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Total Quality Management in Press and Post-Press: A Study of Book Printers in Ibadan, Nigeria

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Abstract:

This study examines the paramount issue of quality control (QC) in printing as a sine qua non for quality production. Having observed that the quality of the books produced by printers in Ibadan is generally on the average, the study investigates how Total Quality Management (TQM) can bring in a turn-around to production quality if injected into printing processes. The study adopted a survey method and structured questionnaire as the sole data collection instrument. Four research questions were formulated, one hundred (100) book printers were randomly chosen from Ibadan printers which constituted the population of the study. The 100 copies of the questionnaire administered on respondents were completed but 92 copies were returned and found useable. The data collected were analyzed using percentages and statistical mean. Findings showed that most of the book printing firms in Ibadan have neither quality control department nor specially trained quality control personnel. Most of the printers never heard of TQM. They all also agreed on the need for improved quality in production.

Keywords: *Quality control, total quality management, book printing, press, post-press*

1. Introduction

Books are sources of knowledge and a key to societal transformation. Books are catalysts for national development (Akangbe, 2015:35). Indeed, the level of growth and development of any society or nation depends, largely, on the quality of books published and used by members of that particular nation. One of the major players in the book industry is the printer who manufactures the book. The printer collaborates with the publisher for a successful book delivery. That is why Sogbein (2006:27-32) submitted that there is a synergy between publishers and printers and that the fortune of publishers is tied to that of printers. This is because the quality of printing will go a long way to determine the acceptance of such a publication in the market. It is logical that a well-designed and printed book is likely to attract the attention of the potential book audience.

Tahir 2005(28-32) observed that majority of the books printed in Nigeria and submitted for evaluation failed to meet the required criteria set for evaluation. These books scored very low especially in the areas of binding, cover and illustration. Tahir 2005(28-32) further opined that a printer is expected to provide good quality books that will sustain wear and tear, and reduce frequent replacements by parents. He believes that a well-produced textbook should last for between three to five years. All these observations and comments have put the printer in a rather difficult situation because there is pressure mounted on him to produce printed books that are cheap, and at the same time of comparable quality to those produced in the developed world. Total Quality Management (TQM) owes its origin to the work of an American, Edwards Deming, who has been described as the "father of modern-day Japanese miracle". It was originally a production engineering term, and has its roots in a variety of disciplines: economics, social psychology, mathematical statistics and management services. TQM is concerned with the scientific management of men, materials and machines. It has been used to improve quality, production capacity and capability of Japanese firms. It is a management philosophy that focuses on human and work processes with the primary goal of ensuring customer satisfaction and continuously improving organizational performance. It is today built into the management philosophy and practices of the most successful international businesses (Adeleke, 2007:27 - 29). Although, TQM's advantages were first taken in the industrial sector, TQM has been found to be as effective in the service industries like banking, insurance, hotels, healthcare, petroleum, etc. Adeleke 2007 (27- 29) describes TQM as a company-wide program that empowers workers and managers to continuously improve their processes and outputs to conform to user's requirement and to delight the customer. It aims at providing a customer-driven organization to improve its products and services.

Some of the major characteristics of TQM as enumerated by Obanya (2002) will be utilised in the course of this research. These are:

- i. To put the customer first: Knowing the customer's requirements and responding to customer's expectation.
- ii. To manage by fact: Data will always be needed to set directions for strategic choices as well as to determine the extent to which organizational goals are met.

iii. To train, empower and recognize employees: To train staff to identify and solve problems, empowering employees to take action to satisfy customer's requirements, and recognizing employees for their efforts to improve performance.

iv. To improve labour-management team work: This is to avoid "we-them" polarization that often exists between the workforce and management; hence involving all staff in the system-thinking process that underline all quality goal setting and implementation of continuous quality improvement program.

v. To lead the change in organizational culture: Leadership commitment to TQM is the foundation of its success. The ultimate aim of this study therefore is to investigate how total quality management principles can be incorporated into the operations of printers at the press and post-press production processes. This is to enhance the quality of the books produced by printers in Ibadan and by extension, Nigeria.

2. Methodology

Printing is a central and vital activity in publishing. In Nigeria, it is an age long profession that has spanned 170 years since its inception in 1846. However, in spite of the availability of relatively modern printing machines and technology, the quality of books produced by the Nigerian printer has been rather low (Adesanoye, 1995; Tahir, 2005; Echehiri, 2005; and Adeleke, 2007). Hence, it has become pertinent that there is a need for a genuine examination of book printing firms in Ibadan to identify the factors responsible for the rather low quality books produced by them. This will enable the researcher, using TQM principles enumerated earlier, to proffer solutions to the causes of inefficiency and low quality standards in the printer's production processes.

The main objective of the study is to investigate the use of TQM as an imperative for quality control and efficiency in Book Printing. The specific objectives are to:

- i. identify the factors responsible for low quality books produced by book printers;
- ii. establish how printers utilize the quality control capabilities of printing machines, tools and equipments;
- iii. identify the effects of pressroom ambient condition on the quality output of paper and ink; and
- iv. find out the press and post-press quality control measures employed by book printers in Ibadan.

