerged from the focus group discussions and questionnaires with students and staff who participated in the Polytechnic CTPUs was the issue of *availability of raw materials*. The supervisors were worried about the late procurement of raw materials. On further probing, it was noted that sometimes the Polytechnics were financially incapacitated due to economic constraints. They relied on students' fee payments and ZIMDEF allowances for consumables and equipment. One supervisor was of the opinion that there was “*late delivery of raw materials*” (PCL1). This could be due the fact the some suppliers may accept a tender to supply materials when they actually do not have them in stock. They would sub-contract and it might take time for them to receive the supplies and then pass them on to the Polytechnics.

The PMU officers from the three polytechnics in their response to the question on the buying process, indicated that the process was a bit long. It emerged that the buying process using *Request for Quotation* (RFQ) method had a number of stages that may contribute to delays in the procurement and delivery of raw materials for the CTPUs. The stages included need identification, raising of requisition by the user department, approval, request for quotation, drawing of comparative schedule, placing order, verification, receiving and paying for the order.

The process was even longer when buying using the tender method which is normally used when the order exceed a certain figure predetermined by the Procurement Regulatory Authority in Zimbabwe (PRAZ).

The buying process was reported to last for two weeks or two months and above depending on how responsive were the suppliers and the signatories. The longer the process took the greater the pressure that will be exerted on the students and lecturers participating in the CTPUs due to limited time that will be left for them to work on the production orders. Too much pressure will then compromise the quality of the products to be produced.

4.2.3 Motivation

The third category which emerged from findings was on motivation. The findings revealed that there was lack of motivation due to poor remuneration and incentive systems in the Polytechnic CTPUs. Both students and lectures shared the same sentiments as one lecturer lamented, “Remuneration is very poor such that people become demotivated” (PCL2). Supporting the above sentiment one student from Polytechnic A added;

.... if people lack motivation, if they are not motivated in the company, some people will do work carelessly with an attitude “so long I have done it”. (PCS8)

This in turn will affect the quality of products being produced. There was also an outcry from students in the FDGA2 that they were “not paid or appreciated on time”. the students reported that they were sometimes paid long after they had rendered their services (two to three months later).

It was interesting to note that some students reported that sometimes their supervisors (lecturers) displayed negative attitude and they lacked positive compliments to the students and this demotivated them a lot.

We are normally given orders when there is very little time for us to work and this demotivate us as our supervisors will be pushing us and giving us negative compliments. (FGA3)

4.2.4 Work overload

The forth category was on work overload. Lecturers cited work overload as another challenge that was hindering them from implementing TQM in the CTPU. The lecturers lamented that the CT syllabus was overloaded and not flexible to allow them and their students to participate fully in the CTPUs. the researchers noted through document analysis of the Clothing and Textile syllabi that they were required to do six items for course per subject/module and a number of skills competencies. Both the lecturers and the students were working under pressure as they struggled to meet the deadlines for coursework requirements. They were spending most of their time working on the coursework components making it difficult for them to have adequate time dedicated to production activities. Supervisor PCL1 lamented;

The Clothing and Textile syllabus is too packed to allow flexibility for students to attend to production activities other than attending to their syllabus requirements (coursework). (PCL1)

Another lecturer from Polytechnic C (PCL2) further elaborated that due to pressure exerted on them because of course work requirements, they had to do production activities during weekends and holidays.

Clothing lecturers and students work after hours and during weekends and holiday not to disturb teaching and learning activities. (PCL2)

On the other hand Supervisor PAL2 from Polytechnic A advocated that they came up with a solution to reduce the workload for students by engaging students on On the Job Education and Training (OJET) in the CTPU who participate on daily basis whilst the other groups ND1 and ND3 come in once a week or when there have urgent bulk orders. The pressure was exerted on the supervisors who had to teach the conventional classes as well as supervise and monitor the CTPUs. Though the lecturers were taking turns to supervise and monitor the students in production activities, this did not reduce the workload.

