The impact of total quality management practices on business performance in the telecommunication sector

Michael Owusu-Kyei
George Oppong Appiagyei Ampong
Alex Antwi-Adjei
Ghana Communication Technology University
Business School, Ghana

Keywords
Total Quality Management; Telecommunication Industry; Business Performance; Organization.

Abstract

Total Quality Management (TQM) has arisen as a reliable quality and performance method that can meet or even surpass the expectations of stakeholders. This technique is anticipated to improve organizational performance and has received considerable attention in recent times. This study investigates the impact of total quality management practices on the telecommunications industry's business performance. Questionnaires were used in the study as survey instruments to collect information about the impact of TQM methods on business performance. The researchers used a multiple regression model to ascertain this. The Descriptive statistical analysis tool is used to find the Correlation matrix, Coefficients, t-statistics, R square and p-values, and, Robustness and Diagnostic Test to examine the impacts of Total Quality Management on business performance.

To assess the situation, eight hundred (800) responses were received from, employees and top management of MTN Ghana Ltd. The study established that principles applied to total quality management have a significant bearing on business performance. It is, therefore, recommended that employees in the telecommunication industry need to be well enlightened on the practices of total quality management to increase performance. The study revealed that top management commitment, employee satisfaction, quality information and reporting, managerial design, and reward and recognition have a positive influence on business performance on Ghanaian telecom companies.

Corresponding author: Michael Owusu-Kyei
Email addresses for the corresponding author: mowusu-kyei@gctu.edu.gh
The first submission received: 11th of January 2025
Revised submission received: 14th of April 2025
Accepted: 30th of April 2025

Introduction

The telecom industry is the centre of every economic development and lacking the ability to function well as an industry affects the economic development of that nation as Ghana and Africa at large is not exception, which Ghana is the country under consideration (Haftu, 2019). When a country losses sight on the telecommunication aspects it generates into absurdity of taunted growth. Communication is the main drive of economic growth and development. This research is well studied in Ghana and to a large extent Africa because these telecommunication companies in Ghana also operate in almost all the African continent and their practices is almost the same in all the continents because they apply the same procedures and apparatus in every country they find themselves (Pierre, 2020). The impact of total quality management practices will certainly have either negative or positive effects on business performance, and that has raised the concern of the researchers to dive into this aspects of the telecommunication sector to do a study to find out impact on business performance of the telecom sector, and also recommend the active practices of total quality management to help boost business performance (Jimoh, Oyewobi, Isa, & Waziri, 2019). Total quality management is crucial for non-manufacturing enterprises like telecommunication companies since competition has become a top priority for almost all businesses in today's interdependent world. The service organizations, including telecommunication and more of these businesses frequently have direct interactions with huge numbers of clients.(Lee & Lee, 2020). Such

numerous customers have diverse requirements and conflicting objectives and can only be acknowledged and addressed through good practices of total quality management. The social demands for high-quality services rise as a society gets more developed and educated (Alfano et al., 2019). As a result, many service firms are making strategic efforts to apply total quality management. Understanding the following concepts is necessary for the efficient implementation of total quality management in service organizations: - services have exceptional attributes for its operations; the roles provided by the operators, the right application of quality control measures, apparatus and techniques (Talib, Rahman, & Qureshi, 2013). It is not appropriate to use the same approach when it comes to the implementation of total quality management practices in the manufacturing and service industry. The practices may differ; therefore it must be treated differently, and much more attention is needed in the service industry like telecommunication sector.(Ali & Johl, 2022).

The impact of total quality management practices on business performance have become a major concern in recent times in an environment where there is high market competition (Abbas, 2020). Various studies have shown that the cost of quality control which is the main focus of total quality management is much lower than the cost of quality failure (Yanamandra & Alzoubi, 2022).

In Ghana, the effects of total quality management practices on business performance have been under-utilized.(Withanage & Habib, 2021). The devolved system of government is relatively new in Ghana. Little has been investigated on the effects of total quality management practices on business performance in the service delivery within the new system of the telecommunication industry in Ghana. Beside, so many issues have come up, that are either directly or indirectly connected or linked to the impact of total quality management practice on business performance (Phan, et al., 2019). It is based on this background that the investigators of this study, planned and researched to answer the question: "what are the effects of total quality management practices on business performance of the Ghanaian telecommunication sector? In Ghana, the telecommunication sector is a sector that has gone through tremendous transition over the past years (Denis et al., 2020). Some years ago, to communicate with another person through phone was a big challenge, especially to communicate outside the shores of the country, unless the person trek on a long distance to a post office where one can have access to a telephone booth. This occurrences transpired over many years through post-colonial days with different types of phones being used in the system.

Consequently, Ghana had its first telecommunication sector in 1994, when the government of Ghana declared and announced reorganization of the telecom industry, which was referred to as "Accelerated Development Goal (ADP 1994-200)". The program's main goals were to broaden the telecoms scope with the support of the World Bank, consultants, and other beneficiaries. As part of the ADP's reform program, the Ghana Telecom Company was established on June 15, 1995, a year after the telecommunication division of the Ghana Post and Telecommunication Corporation was disbanded (GPTC). The Ghana Post and Telecommunication Corporation were established as a public corporation in 1974, and until October 1995, it was responsible for operating the nation's telecommunication and licensing telecom services. The telecom part was then separated from the Post, and in December 1996, the telecommunication part which was "Ghana Telecom" sold a 30 percent ownership in the state business to a Malaysia-led consortium (Telecom Malaysia) for 38 million dollars, along with full managerial control (Agyekum, et al., 2021) A group known as African Communications Group emerged in Ghana's desire to lessen

Ghana Telecom's monopoly and introduce some level of strong competition in the country's telecoms business. The Malaysia team was led by Western Wireless Company, which eventually won the bid. "WESTEL" was the team's trading name. They planned to invest between forty million dollars and seventy million dollars in the company over the next five years. They became the second national licensing operator, with the goal of clearing the 300,000-line backlog. These lines were in high demand by customers at the time, and they ensured efficiency and better service to them. While the other operators planned to develop gradually, Scancom Ghana launched operations in October 1996, using GSM 900 technology and Ericsson equipment, with 15 sites and equipment (Yiadom & Tait, 2022). With its coverage in Greater Accra, Kumasi, and Obuasi, Scancom Ghana was able to provide new network services, resulting in significant coverage of backlogs in both urban and rural regions as well as other continuing developments in other regional capitals. Steadily, the company expanded to all the regional capitals but

with different management, ownership, and shareholding structure. The Scancom company change its name from Spacefon to Areeba, then was later bought by a south African telecom giant company called MTN (Agbenyo, 2017). Since that time, MTN took the market leader and it is still the front-runner in Ghana.

The state decided to establish a body that could supervise the activities of the telecommunication companies. In 1996, the Ghanaian Parliament passed legislation to create a single regulatory agency to oversee the telecommunication sector and ensure a stable operating environment for all telecom participants (Suleman & Zaato, 2021). Another goal of the organization is to encourage fair competition and efficiency. Ghana's regulatory organization is known as the "national Communication Authority" (NCA). The NCA's main goals were to grant licenses and regulate telecommunication operating system operations, as well as assigning or allocating system frequencies. The Ministry of Communications' principal goal is to create a strategic plan and application that will make it easier to use the numerous communication resource (Amua-Sekyi & Asare, 2016). The percentage of total voice penetration rate in Ghana stand at 135.33 percent in the year 2019. Basiru et al. (2022), based on the data from NCA. According to the data, the total number of mobile voice subscriptions in the country was increased to 40,857,077 in December 2091 against 40,934,875 in December 2018 (Adusei & Isaac, 2020). According to the NCA report, Ghana is having three telecom operators providing fixed line services to the Ghanaian populace. Vodafone, AirtelTigo and MTN are the operators providing the fixed lines. In December 2019, the NCA report stated that the total subscriptions for the fixed operators as at time was 288,531 as against 278,379 in December 2018. Vodafone recorded a total subscription of 280,321 in December 2019 compared to the December 2018 figure, which was 271,732, while AirtelTigo ended December 2019 with 8,210 subscriptions as against December 2018's figure which was 6,647. With regards to the information from the NCA report, the telecommunication sector in Ghana has experienced significant growth in the previous last years. Nonetheless, the majority of clients are still subjected to bad customer service, network congestion, lack of quality service, drop calls, and high call rates. In the year 2021 November, Ghanaian customers of Vodafone Ghana experienced a high network blockage countrywide. Stimulated by these lowered service quality standards, the National Communication Authority of Ghana has to put measures in place to guide the quality level of the telecommunication companies (Baku, 2022).