Arising from the stated objectives, the study seeks to answer the following research questions:

1. What are the factors responsible for production of low quality books?
2. How do printers utilize the quality control capabilities of printing machines, tools and equipment?
3. What effect does pressroom ambient condition have on the quality output of paper and ink?
4. What are press and post-press quality control measures employed by book printers in Ibadan?

The study is significant in that it will enable printers to be quality conscious, quality driven, produce quality publications that will increase the aesthetic value and improve the utility benefits derivable by users from such books. The study will also serve as a guide to authors, editors, marketers, bookshops, teachers, students, parents, and other book users to have an insight into what to look for in a well-printed book. This is with a view to deriving maximum value for taking the decision to purchase the book. This study has Ibadan as its geographical scope as it focuses on book printers in Ibadan which is regarded as the home of book publishing in Nigeria. The survey research design is employed for this study. This method was adopted primarily because it is a suitable and efficient way of studying large populations and investigating problems in realistic settings.

The population for this research is all the book-printing companies in Ibadan, Nigeria. The total number of such printing firms is 500 as obtained from the records of registered members of the Association of Master Printers in Ibadan. Out of this, the researcher used simple random sampling technique to select 100 (20%), which constituted the population of the study. Data collection instrument was a questionnaire, which has two sections. Section A is on demographic characteristics of the respondents while Section B, tagged Total Quality Management Questionnaire (TQM), is on quality aspects of printing. A 5 point Likert scale type question was adopted for the four research questions. Strongly agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly disagree (SD) were adopted as response options. The Cronbach alpha reliability coefficient of TQM = 0.763. For data analysis, percentage is used in analyzing the demographic data while Mean is used for analyzing data for the research questions. Decisions are based on a cut-off point of 3.50 on a five-point scale. A mean score of 3.50 and above are regarded as adequate.

3. Literature Review

The literature review discusses an overview of printing, the concept of press, post-press, finishing aesthetics, and Total Quality Management (TQM).

3.1. Overview of Printing

Printing is an indispensable process in book publishing. Without printing, publishing processes is incomplete and book cannot be born. It is through printing that mass production, duplication and dissemination of information can actually take place. As stated by Ifeduba (2004:87),

Printing is an important aspect of book publishing because books, except they are printed and bound, might as well be regarded as manuscripts. No matter the amount of editorial effort made, the act of making public never takes place until printing has taken place.

In the view of Okwilagwe (2001:29), printing is the transferring of an image from one material to another material. He observed further that printing has brought great enhancement into the world of communication through the visual medium. Ifeduba (2004:87) identified three print production technologies with regard to books namely: letter press technology, offset printing technology, and digital printing technology. Similarly, Okwilagwe opined that there are many processes of printing out of which he also identified three basic types which are relief printing or letter press, planographic printing and intaglio printing (2001: 29 – 30).

Basically, printing has three operational stages which are referred to as pre-press, press, and post-press. Essentially, two principal activities, filming and plate making, take place in the pre-press. Filming is a process of transferring the camera ready copy (CRC) onto laser films preparatory to plate making. Rainer (2001: 824-851) avers that there are two types of filming processes, these are negative and positive. The negative is an old process whereby the text is patched on the negative film and exposed to light to make it register on the film. The film will then be used for plate making. Positive filming is a shorter process and an improved technology whereby the text is printed on laser film directly from the computer. There is a technical process called mirroring which simply means flipping or turning the text over. According to Kipphan (2001:24 – 25), pre-press includes all the steps which are carried out before the actual printing. Traditional pre-press is divided into three areas. The first is composition, which is recording text, formatting text and pagination. The second is reproduction of pictures and graphics, and particularly colour separations. The third is assembly and plate making i.e. the assembly of text, picture and graphic elements into complete pages (page layout/make-up), from pages to print sheets, and also the making of the printing plate as the vehicle of information in the printing press. However, two stages are the major concern of this paper which is press and post-press.

3.2. Press

The Press is the second stage in printing process. It is the actual printing which is the mass reproduction of texts and graphics on papers, cards and boards via the printing plates.

Printing technologies can be categorised into two. These are technologies requiring a master, conventional procedures, and non-impact printing (NIP) technologies which do not require a printing plate. Printing technologies requiring a printing plate are technologies like lithography (offset), gravure, letterpress, and screen printing. Kipphan (2001:41) identified electro photography and ink jet as the most common forms of non-impact printing. He submits that all printing technologies carry out the task of transferring information to a substrate which is paper, either in sheet or web form. The execution of this task requires the pre-press phase for procedure specific preparation of the printing process as well as the finishing phase for fabrication of the end product. It is this conventional oriented procedure of printing that this study focuses.