Supervisors from Polytechnic C said they were yet to engage students on attachment in their production unit, however, they were planning to do so in the near future. There was a different scenario at Polytechnic B, where the CTPU was separated from the learning environment and the supervisor was not taking any lecturing load. The CTPU had full-time qualified workers and a very limited number of polytechnic students on attachment.

In addition to the above challenge, students noted that there was lack of proper supervision in CTPUs. Through observations it was noted that lecturers spent most of their time attending to teaching of conventional classes leaving them with limited time to do proper supervision and monitoring of the CTPUs. Participants in FGA3 highlighted that some of their supervisors would just come and sit in the factory. If the students ask them to assist on some processes they would not know how to do it, the supervisors would just tell them to go and do it. It might be that the lecturers would not be well versed on the processes to be done and that could have a bearing

on the overall quality of the garments in the production line. Looking back to the qualifications of the CTPUs supervisors, they possessed high qualifications ranging from HND to Master's degree in Clothing and Textiles. One would wonder why the supervisors would fail to assist students on some processes.

The students on OJET, that is those attached to the Polytechnic CTPUs, brought another dimension of the pressure they were subjected to. They remarked:

"We are working under pressure and working on a product and then instructed to stop and start to work on something new. There is a mixture of Just Do It and Just In Time (JIT)" (FGA3).

the researchers observed that the CTPUs were normally working on the Polytechnic orders for example safety clothing, corporate wear, sportswear and graduation regalia. If there came a social event where the Polytechnic need to send representatives, they would request the CTPU to put in abeyance the production of safety clothing and concentrate on production of corporate wear that will be needed urgently. This might put pressure on the CTPUs participants such that the implementation of TQM practices would be compromised.

4.3 TQM practices that polytechnic CTPUs can use to improve quality

The suggested TQM practices, models, tools and techniques that could be used improve quality of products produced by polytechnic CTPUs emerged as another theme and it had four categories: training, quality tools and techniques, remuneration and incentive system, and leadership commitment.

4.3.1 Training

All the polytechnic CTPUs supervisors (6) suggested that training on TQM initiatives was one of the practices that can lead to quality improvement. The students' view were in sync with the lecturers as they also highlighted that they have not yet understood TQM tools. Students from Polytechnic A remarked, "We have not yet understood quality tools" (FGDA2).

In addition a student from Polytechnic C reiterated that "Trainees should be trained on quality tools the trainees are mostly taught to run with time not to maintain quality" (PCS3). Another student from Polytechnic C echoed that "Trainees should know the quality tools they are not aware of how to check quality". (PCS1)

4.3.2 Quality tools and techniques

The second category on suggested solutions was use of Quality tools and techniques. Both lectures and students identified some quality tools and techniques that can be employed by the CTPUs to improve quality. The lecturers proposed inspection, sampling and process flow chart. The students suggested specification sheet, check sheet, sampling and inspection. "A check sheet should be in the production so that when we are seeing we can also check" (FGDA3).

As for quality techniques, students from Polytechnic A proposed the use of Just In Time (JIT) philosophy, QFD, benchmarking, PDCA, and 5s techniques. Another student added that "implementation of TQM from design to dispatch" (FGDA2), was also another way of improving quality of products produced by polytechnic CTPUs. Furthermore, use of state of the art specialized and computerized machines was also cited as quality improvement practice which could be rigorously engaged in by polytechnic CTPUs.

4.3.3 Remuneration and incentive system

The third category was remuneration of the CTPUs participants. One of the supervisors proffered that the polytechnic management should consider revising the production remuneration policies. This was also cited as one of the challenges that was hindering the polytechnic CTPUs from successfully implementing TQM see section 4.3.4.3 under motivation. Students believed that rewarding participants who produced quality products in the same manner as they may reward the person who reached the target was another practice that may be used by the polytechnic CTPU to improve quality:

Set rewards to be given people who can produce garments in good quality. Just like they are rewarding the person who reach the target they can also say the person who managed to produce good quality on an operation is also rewarded. (PCS3)

Supporting the above view, another student echoed, "Rewards for producing products with good quality instead of focusing on targets only" (PCS1).