Literature review

Some researchers have laid the groundwork for using statistical quality control in quality management. Following that, W. Edward Deming presented 14 principles for adopting TQM (Mukhopadhyay, 2020). The fourteen points are as follows: product and service improvement must be consistent; a new philosophy must be adopted because common delays, mistakes, and defective workmanship are unacceptable, and mass inspection must be phased out. Instead, statistical evidence that quality is built-in should be required, and pricing as a business strategy should be abandoned, management must find problems to solve, training must be the institution's modern method on the job, supervision must be the institution's modern method of production workers, reduce the numbers to quality of supervisors responsibility, to eliminate fear, departmental barriers must be removed, numerical goals must be eliminated, poster and slogans for the workforce asking for new levels of productivity without providing methods. The standard of work that prescribes numerical quotas must be eliminated, the barriers between the hourly workers and their right to pride in workmanship must be removed, and a vigorous program of education and retraining must be instituted (Deming, 2018).

Deming also pioneered a new systematic approach to problem-solving. The PDCA (Plan, Do, Check, Act) cycle is the name given to the method described above (XIN, 2019). An expert called Joseph M. Juran is known for the concept of quality. Juran contributions were not centered only on the end customer or consumer, rather, he made known about internal and external customers, which is very critical when it comes to organizational certainty. According to Farooque, Zhang, and Liu (2019)on supply and distribution chain is valuable to the organization. From the production level to the end, consumers must be looked at by organizations. He said that when those persons are looked at, the activities of the organization are transformed. Armand V. Feigenbaum was another leader who used a system approach in addressing quality issues. Armand V. Feigenbaum believes that a good working environment will

transcend to quality development throughout the entire organization. Total quality control, according to him, is "the development of an effective working system as an integration for developing quality, developing maintenance, and improving quality efforts in the groupings within an organization in order to enable production and service at the most cost-effective levels while ensuring full customer satisfaction" (Foster & Gardner, 2022). Quality leadership, current quality technology, and organizational commitment are three phases recommended by Faigenbaum as a business method (Montgomery, 2020).

Phillip B. Crosby was another expert who was propagating "zero defect "and getting it right the first time. Cao (2019), believed that an organization could do it right if attention is given from the beginning of the idea generation and concept development. Kaoru Ishikawa is best recognized for developing high-quality tools such as the "fishbone diagram." He preached that businesses should consider their internal customers and employ quality circles" to solve quality issues (Androniceanu, 2017). According to Thompson (2020), poor design is responsible for 80% of all damaged products. As conformance numbers move away from the target, he devised the "Taguchi Loss function," which indicates that the cost of quality increases as a quadratic function.

Many others have significantly contributed to Total Quality Management. In the study by Bajaj, Garg, and Sethi (2018), they analyzed eleven (11) different concepts of TQM, which talks about: focusing on the customer, improving processes, enhancing quality rewards, cleanliness and organization, service design, benchmarking, employee empowerment, top management support, employee involvement, employee training and, supplier quality management. All of the aforementioned factors contribute to complete quality management. There were eleven critical success factors (CSFs) identified by (Montgomery, 2020) for putting TQM into practice, which are education and training, award and recognition, employee involvement, process control, and improvement, improvement of quality of the system, student concentration, program design, vision, measurement and evaluation, leadership. Other stakeholders also believed that there are seventeen (17) practices needed in order for TQM adoption to be successful in the service industry. They are customer focus, supplier management, employee encouragement, training and education, benchmarking, continuous improvement, and innovation, employee involvement, information and analysis, quality system, quality culture, teamwork, communication, process and service design, and employee involvement, strategic planning, information and analysis, process management, human resource management, top management commitment. They extended by adding another concept to the full adoption of TQM in the service sector. Bouranta et al., (2019), identified 12 major practices, including top management commitment and visionary leadership, human resource management, technical system, information and analysis system, benchmarking, continuous improvement, customer focus, employee satisfaction, union intervention, social responsibility, services caps, and service culture. Lim, Nair, and Foo (2019), also expounded on elements that influence TQM. These are senior executives being involved in the organization's activities, involving suppliers, having a limited supplier base, involving all employees, having good teams, organizing training programs, having good leadership, focusing on the client, having human resources, o good managerial style, of good organizational structure, the right ownership, improvement throughout the time, consultants, a good culture of business, process-oriented, good statistical tools, good quality inspections, good empowerment, good quality planning, having quality data, having good mechanism to set priorities, method for activity coordination, a good quality council or steering committee, a good written policy, critical performance indicators. The key to business growth is quality improvement (Wu et al., 2018). Quality enhancement guarantees high-quality operations and output, which can assist businesses in advancing into more competitive, international markets. Often, organizations must make fundamental changes to their quality systems before moving on to novel management models (Miguel & Santiago, 2010).

The goal of ISO 9001 is to ensure the success of organizations whose quality management encompasses both operational service processes and customer contacts, with a focus on customer expectations and satisfaction (A. O. Ahmed & Idris, 2020). Total quality management systems improve the quality of the services provided, which in turn increases client happiness. When a consumer is seen as an important tool to gauge the quality of a service, including that of a telecom organization, customer satisfaction is viewed as being vital. For businesses looking to meet or surpass the demands and

expectations of their customers and achieve business performance, ISO 10001 specifies a code of conduct for customer satisfaction.

Inspection of Quality Control (IQC), Statistical Process Control (SPC), Total Quality Control (TQC), and Company-wide Quality Control have all been the subjects of research in the 1990s (CWQC). In the 1980s, these initiatives were organized into sub-groups under Total Quality Management. The standards that were utilized to measure quality were the support programs, which included Six Sigma, re-engineering, ISO 9000, and 9001. These standards were created to elevate quality control across all industries and enterprises. It evolved into the yardstick with the highest level of vigilance for checking all enterprises and industries. Without the approval of these norms, certain industries and businesses could not operate. Organizations may use a variety of methods to enhance their processes, with Lean and Six Sigma being two of the most common (Lazarides & Tsironis, 2018). They are both concerned with defining consumer needs and ensuring that business processes will address those needs in one of the most value-adding ways possible. Although organization-wide adoption of Lean and Six Sigma can yield the greatest benefits, there are many opportunities to implement the methodologies and practices at a local strategic level.

In earlier studies, several aspects of Six Sigma were examined, with an emphasis on success factors and potential drawbacks. The fact is that Six Sigma is most effective when a company already has a clear understanding of what kinds of products and services are in line with its objectives and customers' expectations. This is true despite the overwhelming arguments for its benefits and effectiveness (Tennant, 2017). Problems where the output can be easily measured are ideal for Six Sigma. The hierarchy of specially trained employees, known as the "Belts" of various colors, is supposed to carry out the technique. As a result, there is currently a rapidly expanding market for Six Sigma consultants and training courses, with broad certification activities carried out in a variety of unregulated ways. According to Holweg et al., (2018), Six Sigma is a potent, ground-breaking approach to business transformation that enables organizations to employ straightforward yet effective statistical techniques to achieve and maintain operational excellence.