Printing is a reproduction process in which printing ink is applied to a printing substrate in order to transmit information be it images, graphics, or text in a repeatable form using an image-carrying medium. The image carrying medium is the printing plate; it is the storage element that contains all the information needed to apply the ink for the reproduction of images and/or text by printing. The printing plate or image carrier (master) is the tool (material) by which ink is transferred to the printing substrate which can be paper, card, or board for the reproduction of text, graphics or images. One printing plate has the capacity to generate several prints. The print image is the information provided by the entirety of all the print image elements in all operational stages of an image to be produced by printing. The print image element is an area that transfers and/or receives ink (e.g. letter type face, line, screen dot or cells) in any operational stage of the presentation to be reproduced by printing. The ink is the coloured substance that is applied to the printing substrate during printing while the printing substrate is the material receiving the print. The printing press is the equipment with which the printing process is performed. Printing is procedural and the printing process serves to reproduce enmass and disseminate information that is transmitted and processed within this procedural framework.

The printing stage which is the press is an important central production stage and a vital midway between pre-press and post-press/finishing.

In all printing technologies requiring a printing plate, it is common that information is generated by the surface of the substrate being partially coated with ink. Ink is transferred in the contact zone and sufficient process-dependent contact pressure must be applied between the printing plate and the printing substrate or an intermediate carrier. When the layer of ink on the printing plate or intermediate carrier is brought into contact with the printing substrate, only part of the layer of ink is transferred to the substrate. A residual layer remains on the printing plate. Thus the ink is not transferred in full, the ink layer is split.

In printing, inking and ink transfer is very significant to printing success. Kipphan itemized the following as being crucial to the success of ink application in printing.

1. The thickness of the ink layer on the printing plate (ink supply).
2. The period of contact (printing speed and geometry of the printing components).
3. The contact pressure (also called printing pressure).
4. The rheological properties of the ink.
5. The temperature ratios (temperature has a marked effect on the ink's rheological properties).
6. The surface properties of the printing substrate and printing plate or intermediate carrier wet ability, absorbency, roughness, etc. (2001:44).

Another crucial factor influencing the layer of ink on the substrate is the absorption properties of the ink in the printing substrate. With both absorbent and non-absorbent printing substrates, the ink transfer is reduced if the printing speed is increased, as the period of contact then becomes shorter. In indirect printing, ink transfer takes place in two stages. The layer of ink on the printing plate is brought into contact with a rubber blanket and then part of the ink layer adheres to the blanket. In printing, transfer of ink can be generally affected by the wetting properties of the printing substrate, the surface properties of the materials involved, the properties of the paper, the viscosity of the ink, the printing pressure, the printing speed, and the shape of the cells and their filling level (Kipphan, 2001:45).

Book printing can be in single colour or can have multiple colours up to four colours which are cyan, magenta, yellow, and black. Process colour print is produced by superimposing one colour upon another using the appropriate printing plates. The printing plates for the four primary colours of cyan, magenta, yellow, and black are produced in the pre-press. Depending on the type and capacity of

the machine, the printing plates can be mounted one after the other in a machine that takes one plate at a time. A two colour-machine will take two plates at a time while on a printing press with four printing units; these four separated colours can be printed consecutively. Machines that have one single printing unit are the most common in Ibadan. Kord 64 machine which is a single-unit press is the most prevalent and is basically found in any press in Ibadan. As a matter of fact, it is the target machine which every notable printer begins his press with.

The book publishing sector in Nigeria is generally dominated by educational publishers who specialise in texts for pupils and students at the pre-primary, primary, secondary, and to a small extent, post-secondary levels of education. Therefore, the book printing scene is dominated by school text books, work books, teachers guide, supplementary books, creative works on drama, poetry and prose, examination aids series, etc. Different machines are used to print these different books and the type and size of books will determine the machine that will be suitable for its printing. It is important to submit that a machine will determine the size of plate and paper that will go on it. In Table 1 below are the types of printing machines that are prevalent for book printing in Ibadan and the size of paper that go on them.

Machine	Paper Size	Colour Capacity
1. Speed Master	"24 ^{1/2} x 36"	Four colours at a time
2. Roland Rekord	"24 ^{1/2} x 36"	Four colours at a time
3. Sordz	"24 ^{1/2} x 36"	Two colours at a time
4. Kord	"18 x 24"	Single
5. Solna	"18 x 24"	Single & double colour
6. Thompson Crown (^{1/2} Kord)	"12 x 18"	One colour at a time
7. 201	"15 x 10"	One colour at a time

Table 1: Machines and their corresponding paper sizes and colour capacity

We should note that the type of machine to be used in printing will determine what size the paper will be cut into. In other word, printing machines are paper/plates-specific as each one chooses its paper and plate. The publication size is a great determinant of the printing machine that will be employed for printing. Job sizes depend on each publisher and they vary from one publisher to the other. However, the following are the common publication sizes that are obtainable in Ibadan.