4.3.4 Leadership commitment

The forth category identified was leadership commitment. Two supervisors out of six mentioned that as long as the CTPU had committed leaders TQM would be easier to implement. Concurring with the above view, the students cited that "good leadership" (FGDA2) was a prerequisite for quality improvement. Another student

mentioned management functions as tools and techniques for quality improvement. “Planning, leading, organising, controlling and staffing are the basic tools and techniques that can be used” (PCS6).

4.4 Discussion of findings

The study established that the Polytechnic CTPUs were faced with a mammoth of challenges that were hindering the successful implementation of TQM. The challenges included inadequate sewing machinery, old/ outdated machinery, lack of specialized machinery, limited time, lack of timeous remuneration or appreciation, lack of motivation and malfunctioning machines. Hill (2008) in Basera et al., (2019) concurs with the above findings that inadequate resources, training on quality problem identification and solving techniques, poor rewarding system, lack of quality improvement skills and resistance to change could also hinder successful implementation of TQM.

Previous research by Muzenda (2014) revealed that machinery that was being used in the universities were outdated and they could not match with the tasks and operations that the students needed to perform. The researchers further noted that some of the equipment and machinery was very old to such an extent that they could not be repaired. Additional research in support of this notion carried out in Kenya revealed that outdated training and delivery methods, maladaptive and non-modernized syllabus in the colleges and universities, low collaboration between schools and training leaders and lack of structured internship and apprenticeship programs affected the clothing and textile training quality and investment in the industry (Mosomi et al., 2022).

Mkwanazi and Mbohwa (2017) urge that clothing manufacturing enterprises have challenges in maintaining consistent quality because they lack certain resources and capabilities which are important to implementing and for monitoring of quality practices. These resources include capable sewing equipment, skilled labour, quality assessment standards, pre and post quality checks and the sewing process outline (Lazim, Salleh, Subramania & Othman, 2013). The RBV theory asserts that availability of these resources can give the CTPUs a competitive advantage over their competitors.

In addition, Bereka, Tessema, Plecka & Abdourrahmane (2022, p. 9) found out that “lack of competent management, lack of employee training, organizational resistance to change, insufficient infrastructure, resource limitations, inadequate knowledge base, the lack of government commitment, and employees’ reluctance to get involved in the decision making process” were some factors which hinder the successful implementation of TQM initiatives. Hence, a good quality management system in the Polytechnic CTPUs would be concerned about the inputs used in making of quality clothes, the skill of workers (staff and students) and having adequate sewing equipment and accessories.

Another previous research by Walde & Sangonde (2019) found out that barriers to effective implementation of TQM tools and techniques were lack of communication, lack of education and training, lack of motivation system and lack of drive to change. It is therefore imperative that the Polytechnics provide CT students with 21st century state of the art equipment and quality management skills that will enable Zimbabwe to revive the clothing industry and attain its Vision 2030 mantra. the researchers concurs with the systems theory which asserts that the output from the Polytechnic CTPUs in the form of profits may be reinvested in cash and capital goods such as machinery, equipment, buildings and inventory as observed by Chikere and Nwoka (2015, p. 3). According to RBV theory availability and proper use of these resources may give the CTPU a competitive advantage.

Maupa, Taba & Baumassepe (2019 p. 982) noted that some SMEs possess weaknesses such as low implementation of TQM due to low utilization of production capacity, limited capital, low work culture, and the absence of long term planning. Poor remuneration and absence of incentive systems in CTPUs may be attributed to limited capital and absence of long term planning. If these conditions are not properly handled may result in participants aborting their operations in search of better paying enterprises.

Another observation that the CTPU supervisors noted was that the Clothing and Textile syllabus had a lot of learning areas that the students were expected to cover against very limited time. Balancing coursework and production seemed to be a big challenge for both students and supervisors. Chuma (2023) urged that tertiary institutions need to revisit, revise and update their curriculum so that it matches with Education 5.0 philosophy which puts more emphasis on innovation and industrialization through production of quality goods and services.