It is a business technique that enables organizations to significantly improve their performance by planning and keeping track of routine company operations in a way that reduces resource waste and boosts customer satisfaction (Nayal et al., 2022). If used successfully, the Six Sigma approach begins with a company plan and concludes with top-down execution, having a considerable influence on profit. Six Sigma is a process improvement methodology that has been widely applied in business. Six Sigma and ISO 9001 standards are comparable in a number of ways. Details of all elements that affect Six Sigma and ISO 9001 include: Processing Method-Both standards place more focus on using a process-oriented implementation strategy. The entire system for ISO 9001 is made up of numerous small procedures. As a result, the emphasis is on improving processes as well as final outcomes. Six Sigma, on the other hand, is more concerned with enhancing specific processes (Graafmans et al., 2021). To comprehend how each process functions, Six Sigma uses a SIPOC (Supplier, Input, Process, Output, and Customers) diagram improvement. These two standards are used by organizations because they promote improvement through various means. The Plan-Do-Check-Act cycle is used by ISO 9001 to progress products and services. With the help of this technology, your company can make the necessary adjustments to improve quality and decrease errors.

Similar to how DMAIC technologies are used in Six Sigma to enhance current procedures. This strategy also outlines the necessary adjustments to current strategies to optimize the ultimate quality of your goods and services. The scope of these two standards is where the main distinction lies. An organization's quality management system can be developed using the ISO 9001 specifications (Wilson & Campbell, 2020). Every element pertaining to the control of product and service quality is included. Internationally recognized as a standard for business problems, Six Sigma covers difficulties with customers, goods, services, documents, and resources.

On the other side, Six Sigma is a collection of instruments and techniques that a company can employ to successfully enhance various processes. The Six Sigma standard lacks any widely recognized defined requirements. North America is where it is largely used. Some people are unsure as to whether the two standards mentioned above can replace one another alternatively if combining them would be preferable.

Nevertheless, it is important to remember that the two approaches have different goals and do not complement one another. However, you can combine them for better and higher-quality goods and services (N. Wang, Xiao, & Savin, 2021).

A company's chances of success will rise if Six Sigma and ISO 9001 are combined. For instance, ISO 9001 will give you a foundation for your Quality Management System and Six Sigma to address any problems that are harming it (Chugani, Kumar, Garza-Reyes, Rocha-Lona, & Upadhyay, 2017). For your company, combining the two standards will be a terrific way to save time and money.

In summary, Deming theory is known for his ratio, quality is equal to the result of work efforts over the total costs. If a company is to focus on costs, the problem is that costs rise while quality deteriorates. Crosby's theory also made the point, much like Deming's, that if one spends money on quality, it is money that is well spent. His concept of zero defect and quality council as means of sharing information about quality and services will reduce cost and improve profitability. Joseph Juran stated that if a quality improvement project is to be successful, then all quality improvement actions must be carefully planned out and controlled. Therefore, companies must improve all quality actions by planning and controlling all quality actions to achieve quality results. EFQM the result is a model that refrains from prescribing any one methodology but rather recognizes the diversity management methodologies. Companies must not stick to only one standard way of improving quality but must employ more methodologies to improve quality as the world has become a global market with high competition. Ishikawa also stated the theory of how companies should handle their quality improvement projects. Quality projects are crucial for companies, therefore all quality improvement projects must be carefully implemented.

Top Management Commitment

Top Management Commitment is when leaders at all levels of management get involved and committed to the total quality management practices. The management involvement is most priority when it comes to the non-implementation of total quality management practices. When top management stands aloof and unconcerned to the practices of total quality management, the subordinates who are supposed to be the implementers of total quality management practices also relax. Top management commitment is required to implement effective total quality management processes. Most renowned authors share this sentiment that without top management commitment and involvement of total quality management values, its implantation will prove futile. Total quality management practices cannot be done in isolation; it requires both top management and the whole organization to make it work (Heyns & Boikanyo, 2019). Nonetheless, it is the top management to enforce the practices of total quality management in the organization. When leaders are championing the course of total quality management practices, then, it is obvious that the whole organization will accept it, which will then become organizational culture. In an organization where total quality management practices are not sinking well with the people, training must be required. When attempting to increase quality, training is the single most critical component. "Quality training, according to Rapanta (2021), must be a continuous process to meet not only changes in technology but also changes in the environment in which an organization operates, its structure, and perhaps most importantly, the needs of all the people who work there". There must always be coaching, directing and continuous facilitation from the top management to actualize the effectiveness of total quality management practices in every organization. Most structural adjustments and training needs require top management permission before being implemented, and top management fulfills both the physical and leadership needs of the organization. According to studies from Graves, et al. (2019) when top management are committed to the activities of the business, it increases business performance. Thus, the author of this study hypothesis that Top management commitment is positively related to business performance.

H1: Top management commitment to TQM positively influences business performance

Employee satisfaction

There are three main components to employee satisfaction. Organizational characteristics, personal characteristics, and the job task factor are the three factors (Bhuiyan, 2017). Employee satisfaction, according to Kurdi, Alshurideh, and Alnaser (2020), is the stage in which it has a favorable impact on a

person's motivation, job involvement, organizational citizenship behavior, organizational commitment, life satisfaction, mental health, and job performance when they are content with their jobs. The key aspect with employee satisfaction is that, pleased personnel must work effectively and make meaningful contributions to the business. Employees are expected to be happy to accomplish their tasks and desires at work. A higher level of employee satisfaction promotes expertise retention, customer loyalty, stakeholder value and eventually improves firm performance (Sun et al., 2020). Paais, et al. (2020) alluded that employee satisfaction have a positive effect on business performance. Hence, it was believed that employee satisfaction has positive effects on business performance.
H2: Employee satisfaction is positively related to business performance

Quality Information and Reporting

Quality information and reporting employ valuable reports, graphs, and plans to identify obvious and probable hitches and provide timely information for correction. In the context of worldwide reporting under the United Nations National Quality Assurance Frameworks Manual for Official Statistics, the importance of providing transparent and reliable total quality management (TQM) information is emphasized (UN NQAF Manual - 2019). However, it is vital and ingenious to create and reinforce a data reporting system that seeks to generate and operate with good-quality data to make business decisions. Stakeholders are always in relentless pursuit of reliable data and indications of best practices to guide the incorporation, application, and scale-up of the TQM approaches. The achievement of a high degree of satisfaction among well-informed users and their proper use of statistics are both indicators of success. For official statistics, the United Nations National Quality Assurance Frameworks Manual (UN NQAF Manual - 2019) improves user's access to relevant data and has a significant impact on business performance (Sæbø, Ragnarsøn, & Westvold, 2020). Hermuningsih, et al. (2020) suggested that a firm's performance is influenced by quality data and reporting. In view of this, the authors propose that a firm's performance is positively influenced by quality data and reporting.
H3: Quality information and reporting positively impact firm's performance

Management Design

Management design is a synergy between management and business, incorporating continuing procedures, corporate decisions, and policies that permit modernization, and also create good products, services, infrastructures, atmospheres, and brand quality that boost brand loyalty and offer business avenues for organizational accomplishment. According to the assertion of Müller, Buliga, and Voigt (2021), management design intends to link innovation, technology, management, and customers to provide competitive gain across economic, social/cultural, and environmental factors. The empirical outcomes of Huang, Wu, Lu, and Lin (2016) indicate that management design has significantly positive effects on corporate performance. The telecommunication industry is characterized by having a high stride of technological advancement. Therefore, in order to uphold a competitive edge, telecom firms have to revolutionize with appropriate innovations through the use of their R&D departments. Those novelties have to take into account the available market, technology and management. Ahmed (2020) found that management design have a positive impact on business performance. According to the authors' analysis from the above information, management design has a favorable impact on business performance.
H4: Management design is positively related to business performance

Rewards and Recognition

It is not quite true that so long as employees get their salary, they are happy. Staff members need rewards or recognition or both to make them wholly contented with their work. Firms use rewards and recognition to motivate employees, and reveal that they are appreciated and valued. Such gifts are given to employees from their bosses or the executive board to celebrate something achieved through them to promote performance. The appreciation for the worker's accomplishment is a special praise or gratitude for his or her good work (Manzoor, 2021). Some employees even become satisfied when recognized for their work achievements through a letter or citation from the CEO, and not necessarily monetary bonus. Rewards and recognition are mechanisms that contribute to worker retention and participation efforts.