Publication Type	Trim Size
i. School textbooks	"9 ^{1/2} x 7 ^{1/4} "
ii. Story books	"9 x 6"
iii. Drama	"7 ^{1/4} x 4 ^{3/4} "
iv. Prose	"8 x 5"
v. Poetry	"8 ^{3/4} x 5 ^{1/2} "

Table 2: Publication types and their trim sizes

It is important to remark that the ability of the machine minder (the machine operator or printer) to manipulate the printing machine effectively at the press stage is a crucial factor for quality production. He must display care in discharging his duties and must be quality-conscious as well. For instance, the ink must be well applied, the water must not be excessive, the plate must be well fixed, the blanket must be well checked, there must not be wrong backing of plates, etc. The best of cars will not drive itself, it will be driven by a driver and the competence of the driver will determine the efficiency of the car; similarly, the most sophisticated printing machine will not operate itself and the product of the most efficient machine will depend on the competence of the operators or the machine minder. In other word, efficiency of the operator or the machine minder is not negotiable for high quality printing.

3.3. Post-Press Stage

The third stage in printing is the post-press. This is a stage that has several operations, therefore a great care must be taken so that there will be an eventual beauty for the production. A single operation that goes wrong will affect the final product. Post-press is also known as 'finishing' in printing parlance. It is the closing processes that bring the actual book to be. Therefore all the post-press processes namely: folding, collating, gathering, sewing, binding, trimming, checking and repairs, and packaging must all be well coordinated and executed.

Folding is the very foundation of the finishing processes. This is done by series of folding machines which come in different capacity and speed especially for large print run. But for small impression and especially in small scale firms, folding can be manually done. Folding is the reduction of printed sheets to size and into the number of pages on it. According to *The Chicago Manual of Style*, "A press sheet, also called a printed sheet, bears printed pages on both sides, each side printed from a single plate. The pages are so arranged that when the sheet is folded in half again and again until only one page is showing, all the pages fall into proper sequence" (1993:812). Folding could be susceptible to errors. The success of this exercise depends largely on the accuracy of the page-planning made by the lithographer at pre-press stage. If there is error at that foundational stage, the pages will not be sequential after folding. A press sheet so folded is technically called a signature. A signature is printed on either side by two plates, one on front and the other on the back. A signature comprises multiple pages which may be 8, 16, 24, or 32 pages. A signature may have 64 pages occasionally. The machine that folds printed sheets into signatures for binding is called folder or folding machine.

Collating is the next step that succeeds folding. Collating is the putting together of different signatures sequentially to make a complete book. A signature is also called a section. Gathering is the collection of the folded sections in a proper sequence to make a complete book. When all signatures have been properly gathered, they are referred to as *folded and gathered sheets* (or “f and g’s”) (*The Chicago Manual of Style*, 1993:813). Sewing is a process of stitching collated signatures together as part of the process of binding. A book that has small volume may not require sewing, it could be bound directly. However, voluminous books require sewing as a measure to fortify its binding to ensure its durability. In sewing, gathered signatures can be sewn by Smyth sewing or by side sewing. In Smyth sewing, the signatures are sewn to each other through the folds while in side sewing; the stitches go through all the signatures at once from the side. Books that are Smyth sewn have the benefit of opening flatly with ease while the side sewn books, though stronger than the Smyth, cannot open flatly readily. Binding succeeds sewing. It is the application of cover at the back of the printed text to protect and give it identity. The cover material for a book can be card, board, paper, leather, or cloth. Binding is a process. Types of binding include cold-glue binding, hot-melt-glue binding otherwise called adhesive binding, case binding or hard-cover binding, and mechanical binding. To effect maximum beauty in binding, covers of a book can be creased on machine to map out clearly where the spine will occupy. Creasing beautifies the spine, aids easy opening of pages, and generally enhances the binding. Trimming: This is the process of opening the book at the three edges. This is done for limp publications after binding. A machine which has a big knife is used for trimming. Trimming removes the rough edges of a book, smoothens its three edges and brings out its beauty. Trimming is followed by checking and repairs. Checking and repairs are twin process of checking for and detecting errors in publications and correcting such errors by removing and replacing bad or faulty pages with good copies. Checking and repair are vital quality control measures which are crucial for total quality management in book printing. The final stage in post-press is packaging. Final products are packed in cartons and labeled or neatly wrapped with wrapping papers and legibly labeled by indicating the title of the book and the number of copies in each carton or packet.

3.3.1. Finishing Aesthetics

Aesthetics, a concept in humanities, is an artistic term that deals with beauty. Aesthetics concerns itself with beauty and what is beautiful in life. In arts, aesthetics essentially has to do with appreciation of the beauty that is inherent in a creative work. It is also the setting up of criteria for judging the value of a work of art (Adekunle, 1988:7). Akangbe (2005:113) submits that there are two schools of thought on aesthetics. These are the objectivists and the subjectivists. The objectivists believe that only the object is important and necessary in determining the aesthetic value of a work of art while the subjectivists hold a contrary opinion. They believe that the aesthetic value of an object can be seen in the relationship between the object and the observer. The belief of this school is in line with the popular adage that “beauty lies in the eyes of the beholder”. This study aligns with the subjectivist school with a rider that taste (one’s likeness or preference) will also affect greatly one’s aesthetic evaluation. To a great extent, a person’s taste is conditioned by his cultural background. In our view, the application of aesthetics to printing is not an anathema because printing itself is an art, indeed a craft, which requires creativity, artistry, and imagination.