It emerged that at one Polytechnic A, they came up with a solution to reduce the workload for students by engaging students on attachment in the CTPU who participate on daily bases whilst the other groups ND1 and ND3 come in once a week or when there are urgent big orders. Though the idea was a noble one, it lessens the burden on students but, nothing changes for the lecturer supervisors as they still have to supervise and monitor

students in the CTPU and deliver their allocated lecturing load. the researchers' opinion is that the Polytechnic CTPUs should endeavor to employ full-time supervisors and at least two to four machinists who will work with students and lecturers. This will ensure continuity and smooth progress of work procedures rather than having new attaches every year as the only full-time workers manning the CTPUs.

5. Conclusion

Based on the findings of the study it could be concluded that successful implementation of the TQM ensures production of high quality products, reduce rejects, increases productivity which leads to more sales and more profits. This enables the CTPUs to collect TQM data timeously and make informed decisions that ensures sustainable development of the CTPUs. On the other hand, ineffective implementation of TQM produce substandard products, make less sales, less profit and lead to loss of customers. Effective and efficient implementation of TQM tools and techniques in the CTPU reduces the cost of quality.

Polytechnic CTPUs in Zimbabwe faced a mammoth of challenges that significantly hindered the effective implementation of TQM. These included the dearth of state-of-the-art machinery and accessories which affected production efficiency and quality. Furthermore, participants lacked proper supervision and motivation due to delayed or unsatisfactory remuneration creating a low morale for the CTPU participants. Additionally, delays in the procurement of raw materials led to limited time for production giving the CTPU participants a lot of pressure and compromising output standards. Moreover, there was work overload on both students and staff as the HEXCO curriculum required six pieces of coursework per each subject/module. These operational bottlenecks highlight the need for better planning, consistent funding and strategic support from stakeholders to ensure sustainability and success of TQM in polytechnic based CTPUs.

6. Recommendations

- Polytechnics should provide Clothing and Textiles students with 21st century state of the art equipment and requisite quality management skills that will enable Zimbabwe to revive the clothing industry and attain its Vision 2030 mantra. CTPU supervisors should create an internal quality awareness programme aimed on training and educating all the participants.
- Polytechnic principals and CTPU supervisors should create strong institution and industry partnerships/synergies to stay abreast of the latest trends, technologies and quality management practices in the clothing and textile sector.
- The government policy makers in the education sector may play a supportive role by granting the CTPUs the desired structural and institutional support to induce their willingness to implement TQM practices, models, tools and techniques through increased funding, grants, incentives and educational programs.
- HEXCO curriculum development unit may consider reducing number of coursework items from six pieces to three so that the learners and lecturers may have more time to concentrate on the production of quality goods and services as espoused by Education 5.0.
- CTPU supervisors should generate and keep proper documentation on TQM implementation . Accurate dossier on quality management policies and manuals can provide a control system that will ensure consistency and create awareness in the CTPUs.
- The Procurement Management Unit (PMU) should make sure that quality raw materials for the CTPUs are procured and delivered in advance giving the CTPU participants ample time to plan and execute their production duties without rushing. There should be timely payment of CTPUs participants.

7. Areas for further studies

This study used case studies of three polytechnics to evaluate the TQM practices in Zimbabwean polytechnics CTPUs. The findings were limited to polytechnic CTPUs, and therefore, could not be generalised to other tertiary institutions in Zimbabwe. The researchers recommends that this study be replicated in other tertiary institutions such as teachers' colleges and university clothing and textiles production units to confirm the findings and to generate more insights on benefits and barriers to the implementation of TQM practices.