This strategy when implemented can boost the employees' comfort, efficiency, and satisfaction in their responsibilities**.** The strand of literature postulated by (Jawaad, 2019) shows that there is a positive correlation between reward and recognition and business performance. As a result, the author's believe that reward and recognition may have a positive impact on corporate performance.
H5: Rewards and recognition positively affect business performance

Research methodology

For this research work, survey technique was adopted to collect data about the proclivity of TQM on corporate performance. Eight hundred fifty (850) questionnaires were administered to employees and top management of MTN Limited within the Greater Accra Region of Ghana. These people were chosen at random from ten (10) different MTN customer service centres across Greater Accra's ten divisions. These divisions are as follows: Lapaz centre, Achimota centre, Malam Junction centre, Roman Ridge centre, Osu centre, Kaneshie centre, Tesano centre, Circle centre, Kwashieman centre, and Darkuman centre. The researcher administered eighty (80) questionnaires at each of the 10 care centres. With this, fifty five (55) questionnaires were administered to the employees, and thirty (30) were given to top management at each Centre. In aggregate, five hundred (500) questionnaires were given to the employees, and three hundred (300) were administered to top management. A sum of 850 questionnaires was distributed, but 800 responses were retrieved for use, representing 94.12% recovery rate. The researchers also performed preliminary analyses like reliability, validity, and multicollinearity tests to determine whether the data were appropriate for the study and would match the anticipated model. The data collected were analyzed and inference drawn in the study. The investigations of this research began early this year (2022) and findings were made at the middle of the year.
Equation of basic panel regression is

$Yit = a + \beta Xit + \mathcal{E}$

Where: Y is dependent variable X is independent variable α & β are coefficients i is cross-section t is time series ε is error margin. In order to measure the relationship between TQM and performance, the researcher formulated the equation below. The regression equation with health industry dummy is

$Yit = \beta 0 + \beta 1Xit + \beta 2Xit + \beta 3Xit + \beta 4Xit + \beta 5Xit + \beta 6Xit + \beta 7Xit + \beta 8Xit + \mathcal{E}$ …….…….. (4.2)

Where: Y is a continuous variable (the dependent variable) and represents the firm performance measured by the models, for the firm (i), in the period (t). β_0 is the constant of the model, while β_1 to β_8 represent the slope of the explanatory variables (X).

Research framework

The authors designed a conceptual framework for the study. The framework is used to make conceptual characteristics and knowledge accrual to support Total Quality Management on Business Performance. The variables employed have effects on Business Performance on Telecom companies. In TQM policies, effective implantation and practices determines Business Performance. The conceptual framework consist of the following variables: Top Management Commitment, Employee Satisfaction, Quality Data and Reporting, Design Management, and Reward and Recognition.

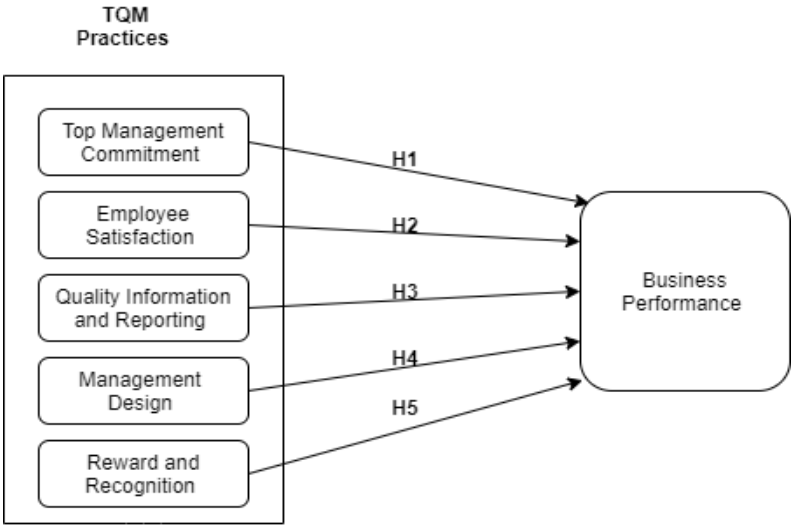


Fig 1: Authors Conceptual model

Source: authors design

Table 1: **Labels of Variables used**

Labels	Variables
Dependent variable:	
BUP	Business Performance
Independent variables:	
TOP	Top management commitment
EMP	Employee satisfaction
QUA	Quality Data & Reporting
DES	Design management
REW	Rewards and Recognition

Source: authors design

Table 1 shows the dependent and independent variables of the study. The dependent variable is the business performance while the independent variables are top management commitment, employee satisfaction, quality data & reporting, design management, and rewards & recognition.

Findings and discussions

Table 2: Correlation matrix

Variable	BUP	TOP	EMP	QUA	DES	REW
BUP	1					
TOP	.902	1				
EMP	.223	.131**	1			
QUA	.108	.148*	−.025	1		
DES	.322	.207	.142	−.013	1	
REW	.014*	.031*	.271*	.052	.145**	1

** The correlation is significant at the two-tailed threshold of 0.01 (lower bound).

* The correlation is significant at the two-tailed P value of 0.05.

Source: authors design

Table 2, shows the correlation matrix, which demonstrates the link between the variables. The results show that there is a positive and robust link between TOP and BUP at 902, as shown in the table (90.2 %). This suggests that Top Management Commitment (TOP) has a substantial positive relationship with Business Performance (BUP). It specifies that Top Management Commitment (TOP) has a high tendency for Business Performance (BUP), which is supported by the study by (Dubey et al., 2018). The results also

show that there is a positive correlation between EMP and BUP at 223, and shows (22.3 %). This suggests that employee satisfaction has a positive relationship with Business Performance. These results support an investigation done by (Badrianto, et al 2020). The table also indicates a positive link between Quality Information and Reporting and BUP at 108, which depicts (10.8%). It shows that QUA have a positive impact on Business Performance, that supports a study by (Budianto, 2019). Design Management and BUP are positively related at 322, which gives (32.2%) and it is coherent with the study of (Leitão, et al. 2019). The investigational results illustrate that REW has a positive relationship with BUP. This is because, when employees are fairly rewarded, it gives them confidence to stay loyal. Table 4 reveals, however, that a significant number of cross-correlation values for the independent variables are tiny**.** This provides a valid reason to be less concerned about the issue of multicollinearity among the independent variables.(Afriyie et al., 2020).

*Table 3**:** Impact of Total Quality Management on Performance*

Independent Variables	**Dependent Variable**	
	Business Performance (BUP)	
	B	**t-Statistic**
Top Management Commitment	0.623	7.875
		(0.003)
Employee Satisfaction	0.558	6.290
		(0.005)
Quality Data and Reporting	0.395	2.471
		(0.003)
Design Management	0.541	9.908
		(0.002)
Rewards and Recognition	0.694	7.678
		(0.000)
R-square	0.883	
p-value	0.001	

***Note**: The table above illustrates values for Coefficients, t-Statistics, R square and p-values of the study*
Source: authors design

The results of the model estimation for the data shown in Table 3 indicate admirable outcomes for the impact of comprehensive quality management on performance. The authors considered a model of that could practically envision Business Performance through Total Quality Management, with a Confidence Interval level of 95.0percent. The model had a p-value of 0.001 in the experiment. The coefficient of determination (R-square) calculated from the table was 0.883. This number indicates that the model correctly predicted 88.3 percent of the distribution, implying that MTN's total quality management techniques were responsible for nearly 90% of the changes or variance in company performance. The R-square score indicates that the model has a high level of precision as a result of the independent variables' accurate estimating capabilities. The larger the percentage of accurate estimation, the better the model fits the study statistically. Variables used in a study have physiognomies to convincingly measure the phenomenon through the results produced in the experiment. As a result, a unit change in one variable is likely to have an influence on the other.