In printing, aesthetics is an extrinsic evaluation of the overall beauty or appeasement of a published book. It centres on what is pleasing to the eyes, appealing to taste, attractive to visual and artistic in production. In other word, finishing aesthetics is not a docile adornment or passive ornamentation but rather an injection of innovation that is functional, a utilitarian innovation that is tangible and effective. There are several indices of finishing aesthetics. They are different activities that are carried out at the post-press stage to add flavor of beauty to the publication. The ones that are common among printers in Ibadan are identified below.

- i. Lamination – This is the application of a transparent protective film to the cover paper by
- ii. means of a laminating machine. Its varieties include hot lamination, cold lamination, transparent and matt lamination.
- iii. Marbling – This is the colouring of the cover page or any part of the book in imitation of variegated marble.
- iv. Varnishing – It is the application of liquid to the already printed cover to form a hard shiny transparent surface.
- v. Head banding and foot banding – This is the art of wearing often brightly colour ribbons to decorate the edges of the sheets in hardbound books. The band on the upper edge is called headband while the one on the lower edge is called foot band.
- vi. Ornamentation – This is the process of decorating book covers with ornamental designs. The designed books, especially Islamic books, come with a lot of ornamentation.
- vii. Gold and silver tooling – This is one of the most usual ways of decorating book covers. It is achieved by sampling heated metal (having relief) on the cover material to make an impression. Tooling is described as blind tooling when it is used to create only a simple impression of the hot tool. When the impression of the tool is left on the cover materials (usually leather) in gold, it is called gold tooling.
- viii. Polishing – This is the use of an instrument called polisher to smooth out any irregularities.
- ix. Gilt edging – This is the colouring of the edge of a book with silver or gold as a touch of class.
- x. Embossing – This is a way of creating relief on the text or logo or the desired spots on the cover to come up with a beautiful effect.
- xi. Perforating – A coupon may be attached to a book to be filled and mailed to publisher. Such a page requires the finishing operation known as perforating. The essence of perforation is to aid tearing.
- xii. Creasing – This is the creation of depression on both sides of the cover to aid opening and folding of books. It also gives prominence to the spine.

4. Concept of Total Quality Management

Total Quality Management is formerly known as total quality control and extensively recognized by its abbreviation as TQM, since the mid-nineteen eighties. There are two theories associated with its origin. The first was that TQM was created as a misinterpretation from Japanese to English since no difference exist between the words 'control' and 'management' in Japanese (XU, Q1994). According to William Golomski (American quality scholar and consultant, 1924-2002), Koji Kobayashi at NEC (Nippon Electric Company) first mentioned TQM in his speech when he received the Deming Prize in 1974.

The second theory posited that the US Naval Air Systems Command used the American Society for Quality Management in 1984 to describe its Japanese-style management approach to quality improvement since they did not like the word control in Total Quality Control. One of the employees could then have suggested the word management. This is consistent with the story that the United States Navy Personnel Research and Development Centre began researching the use of statistical process control (SPC). This is in addition to the work of Juran, Crosby, and Isikawa and the philosophy of W. Edwards Deming to make performance improvements in 1984. This approach was first tested in North Island Naval Aviation Depot.

The terminology for TQM is difficult to summarize into a simple sentence definition. However, Capezio and Morehouse (1995), define it as 'a management process and set of disciplines that are coordinated to ensure that the organisation consistently meets and exceeds customer requirements'. It is a philosophy of business that founds its principles on customer satisfaction, based on two objectives. These are to carefully design the product or service and ensure consistency in the design. Orientating the acceptance of these two major objectives by all individuals within the organisation is necessary.

Richardson (1997) adds that TQM 'is a plan and strategy to extend quality control efforts to every function of the company'. He went further to define each of the individual terms. He said that Total means that everyone participates and that it is integrated into all business functions, Quality means meeting or exceeding (internal and external) expectation, while Management means improving and maintaining business systems and their related processes or activities. Milakovich and Gordon (2001) define TQM as "a management approach that encourages organisation wise commitment, teamwork and better quality of results by providing incentives to increase the success of the enterprise". They enumerated the elements of TQM to include commitment to meeting customer-driven quality standards; employee participation or empowerment to make decisions at the point closest to the customer; actions based on data, facts, outcome measures, results, and statistical analysis; commitment to process and continuous quality improvements and organizational changes and teamwork to encourage implementation of all of the mentioned elements.

Milakovich and Gordon's approach to TQM is in agreement with the definition given by the International Organization for Standardization (ISO). The ISO 8402:1994 defines TQM as:

- A management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefit to all members of the organization, and the society.

Rigby (2009) added a further dimension to the definition of TQM. He describes TQM as a systematic approach to quality improvement that marries product and service specifications to customer performance. He added that TQM then aims to produce these specifications with zero defects. This, he says, creates a virtuous cycle of continuous improvement that boosts production, customer satisfaction and profits. He emphasized that for TQM to succeed, it requires managers to:

- a. Assess customer requirements. This is necessary in order to:
 - i. understand present and future customers' needs; and
 - ii. design products and services that cost-effectively meet or exceed those needs.
- b. Always deliver quality goods. This, he says, only happen if management would pay attention to the following:
 - i. identify the key problem areas in the process and work on them until they approach zero-defect level;
 - ii. train employees to use the new technology;
 - iii. develop effective measures of product and service quality;
 - iv. create incentives linked to quality goods;
 - v. promote a zero-defect philosophy across all activities; and
 - vi. encourage management to lead by example.