References

- Al-Qahtani, N. D., Alshehri, S. S., & Abdaziz, A. (2015). The Impact of Total Quality Management on organizational performance. *European Journal of Business and Management*, 7(36), pp. 119-127.
- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), pp. 99–120.
- Basera, V., Mwenje, J., & Rutiri, S. (2019). A span of quality management in Zimbabwe: A perspectives review. *Annals Management and organization Research (AMOR)*, 1(2), pp. 77-94.
- Bayazit, O. (2003). Total Quality Management (TQM) Practices in Turkish Manufacturing Organizations. The TQM Magazine, 15, pp. 345-350. <https://doi.org/10.1108/09544780310502435>
- Beraki, M. T., Tessema, M. T. T., Plecka M., & Abdourrahmane, M. (2022). Total Quality Management (TQM) in Small and Medium-sized Enterprises (SMES): The case of South Africa. *Journal of organizational Culture Communications and Conflict*, 28(3), pp. 1-14.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.
- Chuma, C. (2022). Curriculum review and Education 5.0 in Higher Education in Zimbabwe: A review of Textiles and Clothing-related programs. *Chitrolekha Jopurnal of Art and Design*, 6(1). <https://doi.org/10.21659/cjad.61.v6n103>
- Dhieu, J. J. (2019). *Adoption of Total Quality Management practices and performances of manufacturing firms in Nyeri County, Kenya*. Kenyatta University: Masters' Degree Thesis. Dhieu, J. J. (2019). *Adoption of Total Quality Management practices and performances of manufacturing firms in Nyeri County, Kenya*. Kenyatta University: Masters' Degree Thesis.
- Flynn, B. B., Schroeder, R. G., & Sakakibara, S. (1994). A framework for TQM research and an associated measurement instrument. *Journal of Operations Management*, 11(4), pp. 339–366.
- Habib, M., Cano, M., Viza, E. and Bakhishi, A. (2021). Potential Effectiveness of Quality Tools and Techniques to Introduce Total Quality Management (TQM) in Ready Made Garments (RMG) Manufacturing Industries in Bangladesh. *Proceedings of the 4th European International Conference on Industrial Engineering and Operations Management*, Rome, Italy, August 2-5, 2021, 2607-2618.
- Hossain, A. (2013). *An overview of Quality and Quality control in textile industry*. Textile Learner. <http://textilelearner.blogspot.com/2013/05/an-overview-of-quality-and-quality.html>
- Kanyati, M. (2022). The Key Challenges Facing the Textiles and Apparel Manufacturing Firms in Zimbabwe: A Case Study of Harare Province. *International Journal of Research and Innovation in Applied Science (IJRIAS)* |Volume VII, Issue I, January 2022.
- Kareska, K. (2023). Total Quality Management I Production and Service organizations. SSRN. <https://papers.ssrn.com>
- Knowles, G. (2011). *Quality Management*. [HTTPS://BOOKBOON.COM](https://bookboon.com) ISBN 978-87-7681-875-3.
- Kuipa, P. K., Kanhukamwe, Q. C., Simbi, D. J., & Mwenje, E. (2016). *Report of the technical committee on the conversion of polytechnics in Zimbabwe to degree granting status*.
- Kuipa, P. K., Kanhukamwe, Q. C., Simbi, D. J., & Mwenje, E. (2016). *Report of the technical committee on the conversion of polytechnics in Zimbabwe to degree granting status*.
- Labh, R. R. (2017). Total Quality Management Notes. JNTU World <http://www.alljntuworld.in>
- Madanhire, I., Kagande, L., & Chidziva, C. (2013) Application of Just In Time (JIT) manufacturing concept in Aluminium Foundry industry in Zimbabwe. *International Journal of Science and Research (IJSR)*, 2319-7064 <https://www.ijstr.net>
- Maupa, H., Taba, J. M. I., & Baumassepe, A. N. M. (2019). Improving the Quality of Small and Medium Enterprises in South Sulawesi – Indonesia. *International Journal of Scientific & Technology Research*, 8(9). <https://www.ijstr.org>
- Mkwanazi, M. S., & Mbohwa, C. (2017). Quality control in the clothing production process of an under-resourced sewing co-operative: Case study. *Proceedings of the 2017 International Conference on Industrial Engineering and Operations Management (IEOM)* Bristol, UK, July 24-25.