An increase in one variable, on the other hand, causes an increase in the other, and vice versa. For example, if the variable Top Management Commitment is increased, there is a good chance that Business Performance will improve as well. Table 3 shows that the correlation of Top Management Commitment for Business Performance is 0.623. This demonstrates that for every unit rise in Top Management Commitment, there is an expected unit increase of 0.623 in Business Performance, with all other variables being constant. The findings show that Top Management Commitment has a favorable impact on Business Performance, with a statistically significant value of 0.003 in the study. This finding suggests that

Top Management Commitment has a high inclination for organizations to succeed. This finding is analogous to earlier study by Hermano and Martín-Cruz (2016). In this competitive environment through globalization, companies survive with much effort, unless top management is committed to create the avenues and strategies to forestall competitive advantage over their rivals. Total quality management (TQM) has long been recognized as one of the critical challenges that have waxed the interest of both management and customers.

The variable, Employee Satisfaction reported a positive relationship with Business Performance, and highly significant in this research. Employee Satisfaction is considered as one of the effective TQM tools to offer businesses with growth and success. A satisfied worker helps in quality improvement, cost minimization, and maximization of business profits. Our findings support previous research by Khan, Abbasi, Waseem, Ayaz, and Ijaz (2016), who discovered that employee satisfaction improves business performance. TQM being implemented can also increase customer and employee satisfaction when they are rewarded or recognized (Glaveli, Vouzas, & Roumeliotou, 2021). Such appreciations and incentives shown to individuals have rippling effects on business performance and survival. This research result provides empirical evidence that Rewards and Recognition positively affect firm performance with a highly statistical significance level of 0.000. Our study is in congruence with previous findings by Popli and Rizvi (2016) which found that Rewards and Recognition produced a positive effect on Business Performance. Companies with effective and operative TQM implementation can accomplish corporate benefits such as productivity enhancement, quality enrichment, turnover maximization, organizational goodwill, and customer and staff retention.

Robustness checks

The Institute of Electrical and Electronics Engineers (IEEE) defined robustness as the degree to which a system or component can function correctly in the presence of invalid inputs or stressful environmental conditions (Koopman & DeVale, 2000). To examine the strength of the models, robustness tests were run on the results. The process was to verify the robustness (i.e. correctness) of the experiment done.

Table 4: Robustness and Diagnostic Test of Impact of Total Quality Management on Performance

BUP	Coef.	Robust Std. Err.	T	P>|t|	[95% Conf. Interval]	
TOP	8.433	1.123	3.060	0.003	6.090	11.777
EMP	1.483	4.397	0.340	0.004	8.915	1.881
QUA	0.023	0.136	-0.210	0.005	4.405	8.239
DES	2.769	1.660	1.670	0.001	6.694	1.155
REW	7.501	4.687	2.880	0.000	10.584	9.419
R-squared		0.914				
p-value		0.000				
Root MSE		1.027				

BUP, TOP, EMP, QUA, DES, REW characterize Business Performance, Top management commitment, Employee satisfaction, Quality Data & Reporting, Design management, Rewards and Recognition respectively.

Source: authors design

The authors used a robustness and diagnostic test, which is an alternative to least square regression for detecting significant observations and overcoming some limitations of traditional parametric and nonparametric methods, to examine the Business Performance practices for telecommunication companies in the implementation of TQM. Top management commitment, employee satisfaction, quality information and reporting, management design, rewards and recognition were all identified as explanatory variables in this study. According to the results of the robust test, the model is statistically significant and higher (0.000), as shown in Table 4. The effect of the explanatory variables (total quality management practices) on the dependent variable (business performance) was 0.914. This expounds that the variance explained by the model happened to be 91.4%, signifying immense results produced. From the investigation, the

impact of improving business performance is consequential from the execution of TQM activities, since they have strong prediction power. The test, on the other hand, endorses the notion that TQM has a significant impact on corporate performance. The findings give an intensified confidence that total quality management practices are a booster for firm performance. As far as a business entity introduces and implements quality management activities, the organization's competitive advantage will be improved (Chen, Lee, & Wang, 2020). It is palpable that improving operational efficiency can result in customers satisfaction by delivering contented services on time and providing quality products to meet their needs and or requirements.

Table 5 Reliability, KMO, and Bartlett's Tests

Test	Statistic	Df	Sig.
Cronbach's Alpha	.897		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.710		
Bartlett's Test of Sphericity	25.292	15	.000

Cronbach's alpha measures the reliability or internal consistency of the variables of interest. It is a way of measuring the strength of that consistency. Cronbach (1951). (Purwanto, 2021) asserts the test rule used to determine whether the chosen variables are internally consistent and reliable should be greater than 0.70. From Table 9, the alpha coefficient is 0.897, exceeding the pragmatic threshold of 0.70. This indicates that the variables have a higher level of internal consistency for the investigation. The Kaiser-Meyer-Olkin (KMO) index evaluates the sampling accuracy, which establishes whether or not the responses provided with the sample are sufficient. Kaiser (1974) advocates a KMO value of 0.50 as the lowest (satisfactory) threshold to progress with an acceptable factor analysis. The KMO measure, which can be seen in the table above, is 0.710, which is suitable for the research. Bartlett's test is another technique for examining how strongly variables are related. Bartlett's test of Sphericity is used to test the hypothesis that the correlation matrix is an identity matrix. The significance value of Bartlett's Test of Sphericity must be less than 0.05 for the factor analysis to be acceptable. The table above also reveals that the result of Bartlett's Test of Sphericity is 0.000 (highly significant p-value). This demonstrates that the data gathered for the model were high and statistically significant.

Table 6 Principal Component Factor Analysis and Communalities

Variable	Component Matrix			Communality
	Factor 1	Factor 2	Factor 3	
BUP	.818	.673	.702	.786
TOP	.735	.597	.686	.693
EMP	.705	.581	.464	.772
QUA	.380	-.166	.535	.506
DES	.681	.628	.455	.729
REW	.595	.459	.531	.688

The loadings of the six variables on the three extracted factors are shown in the component matrix with communalities in the table 6. The factor analysis technique chooses variables that should be congregated together on a factor. The factors cannot be simply named or easily described, since the outcomes could possibly be related with one another. The model of 6 variables were separated into 3 items based on the most important items, and had identical answers in factor 1 and concurrently in factor 2 and factor 3. The greater the absolute value of the loading, the more the factor contributes to the study variable. With identical responses detected in component 1, component 2, and component 3 at the same time, the model identified Business Performance (BUP) as the most important item from the information presented Factor 1, followed by Effective Top Management Commitment (TOP) with 735, the next most important variable is Employee Satisfaction (EMP) with a figure of 705 from the information presented in Factor, also, Managerial Design (DES) attained a figure of 681 as well as Reward and Recognition (REW) also with 595 in Factor 1, but the model regarded Quality Data and Reporting (QUA) as a less relevant

item. TQM variables presented in the factor loading are to be considered as good implementers in the telecom industry.