Schoonover (1993) is however of the opinion that TQM is a philosophy that focuses on improving customer and employee satisfaction, as well as profitability. He describes one of the key factors of TQM as that of employee involvement through teamwork. Without it, even the best mentioned TQM programme could not succeed. To have an effective team, a company must emphasize the people part of the equation through enlightened management, ethics, and the elimination of fear. Employees, he says, cannot put their best foot forward if they fear losing their jobs or if they do not find management's behaviour ethical and rational. Fear of reprisal can affect an employee's willingness to speak freely in a TQM open-discussion forum. He iterated that management must remember that though 'Profit is the goal; people are the means'. Enough attention must be given to the 'people principle' of TQM. It should be remembered that it takes people to make TQM work.

Stark (1998) supports Schoonover's views but thinks that TQM is more of a cultural affair. He considers TQM as a description of the culture, attitude and organisation of a company that aims to provide and continue to provide its customers with products and services that satisfy their needs. The culture requires quality in all aspects of the company's operations, with things being done right first time, and defects and waste eradicated from operations. He opines that a successful TQM environment requires a committed and well-trained work force that participates fully in quality improvement activities. Such participation is reinforced by reward and recognition systems, which emphasize the achievement of quality objectives. He stressed that on-going education and training of all employees supports the drive for quality. This encourages employees to take more responsibility, communicate more effectively, and act creatively and innovatively. He however pointed out that it is not easy to introduce TQM in an organisation. Before it can be

introduced, an open cooperative culture has to be created by management. Employees have to be made to feel that they are responsible for customer satisfaction. They are not going to feel this way if they are excluded from the development of visions, strategies, and plans. It is important that they participate in these activities. He warned that employees are unlikely to behave in a responsible way if they see management behaving irresponsibly – saying one thing and doing the opposite.

From the above, it is obvious that TQM uses a combination of methods, theories, techniques and strategies for achieving exceptional quality. It emphasizes the crucial role of management and the judicious use of employees for achieving world-class qualities. Richardson (1997) posited that TQM is ‘not a fad of the times, but rather a correction of the previous failures in management combined to produce a better management style when used appropriately’.

5. Data Analysis

Four research questions were answered in this study; the analysis of data gathered is presented below. One hundred (100) copies of the questionnaire were administered, 92 copies (92%) were retrieved from the respondents and were found useful. A 5-point Likert scale was adopted with the following options: Strongly agree (SA=5), Agree (A=4), Undecided (U=3), Disagree (D=2) and Strongly disagree (SD=1) for all the questions. The Cronbach alpha reliability coefficient of TQM = 0.763.

- Research question 1: What are the factors responsible for production of low quality books?

		SA	A	U	D	SD	N	M	Decision
1	The quality of the camera ready artwork (CRA) submitted for press impact on the quality of books produced.	60	24	0	6	2	92	4.48	Adequate
2	The cost the customer is willing to pay is crucial to the quality of job produced.	52	28	6	4	2	92	4.35	Adequate
3	The inability of some book printers to acquire modern printing equipment limits the printer's ability to produce high quality jobs.	42	24	8	12	6	92	3.91	Adequate
4	The age and type of printing machines used affect the quality of jobs produced.	56	26	0	10	0	92	4.39	Adequate
5	Unavailability of standard machine spare parts leads to production of low quality jobs.	52	28	0	10	2	92	4.28	Adequate
6	Insufficiency of competent machine engineers also facilitate low quality jobs.	52	28	0	10	2	92	4.28	Adequate
7	Frequent breakdown of printing machines and irregular maintenance schedule leads to low output.	50	36	4	2	0	92	4.46	Adequate
8	Poor paper and low ink quality affect the quality of printed books.	48	34	2	6	2	92	4.30	Adequate
9	Shortage of competent, dedicated and highly-skilled press operators affect book quality considerably.	64	20	2	2	4	92	4.30	Adequate

Table 3: Respondents' rating of factors responsible for low quality books

- NB: Decisions above are based on a cut-off point of 3.50 on a five-point scale. All items with a mean score of 3.50 and above are regarded as adequate.

Table 3 shows that the respondents agreed and rated all the nine items relating to factors responsible for production of low quality books as adequate.

- Research question 2: How do printers utilize the quality control capabilities of printing machines, tools and equipment?