- Mncube, W. M., Bakama, E. M., & Mushavhanamadi, K. (2022). Benefits and Barriers to Total Quality Management (TQM): A Review in South African Industries. *Proceedings of the First Australian International Conference on Industrial Engineering and Operations Management*.
- Mosomi, J. O., Osanjo, L. A., & Mwiti, B. K. (2021). Localising global approaches to improve Clothing, Textile and Apparel industry standards in Kenya: A systematic literature review. *Design Review Journal*, University of Nairobi, pp. 25-42.
- Mpofu, T. (2013). Challenges faced by the clothing sector in Zimbabwe. *IOSR Journal of Business and Management (IOSR-JBM)*, 17(12), pp. 89-97. <https://www.iosrjournals.org>
- Mupfumira, I. M., & Mutsambi, T. P. (2012). An evaluation of the demonstration and industrial attachment strategies in implementing Clothing curriculum: A case study of Masvingo Polytechnic in Zimbabwe. *Journal of African Studies Development*, 4(4), pp. 111-121. <https://www.academicjournals.org/JSAD>.
- Muzenda, V. (2014). The delivery of the Clothing and Textiles curriculum in Zimbabwean Universities: Towards an integrated approach to Vertical and horizontal discourses. Doctor of Philosophy Thesis. University of Fort Hare.
- Nahyana, M. (2019). Project Management, Infrastructure Development and Stakeholder Engagement. A case study from South Africa, 3(2), pp. 561-572.
- Ngwenya, B., Sibanda, V., & Matunzeni, T. (2016). Challenges and Benefits of Total Management (TQM) implementation in Manufacturing companies. Case study of Delta Beverages in Zimbabwe. *International Journal of Original Research*, 2(6).
- Nguku, E. (2012). *Analysis of Textiles and Clothing Institutions in the East-Southern Africa*. African Textile Industries Federation ATIF. <https://www.nguku@icip.org>.
- Ntombekaya, N. A. (2010). The application of Total Quality Management within small and medium enterprises. Cape Peninsula University of Technology. Masters Thesis.
- Phan, A. C., Nguyen, H. T., Nguyen, H. A., & Matsui, Y. (2019). Effect of Total Quality Management Practices and JIT Production Practices on Flexibility Performance: Empirical Evidence from International Manufacturing Plants. *Sustainability Journal*. MDPI.
- Raaz, N. A. (2016). *Difference between quality assurance and quality control*. AMCS Textile Ltd (AEPZ). Textile Merchandising.
- Ramford, J. (2022). Deming Chain Reaction. Agility Online Ltd. <https://agilityportal.io>
- Reis, M., Matias, J. C. O., & Azevedo, S. G. (2014). The Importance of Total Quality Management on Customer Satisfaction. Conference paper.
- Satiya, Q., & Chiweshe, R. (2017). The essence of setting up clothing and textile production units in Zimbabwean polytechnics. *International Journal of Latest Engineering and Management Research (IJLEMR)*, 02(06), pp. 24-32.
- Shafiq, M. (2011). *An investigation of Total Quality Management Practices in Pakistan*. The York Management School: New York University. A Doctoral Thesis.
- Shridharan, M. A. (2022). Systems Theory of Management. *Think Insights*. <https://thinkinsights.net/strategy/systems-theory-management#>
- Syduzzaman, Islam, M. Habib, A., & Yeasmin, D. (2016). *Effects of Implementing TQM Principles in the Apparel Manufacturing Industry: Case Study on a Bangladeshi Clothing Factory*, Science and Technology, 6(3), 68-75. <https://doi:10.5923/j.scit.20160603.02>
- Walde, P. & Sangode, P. B. (2019). Developing a Framework for Implementing TQM Practices through a Comparative Study. *International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL)*, 7(4), pp. 121-132.