Hypotheses testing

The outcome of this study's empirical evidence supports the notion that total quality management methods have direct and beneficial effects on corporate performance in the telecom companies in Ghana. The findings of this study revealed that there is a link between top management commitment to TQM and business success, hence we accept the hypothesis, H1, which is in line with the contribution of El-Kassar and Singh (2019). Does employee satisfaction affect business performance? Employee happiness has a favourable association with organizational performance, according to the findings of our research. However, we believe it is more likely that H2 will be accepted. Employees with a concerted satisfaction edge can provide high-quality products and services to match client demands. From Nguyen, Tran, & Huynh (2019), contented employees having good rapport with buyers can meet the desires of clients and emphasis on continuous improvement. We accept H3 as true since the empirical data in this study supports the idea that good information and reporting are positively correlated with business performance. Valuable data and reporting system can appropriately reflect the real business condition or state of affairs to stakeholders. It also seeks to provide adequate information to make timely business decisions. In respect to quality data and reporting, it can help the employees, management or directors to identify flaws and solve them, or possibly curtailing the adverse effect from escalating.

Findings obtained from this study provide evidence that the influence of management design on business performance is positive, consequently, we accept hypothesis H4. The findings of our experiments revealed that there is a link between rewards and recognition and corporate performance. Our hypothesis, H5, is nonetheless, accepted. Motivation helps individuals to build confidence in their capabilities for sustained growth of business and productive improvements. It is important that incentives are given to stakeholders when necessary since they are a form of strategy to improve performance. They play a major role in the organization as such enticements encourage staff members to supportively deliver quality goods and services to clients (Y.-C. Wang, Luo, & Tai, 2017). Rewarding employees, even if the ameliorations are small will create greater value with time.

Table 8: Summary of Hypothesis

Hypothesis		Conclusion
H1	Top management commitment to TQM positively influences business performance	Supported
H2	Employee satisfaction is positively related to business performance	Supported
H3	Quality information and reporting positively impact firm's performance	Supported
H4	Management design is positively related to business performance	Supported
H5	Rewards and recognition positively affect business performance	Supported

Source: authors design

Conclusion

Effective implementation of TQM practices in telecom companies in Ghana is critical for leadership effectiveness and business performance as well as the survival of telecommunication companies in Ghana. However, efficient management leads to performance enhancement; therefore, it is important to place more prominence on TQM practices to improve organizational performance. According to the investigation, TQM is being employed in the Ghanaian telecommunication industry. TQM practices such as top management commitment, employee satisfaction, quality data and reporting, management design, and reward and recognition implemented by telecommunication companies yield significant results for the firm's business performance.

Nonetheless, some employees reported some concerns raised by some clients of the telecom companies, which shows that TQM practices must be boosted in order to address the grievances of their clients. The major reasons for customers' grievances are intermittent network interruptions, unaddressed

complaints, and mobile money fraudsters and hackers, which affect the operational activities of these telecom operators and the quality of service rendered which can be linked to the effects of TQM practices on business performance. Therefore, top management must be up to their game of ensuring effective practices of TQM at all levels of the organization. Now, the major challenges facing telecom customers in Ghana are mobile fraudsters and hackers that can be linked to poor management design, so management must design systems to curb these issues and customers will have a smooth mindset on the business performance of the Ghanaian telecom industry. This confirms the position of several stakeholders in the industry that swindlers have been tormenting customers. In addition, the top management also associated part of their inabilities with the intermittent power cut-off.

Telecommunication operators in Ghana believe that a large amount of money is channeled through the procurement of high-value telecom equipment, and must therefore be protected in order to have a smooth system to monitor the daily operations of the business, as there is a need to focus more on ensuring client contentment through successful TQM implementation. For the reason that total quality management (TQM) is widely recognized as a critical instrument for Telecom Company's long-term success, it is unfortunate that clients expect rapid results, making long-term accomplishments a source of dissatisfaction. Nonetheless, when there is top management commitment, employee satisfaction, quality information and reporting, management design, and reward and recognition, the telecom companies will surely attain the expected performance. All these mechanisms must be strategically executed to yield effective results in business performance. If top management is committed, performance will be achieved, as well as satisfied employees, quality information and reporting, good management design, and reward and recognition. Employees work hard when they are satisfied, also quality information, good management design, reward, and recognition help management to work efficiently and effectively to achieve business performance in the Ghanaian telecom companies. However, the needs and prospects of these stakeholders should be balanced to forestall satisfaction.

Policy implications

Quite several policies can be espoused from the conclusion suggestions in the research. Considering the analysis of TQM practices in the Telecommunication sector, telecom performance can be improved if guidelines and principles are meticulously followed. The implication is that so long as the TQM practices are addressed, performance will be enhanced. Based upon the conclusions drawn in the research work, it is recommended that by emphasizing top management commitment, employee satisfaction, quality data and reporting, management design, and reward and recognition implemented by telecommunication companies, they can survive in the competitive environment.

The report also recommends that in order for businesses to thrive in the current economic climate, they should concentrate on these quality management techniques. Organizations are generally recommended to build pertinent policies for the improvement of strong total quality management policies, which in turn might produce satisfactory returns, in order for them to grow effectively in the industry. The goal of well-implemented total quality management rules is to improve telecommunications company performance and prevent major setbacks from happening. In order to improve performance, it is openly recommended that Ghanaian telecom firms increase the entire quality management features, such as top management commitment, employee contentment, high-quality information and reporting, management design, and rewards and recognition. However, the study recommends that top management commitment should be strengthened in order to mediate the other policies into action. It is believed that when top management is committed to their duties, employee satisfaction, quality information and reporting, management design, rewards, and recognition will be properly practiced because top management commitment serves as a catalyst to improve performance.

Employee satisfaction and management design should be checked by the top management on a regular basis, and reports issued without delay to ensure the efficient functioning of the telecom structure. A defective system can be corrected in a timely manner to retain optimal internal mechanisms. To ensure high-quality service, all telecom firms must have qualified senior managers who will oversee the entire management and workforce. If numbers or figures are discovered to be within a suitable range, data validity checks can be performed to confirm accurate information and reporting, and discrepancies can be quickly resolved. This will make it easier for telecoms to assess performance and permit quick correction

in the event of shortcomings. However, management must develop and adhere to commendable whole quality management standards that would limit the telecom company's innovation and technology advancement operations.

The researchers hereby suggests that telecom companies in Ghana adopt technological devices that will drive innovation in order to achieve maximum performance. However, rewards and recognition should consistently be done to boost the motivational drive of the entire staff which intends to facilitate performances. According to the report, telecom businesses should place more emphasis on the factors that improve performance and consequently increase market share and income. The study's conclusions will be relevant to managers, CEOs, directors, and academics.

Theoretical implications of the study

In the telecom industry, TQM practices must be adhered to in other to attain service quality. The various TQM theories such as Deming's theory, Crosby's theory, Joseph's theory, the European Foundation for Quality Management, Ishikawa's theory, and Quality Control and Statistical theory propose that quality assurance must be a priority for telecom companies in order to have effective performance. The Plan, Do, and

Act must be applied by the telecom companies to influence performance and service quality.

Deming theory is known for his ratio, quality is equal to the result of work efforts over the total costs. If a company is to focus on costs, the problem is that costs rise while quality deteriorates. So telecom companies must pay attention to quality in order to achieve attainable performance by applying Deming's theory of TQM.

Crosby's theory also made the point, much like Deming's, that if one spends money on quality, it is money that is well spent. His concept of zero defect and quality council as means of sharing information about quality and services will reduce cost and improve profitability. If telecom wants to achieve excellent performance, they must spend on quality.

Joseph Juran stated that if a quality improvement project is to be successful, then all quality improvement actions must be carefully planned out and controlled. Telecom companies must improve all quality actions by planning and controlling all quality actions to achieve standard performance.

EFQM The result is a model that refrains from prescribing any one methodology but rather recognizes the diversity management methodologies. Telecom companies must not stick to only one standard way of improving quality but must employ more methodologies to improve quality in order to achieve excellent performance as the world has become a global market with high competition.