S/no	Item	SA	A	U	D	SD			
1	Knowledge of the usage of both colour and registration guides is a necessary requirement for high quality jobs.	74	18	0	0	0	92	4.80	Adequate
2	The print production staff needs to understand the new concept of electronic image processing systems available in the print industry.	60	22	8	2	0	92	4.52	Adequate
3	Higher quality prints are obtained through electronic data processing.	36	22	18	12	4	92	3.91	Adequate
4	The analogue printing techniques are fast becoming obsolete in the Nigerian Printing Industry.	36	46	2	4	4	92	4.30	Adequate
5	Knowledge acquisition on modern printing techniques is not relevant to our situation in the Nigerian Printing Industry.	16	32	0	30	14	92	3.07	Inadequate
6	Non-adherence to requirements laid-down by the customer has been a major reason for production of low quality books	22	32	16	16	6	92	3.40	Inadequate

Table 4: Respondents' rating of printers' utilization of the quality control capabilities of printing machines, tools and equipment?

→ NB: Decisions above are based on a cut-off point of 3.50 on a five-point scale. All items with a mean score of 3.50 and above are regarded as adequate.

A list of skills and techniques based on the utilization of the quality control capabilities of printing machines was generated and respondents were asked to rate the adequacy of such skills and techniques needed for quality control. Table 4 shows that the respondents rated four items relating to the utilization of quality control capabilities of printing machines as adequate while items 5 and 6 were considered inadequate as indicated by the mean scores ratings of less than 3.50.

➤ Research question 3: What effect does pressroom ambient condition have on the quality output of paper and ink?

A list of pressroom ambient conditions that affect the quality output of paper and inks was generated, and respondents were asked to rate the adequacy of such conditions as they affect quality of paper and inks. Table 5 below shows the mean of the responses of the respondents for the items being investigated.

s/No	Items	SA	A	U	D	SD	N=46	M	Decision
1	Air conditioner enhances the effective control of ambient conditions in the pressroom.	64	22	0	2	4	92	4.52	Adequate
2	When the humidity is high paper absorbs moisture and expands, this affects registration of multi-colour jobs.	62	24	0	2	4	92	4.50	Adequate
3	When the humidity is high, accurate feeding of sheets into the machine becomes difficult and this affects registration on the machine.	38	42	0	6	6	92	4.09	Adequate
4	Curled and wavy edges of paper are the result of unfavorable atmospheric condition of the press room.	30	34	22	6	0	92	3.96	Adequate
5	Atmospheric condition affects ink drying on paper after printing.	30	44	4	12	2	92	3.74	Adequate

Table 5: Effect of pressroom ambient conditions on quality of paper and inks

→ NB: Decisions above are based on a cut-off point of 3.50 on a five-point scale. All items with a mean score of 3.50 and above are regarded as adequate.

Table 5 above shows that the respondents rated all the five items relating to effects of pressroom ambient condition on quality output of paper and inks as adequate.

➤ Research question 4: What are the press and post-press quality control measures employed by book printers in Ibadan?

		SA	A	U	D	SD	N	M	Decision
1	Effective make-ready of machine can make or mar printing.	60	24	0	6	2	92	4.48	Adequate
2	Quality of dampen roller, blanket, and printing consumables will bear on the final quality of books printed.	52	28	6	4	2	92	4.35	Adequate
3	Accurate application of water and ink by the operator enhance quality book production.	42	24	8	12	6	92	3.91	Adequate
4	Speed of printing machine can have impact on the quality of printing.	56	26	0	10	0	92	4.39	Adequate
5	Wrong backing of plates by machine operators will impact on quality of book production.	52	28	0	10	2	92	4.28	Adequate
6	All press operating systems must be examined, adjusted and standardized to attain quality from the combined efforts of management, administration and operators.	52	28	0	10	2	92	4.28	Adequate
7	Foundational error at page planning stage will manifest at the stage of folding.	50	36	4	2	0	92	4.46	Adequate
8	Checking and repair are vital quality control measures which are crucial for total quality management in book printing.	48	34	2	6	2	92	4.30	Adequate
9	Effective binding will heighten significantly the finishing quality of the book.	48	34	2	6	2	92	4.30	Adequate
10	The success of this exercise depends largely on the accuracy of the page-planning made by the lithographer at pre-press stage.	64	20	2	2	4	92	4.30	Adequate

Table 6: The press and post-press quality control measures employed by book printers in Ibadan

→ NB: Decisions above are based on a cut-off point of 3.50 on a five-point scale. All items with a mean score of 3.50 and above are regarded as adequate.

Table 6 shows that the respondents agreed and rated all the ten items relating to press and post-press quality control measures employed by book printers in Ibadan as being adequate.

6. Discussion of Findings

This study reveals that majority of the printers in Ibadan are males. Out of the 92 copies of the questionnaire retrieved, 80(87%) were males while only 12(13%) were females. This is in line with the findings of Okunola (2001:28-30), who affirmed that women seem to shy away from the printing industry because it entails tedious labour and long working hours. A machine operator, for instance, may remain standing by his machine for between 8 to 15 hours per day, while press managers also could be on duty for an average of 20 hours per day. Another major finding of this study was that printing profession in Ibadan lacks specialty as most of them engage in all kinds of printing without specializing in a particular aspect of printing. Thirty-four respondents which was 37% engaged in general commercial printing; 1 which was 2% engaged in pre-press operations only while 56 which translates to 61% engaged in general commercial printing, book printing, book binding, and pre-press operations only, all at once. None of the respondents specialized in book printing solely. This finding agrees with that of Obidiegwu (2006) who observed that there are only a few printers in Nigeria geared specifically to book printing as distinct from the printing of posters, labels, vouchers and calendars. Book printing requires specialized machineries, processes and personnel. This could be a factor responsible for the low quality books produced by these general-purpose printers.

The result of this study also established that majority of the printers were aware of the need to improve the quality of the books produced by them. This corroborates the assertion of Mclelan (1997) that printers must realise that the quality of their books will have great impact on the quality of the people in the society and determine the printer's survival in the book market. Adesanoye (2007: 3-9) also observed that because of the low quality books produced by printers, many publishers now take their jobs to China, India or Japan, thereby further emasculating an already deformed printing sub-sector. Furthermore, the study also showed that most of the book printers in Ibadan have neither quality control department nor specially trained quality control personnel. This phenomenon has influenced negatively the quality of books produced.

Another important finding of this study was that the educational backgrounds of majority of the printers were very low. This was evident from the difficulties most of the respondents had in understanding the aim and contents of the questionnaire administered on them. It was discovered that printing, though an elitist profession, is not populated by well trained personnel as most of the practitioners in Ibadan were secondary school leavers while a few were holders of Nigeria Certificate in Education (NCE) and Ordinary National Diploma (OND). It therefore follows that to effectively introduce the principles of TQM in the book industry, and if real growth at individual and organizational levels is to be achieved and sustained, there must be a coordinated and well-planned integration of training, education and continuous development in the printing industry.

It was discovered that majority of the printers have never heard about TQM. This observation is by no means peculiar to the Nigerian printing industry as Burgess and Shaw (2001) observed in a similar study that many companies have not fully exploited the benefits of TQM. This, they said, is because many organizations, instead of incorporating quality management into their working systems, still employ acceptance-sampling techniques along with 100% inspection of the final product. This means that they inspect defects out of a batch of products rather than building quality into production. In book production, it often happens that blank or defective sheets might not be detected until after the book has been bound. This is if the printer is lucky to discover it before delivery as often times, it is the publisher or the buyer who discovers it.

It was equally discovered that majority of the printing machines used by the printers is old, outdated and poorly maintained. This obviously has negative effect on the quality of books produced, especially, when compared with the quality of similar books produced in the developed countries. This is a pointer to the fact that the printing industry in Ibadan, and indeed in Nigeria, still has a long way to go in terms of efficient machine maintenance, quality production and adoption of new technologies before it can catch up with industry leaders around the world. However, Adesanoye (2007: 3-9) absolved the printers when he observed that one grave consequence of the massive devaluation of the Naira and lack of capital has been the great difficulty Nigerian printers have been encountering in replacing their machinery. Today, sourcing for foreign exchange to replace obsolete equipment is a more daunting task with the economic incarceration which Nigeria is undergoing. This is because the foreign exchange required to purchase modern equipment has been virtually impossible to source with the 2016 economic policy of the Federal Government of Nigeria.

On the whole, it was clearly established that based on the various findings already discussed, most books printed in Ibadan, and indeed Nigeria, are not always of the highest possible quality.

7. Conclusion

It is revealed from the findings of the study that Total Quality Management is a powerful strategic weapon for quality control of book printing at the press and post-press levels. For Ibadan printers to maintain adequate enhancement of the quality of their books, effective competition with their foreign counterparts and assurance of a secured future for themselves and their organizations; the time to implement TQM in the press and post-press operations is now. Any book printer who ignores TQM is deliberately programming her/himself out of business. It is therefore not negotiable that press managers, production managers, print managers, work managers, press supervisors, machine operators, binders, finishing staff, press hands, and indeed all staff at the press and post-press levels must be alert to the demands of quality and apply TQM consciously to their various operations. At the corporate level, the organizations must introduce and implement TQM in order to ensure quality control and efficiency in the management of corporate resources and consequently organizational, profitability, survival, growth and goodwill.

8. Recommendations

Arising from the findings of this study, the following recommendations are made to the printers in Ibadan in particular and Nigeria in general.

- i. Printers should lay emphasis on quality and state of the arts printing equipment at the pre-press, press and post-press levels.
- ii. Printers should anticipate and meet users' needs satisfactorily by producing high quality printed jobs. They should also match cost with value by striving to produce quality prints at rates that are commensurate and affordable.
- iii. Printers should lay premium on training and retraining their staff more so that many of them lack basic education. Meaningful changes and progress cannot be attained in the printing sector without adequate training. Training and retraining are sine qua non for Total Quality Management. A rider to this is that printers in Ibadan should desist from technological phobia by imbibing new tools and acquiring new skills in software for their operations.
- iv. Quality execution of the operational processes is a prerequisite for TQM. TQM is absolute and total therefore every stage of production processes must be quality-conscious and quality-driven.
- v. Team work is essential. The high and the low, the skilled and unskilled, the senior and junior must play their parts diligently to attain a quality delivery of the organizational goals.
- vi. Government should reduce tariffs on printing equipment and printing consumables to lessen the overall production cost of book.

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