Ishikawa also stated the theory of how companies should handle their quality improvement projects. Quality projects are crucial for telecom companies, therefore all quality improvement projects must be carefully implemented to achieve the expected performance.

Limitations of the study

The research work significantly contributes to the impact of TQM practices on telecom companies to enhance business performance. Nevertheless, the study was faced with certain limitations. The first shortfall of the research is the limited data used by the researchers.

The research examination was constrained in the sense that the study could not do a thorough investigation of all the centres of telecom companies in Ghana. Therefore, the research relied on a sample size of the few centres of the telecom companies in the sector. Data collection concerning telecom operations is difficult, which is probably the reluctance of employees to allow easy access to information due to bureaucratic, dogmatic, and other influences in the telecom administration. Hence, the researchers could not administer questionnaires to all possible respondents of the population, except those reachable.

However, the collated data was limited to a cross-section of the total population. In addition, in the model to estimate the impact of TQM practices on business performance, other satisfaction elements were not available even though that could not have affected the soundness of the results. Some of the employees also think providing data about the telecom company represents leaking or divulging valuable information into the public domain for competitors to see their strategies, strengths, and weaknesses.

However, these limitations enumerated did not affect the predictability, validity, and precision of the findings of the research.

Recommendations of policies

Based on the findings, this study makes the following recommendations with the purpose of improving the system. The investigation suggests that the integration and implementation of Total Quality Management principles should be prioritized for corporate success. In addition, telecommunication workers, particularly lower and middle management should be trained to understand the necessity of comprehensive quality management as a cost-cutting technique. Telecommunication companies must employ renewable energy solutions such as solar power to handle their energy problems. For uninterrupted service delivery, the government must strive diligently to increase electricity supply to other communities. Telecommunication providers are required to co-locate their masts to avoid unnecessary space acquisition and pole spread-out.

Telecommunication providers must also improve the speed of their communication networks. Innovative and sustainable revenue streams must be identified and executed swiftly in response to changing customer behavior and new mobile technology. To survive, telecommunication operators in Ghana must drastically alter their business models and service offerings due to increased competition from non-telecom providers, lower network investments, and the rise of digital media and mobile technology. In addition, top management commitment, employee satisfaction, quality data and reporting, management design, and reward and recognition must be strengthened in order to achieve effective implementation of TQM practices. Today's market is highly competitive, and analysts expect that it may only have three major competitors, with MTN being the market leader. However, in order to prevent the country from being overtaken by the negative effects of the telecommunications transformation, the government is also closely monitoring cyber security threats. As a result, the sector is expected to tighten up cyberspace to lessen the negative impact of charlatans.

The investigation also recommends that telecommunication companies should effectively establish their quality management systems according to the obligation of ISO 9000, 9001 for successful TQM implementation, and business accomplishment. Such canons would assist the industry in ensuring that they are meeting the expectations of customers and other stakeholders while staying within the specified regulatory and statutory requirements for the product or service they are offering. This study will be useful for telecommunication company managers, CEOs, directors, and academicians, based on our findings.

Recommendations for future research

The research findings augmented knowledge in assessing the impact of total quality management practices on business performance in the telecom industry. However, the researchers implores that other areas could also be looked into to extend scholastic ideas in the field. Firstly, by hiring qualified employees to execute TQM policies, telecom companies should hire more qualified employees or provide the present staff with more training on TQM to improve business performance. Gathering feedback, serving customers at all days and times, and making customers feel wonderful by having good customer service, are all done by employees. The research direction in this area will give a comprehensive view of customer trust and satisfaction.

Secondly, improving the understanding of the technical support of TQM on customer satisfaction may be examined (as further research). Telecom operators must improve technical support of Equipment & Materials to help telecom businesses cut down on customer complaints, offer customers improved TQM services, and as TQM improves, activities get better, which leads to much improvement in customer satisfaction, thereby achieving customer satisfaction required. Another worthy area of research into the TQM influence on customer satisfaction is for future academics to explore the amalgamation of TQM and consumer behavior. Thus, this research direction could be studied from the theoretical relations between TQM and consumer behavior.

To secure their particularities and leverage the substantial connections and synergies between them. TQM has to be effectively employed to ensure an appropriate link between consumer behavior,

employees, and other stakeholders of telecommunication companies. However, TQM seeks to provide organizational sustainability in the telecom industry to ensure that the company functions more professionally and efficiently.

References

Abbas, J. (2020). Impact of total quality management on corporate green performance through the mediating role of corporate social responsibility. *Journal of Cleaner Production, 242*, 118458.

Adusei, C., & Isaac, T.-K. (2020). Branding and Retailing in the Telecommunications Industry of Ghana. *American Journal of Marketing Research, 6*(1), 9-18.

Afriyie, S. O., Kong, Y., Lartey, P. Y., Kaodui, L., Bediako, I. A., Wu, W., & Kyeremateng, P. H. (2020). Financial performance of hospitals: A critical obligation of corporate governance dimensions. *The International Journal of Health Planning and Management, 35*(6), 1468-1485.

Agbenyo, F. (2017). Mobile telecommunication usage and socio-economic development in Ghana: A case study of Bamahu community in the Wa municipality. *ADRRI Journal (Multidisciplinary), 26*(7), 1-18.

Ahmed. (2020). Intellectual capital and business performance: the role of dimensions of absorptive capacity. *Journal of Intellectual Capital, 21*(1), 23-39.

Ahmed, A. O., & Idris, A. A. (2020). Examining the relationship between soft total quality management (TQM) aspects and employees' job satisfaction in "ISO 9001" Sudanese oil companies. *The TQM Journal*.

Alfano, C. M., Leach, C. R., Smith, T. G., Miller, K. D., Alcaraz, K. I., Cannady, R. S., . . . Brawley, O. W. (2019). Equitably improving outcomes for cancer survivors and supporting caregivers: a blueprint for care delivery, research, education, and policy. *CA: a cancer journal for clinicians, 69*(1), 35-49.

Ali, K., & Johl, S. K. (2022). Soft and hard TQM practices: future research agenda for industry 4.0. *Total Quality Management & Business Excellence, 33*(13-14), 1625-1655.

Amua-Sekyi, E. T., & Asare, P. Y. (2016). *A survey of information communication technology literacy among lecturers.* Paper presented at the Information and Knowledge Management.

Androniceanu, A. (2017). The three-dimensional approach of Total Quality Management, an essential strategic option for business excellence. *Amfiteatru Economic, 19*(44), 61-78.

Bajaj, S., Garg, R., & Sethi, M. (2018). Total quality management: a critical literature review using Pareto analysis. *International Journal of Productivity and Performance Management, 67*(1), 128-154.

Baku, A. A. (2022). Digitalisation and New Public Management in Africa *New Public Management in Africa* (pp. 299-316): Springer.

Basiru, A. O., Oladoye, A. O., Adekoya, O. O., Akomolede, L. A., Oeba, V. O., Awodutire, O. O., . . . Abodunrin, E. K. (2022). Livelihood Vulnerability Index: Gender Dimension to Climate Change and Variability in REDD+ Piloted Sites, Cross River State, Nigeria. *Land, 11*(8), 1240.

Bhuiyan, M. S. J. (2017). Influence of individual characteristics, organizational support system and learning organizational practices in post-program transfer of training: A study on management development programs of Bangladesh Civil Service. *International journal of human resource studies, 7*(3), 23-48.

Cao, T. Y. (2019). *Conceptual development of 20th century field theories*: Cambridge University Press.

Chen, R., Lee, Y.-D., & Wang, C.-H. (2020). Total quality management and sustainable competitive advantage: serial mediation of transformational leadership and executive ability. *Total Quality Management & Business Excellence, 31*(5-6), 451-468.

Chugani, N., Kumar, V., Garza-Reyes, J. A., Rocha-Lona, L., & Upadhyay, A. (2017). Investigating the green impact of Lean, Six Sigma and Lean Six Sigma: A systematic literature review. *International Journal of Lean Six Sigma*.

Deming, W. E. (2018). *The new economics for industry, government, education*: MIT press.

Denis, G., Alary, D., Pasco, X., Pisot, N., Texier, D., & Toulza, S. (2020). From new space to big space: How commercial space dream is becoming a reality. *Acta Astronautica, 166*, 431-443.

El-Kassar, A.-N., & Singh, S. K. (2019). Green innovation and organizational performance: the influence of big data and the moderating role of management commitment and HR practices. *Technological Forecasting and Social Change, 144*, 483-498.

Farooque, M., Zhang, A., & Liu, Y. (2019). Barriers to circular food supply chains in China. *Supply Chain Management: An International Journal, 24*(5), 677-696.

Foster, S. T., & Gardner, J. W. (2022). *Managing quality: Integrating the supply chain*: John Wiley & Sons.

Glaveli, N., Vouzas, F., & Roumeliotou, M. (2021). The soft side of TQM and teachers job satisfaction: an empirical investigation in primary and secondary education. *The TQM Journal*.

Haftu, G. G. (2019). Information communications technology and economic growth in Sub-Saharan Africa: A panel data approach. *Telecommunications Policy, 43*(1), 88-99.

Hermano, V., & Martín-Cruz, N. (2016). The role of top management involvement in firms performing projects: A

dynamic capabilities approach. *Journal of business research, 69*(9), 3447-3458.
Heyns, M. M., & Boikanyo, D. H. (2019). The effect of work engagement on total quality management practices in a petrochemical organisation. *South African Journal of Economic and Management Sciences, 22*(1), 1-13.
Huang, K.-E., Wu, J.-H., Lu, S.-Y., & Lin, Y.-C. (2016). Innovation and technology creation effects on organizational performance. *Journal of business research, 69*(6), 2187-2192.
Jimoh, R., Oyewobi, L., Isa, R., & Waziri, I. (2019). Total quality management practices and organizational performance: the mediating roles of strategies for continuous improvement. *International Journal of Construction Management, 19*(2), 162-177.
Khan, A. A., Abbasi, S., Waseem, R. M., Ayaz, M., & Ijaz, M. (2016). Impact of training and development of employees on employee performance through job satisfaction: A study of telecom sector of Pakistan. *Business Management and Strategy, 7*(1), 29-46.
Kurdi, B., Alshurideh, M., & Alnaser, A. (2020). The impact of employee satisfaction on customer satisfaction: Theoretical and empirical underpinning. *Management Science Letters, 10*(15), 3561-3570.
Lazarides, N., & Tsironis, G. (2018). Superconducting metamaterials. *Physics Reports, 752*, 1-67.
Lee, S. M., & Lee, D. (2020). "Untact": a new customer service strategy in the digital age. *Service Business, 14*(1), 1-22.
Lim, A.-F., Nair, R. K., & Foo, P.-Y. (2019). TQM and organisational innovation: a systematic review and research framework. *International Journal of Innovation and Learning, 26*(3), 273-300.
Manzoor, e. a. (2021). Intrinsic rewards and employee's performance with the mediating mechanism of employee's motivation. *Frontiers in Psychology, 12*, 563070.
Miguel, B. C., & Santiago, G. B. (2010). Application of the total quality management approach in a Spanish retailer: the case of Mercadona. *Total Quality Management, 21*(12), 1365-1381.
Montgomery, D. C. (2020). *Introduction to statistical quality control*: John Wiley & Sons.
Mukhopadhyay, M. (2020). *Total quality management in education*: SAGE Publications Pvt. Limited.
Müller, J. M., Buliga, O., & Voigt, K.-I. (2021). The role of absorptive capacity and innovation strategy in the design of industry 4.0 business Models-A comparison between SMEs and large enterprises. *European Management Journal, 39*(3), 333-343.
NGUYEN, M. H., TRAN, B. T., & HUYNH, L. T. (2019). Relation between employees and customers affects to the positive word of mouth through customer satisfaction. *The Journal of Distribution Science, 17*(6), 65-75.
Pierre, J. (2020). Slavery, anthropological knowledge, and the racialization of Africans. *Current Anthropology, 61*(S22), S220-S231.
Popli, S., & Rizvi, I. A. (2016). Drivers of employee engagement: The role of leadership style. *Global Business Review, 17*(4), 965-979.
Purwanto, A. (2021). Partial least squares structural squation modeling (PLS-SEM) analysis for social and management research: a literature review. *Journal of Industrial Engineering & Management Research*.
Rapanta, e. a. (2021). Balancing technology, pedagogy and the new normal: Post-pandemic challenges for higher education. *Postdigital Science and Education, 3*(3), 715-742.
Sæbø, H. V., Ragnarsøn, R., & Westvold, T. (2020). Official statistics as a safeguard against fake news. *Statistical Journal of the IAOS, 36*(2), 435-442.
Suleman, S., & Zaato, J. J. (2021). Local content implementation and development in Ghana's upstream oil and gas sector for sustainable development: contemporary issues on policy management. *Discover Sustainability, 2*(1), 1-15.
Sun, H., Rabbani, M. R., Ahmad, N., Sial, M. S., Cheng, G., Zia-Ud-Din, M., & Fu, Q. (2020). CSR, co-creation and green consumer loyalty: Are green banking initiatives important? A moderated mediation approach from an emerging economy. *Sustainability, 12*(24), 10688.
Talib, F., Rahman, Z., & Qureshi, M. N. (2013). An empirical investigation of relationship between total quality management practices and quality performance in Indian service companies. *International Journal of Quality & Reliability Management, 30*(3), 280-318. doi: 10.1108/02656711311299845
Tennant, G. (2017). *Six Sigma: SPC and TQM in manufacturing and services*: Routledge.
Thompson. (2020). The importance of design in lithium ion battery recycling–a critical review. *Green Chemistry, 22*(22), 7585-7603.
Wang, N., Xiao, M., & Savin, I. (2021). Complementarity effect in the innovation strategy: internal R&D and acquisition of capital with embodied technology. *The Journal of Technology Transfer, 46*(2), 459-482.
Wang, Y.-C., Luo, C.-C., & Tai, Y.-F. (2017). Implementation of delightful services: From the perspective of frontline service employees. *Journal of Hospitality and Tourism Management, 31*, 90-104.
Wilson, J. P., & Campbell, L. (2020). ISO 9001: 2015: the evolution and convergence of quality management and knowledge management for competitive advantage. *Total Quality Management & Business Excellence, 31*(7-8), 761-776.
Withanage, S. V., & Habib, K. (2021). Life Cycle Assessment and Material Flow Analysis: Two Under-Utilized Tools

for Informing E-Waste Management. *Sustainability, 13*(14), 7939.

Wu, B., Pan, Z., Ding, D., Cuiuri, D., Li, H., Xu, J., & Norrish, J. (2018). A review of the wire arc additive manufacturing of metals: properties, defects and quality improvement. *Journal of Manufacturing Processes, 35*, 127-139.

XIN, L. (2019). The implementation of plan-do-check-act cycle to improve the production line productivity in surface mounted technology area of industry. Universiti Sains Malaysia.

Yanamandra, R., & Alzoubi, H. M. (2022). Empirical Investigation of Mediating Role of Six Sigma Approach in Rationalizing the COQ in Service Organizations. *Operations and Supply Chain Management: An International Journal, 15*(1), 122-135.

Yiadom, M. B., & Tait, M. (2022). Experiential Marketing as a Mechanism to Deliver Value for Mobile Network Operators. *African Journal of Business & Economic Research, 17*(3).