

Advanced learning in Sub-Saharan African nations in perspectives of E-commerce, Total quality management and Continuous observation

Abstract

Developing the Vision 2030 in the Zambia, which demands a highly competent human capital base. The increasing application of the e-learning systems in tertiary institutions has presented tremendous opportunity in enhancing the strengthening of total quality management system, most Zambian colleges have failed to do so without adopting the best way possible. Also based on the transformative nature of the digitalization as a part of an overall process of Total Quality management, the present study will look at the strategic incorporation of e-learning instruments in the assessment and Continuous-observing process in order to address the systemic gaps, in line with the purpose of national developmental intents. The state of play of the adoption of digital platforms in tertiary institution in Zambia has been described in this paper and remedies to maximize these technologies in end to end total quality management has been prescribed. Total quality management as part of advanced learning is an complex and abstract concept that is frequently delineated by practices of audit, assessment, standards and indicators that include efficiency, effectiveness, equity and excellence. In the digital era, the mandatory transition to digitalization in education and efficient management of these processes are viewed as a key factor for providing equity, accessibility and efficiency in education. This paper analyses the opportunities of e-commerce application in the better total quality management and Continuous observation process in the institutions of high learning in the Zambian territory, which is a product of the desire in the country.

Keywords: Total Quality Management; E-learning; Advanced Learning; Continuous Observation.

Research Article

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Received: 29 May, 2026; **Accepted:** 10 June, 2026;

Published: 17 June, 2026.

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Introduction

In Zambia, the sudden introduction of remote learning in the Covid-19 pandemic indicated the lack of technological preparedness when many institutions of high learning face qualification to conduct learning processes using learning management systems [1]. Such systemic failures are examples that demonstrate the dire necessity of uniformed digital structures that can be employed in robust assessment habits and administrative measures regarding institutes [1,2]. Digital total quality management applications have an important prospective solution to these issues, which allow institutions to digitize the compliance check process, Continuous observation of assessment standards and realizing a system to provide feedback to the parties in real-time [3]. Introduction of e-commerce into the advanced learning sector is either a groundbreaking in enhancing the total quality management and Continuous observation frameworks particularly in the developing country context where due to lack of resources, educating is also an issue [1,2].

To understand the current conditions of digital total quality management in Zambian advanced learning, this paper will focus on how the technological inefficiencies and infrastructural deficiencies that

hindered the work of the institution could be overcome through the application of automated systems throughout the pandemic [1,4]. Additionally, there has been a lack of Continuous observation tools in the available learning management systems that has limited the capacity of total quality management officers to conduct appropriate evaluations of the teaching standards and the adherence to the required number of contact hours when they assess the standards [1]. This is the reason why, contrary to lump-summing of such assessments as a part of general audits of IT infrastructure, it has been pressed that the Zambia Advanced learning Authority should embrace the application of a particular assessment model in learning management systems [1]. Through data analytics and automated reporting systems, these platforms can introduce actionable insights to leaders of institutions on learning outcomes and operational efficiency, establishing a learning culture of constant improvement [5].

Study provides a comprehensive evaluation of the ancient progression and regulations that have had a certain impact on the practices of total quality management in the Zambian advanced learning sector through highlighting the shift in the formerly utilized accreditation methods to technology-oriented Continuous observation systems [1,6]. The historic methods of total quality management within the Zambian advanced learning system include reviewing the processing of periodic manual reviews and visits by accreditors, which has been struggling to quantify the dynamic quality of teaching and learning practices and not provision of timely feedback which is sufficient to the institution to improve [1,7]. This is an illustration of a dedicated model that would ensure the online learning systems are able to perform to the intended standards particularly in the view of some of the hindrances of user technology acceptance, cost of implementing and lack of clarity of regulatory consequences which can currently affect successful implementation [1].

To address these inadequacies, newer models of Total quality management put a greater emphasis on the impact of adding e-commerce into processes that facilitate continuous observation and dynamic

less stagnant decision-making processes that other traditional audits may not [8,9]. This transition is needed given the complex nature of educational quality that is multi-dimensional and needs ongoing evaluation and improvement efforts instead of episodic reviews [10]. The legal framework of such regulatory functions has been established under the Advanced learning Act No. 4 of 2013 which demands the Authority to regulate institutions, match development and audit total quality management mechanisms to make the programs responsive to national human resource and economic needs [11]. Regardless of this law, the industry still faces systemic problems such as inadequate funding, management concerns along with the requirement to be more relevant and responsive to national development objectives [12,13]. This multiplication of colleges and universities with the liberalization of this sector first introduced by the creation of legislative reforms in 1992 and 1999 occurred without a central regulating authority on the quality and this already led to a tremendous growth that surpassed quality control [4]. The shortcomings of these old fashioned ways have become more visible during the digital age and there has been a move towards more dynamic and data-driven methods that can track how institutions are performing and abiding by the rules on a continuous basis [1,14].

Specifically, the Advanced learning Authority is charged with the responsibility of ensuring that institutions satisfy minimum qualifications to be registered, accredit learning programs in the public and privately run institutions and offer technical support and capacity building to the government [4]. This is supported by the regulatory framework and a database of around 300 content area experts in the key disciplines who are involved in the review and evaluation of accreditation processes though many of these evaluators do not as yet have experience in the systematic review procedures that underlie effective total quality management processes [4]. Moreover, the external total quality management system is put in place to test efficacy of these inner mechanisms to see that organizations stay within the cadre of the national standard and foster the culture of incessant agencies enhancement [11]. Nonetheless, reliance on regular external audits has been criticized in relation

to promoting compliance-oriented mentalities instead of enabling healthy internal cultures of quality as most institutions result in nothing more than meeting bare minimal requirements during intervals of review instead of inculcating quality-sustaining actions [11]. To minimize these risks, the Government established the Advanced learning Authority to register the advanced learning institutions and accrediting learning program, and The Zambia Qualification Authority to register, accredit and validate the qualifications [13].

Theoretical Perspectives

The practice behind technology adoption in the Zambian setting is the Advanced learning Act No. 4 of 2013 which established an institution to ride the universities, the Advanced learning Authority that registers and regulates the universities with the purpose of guaranteeing the delivery of quality services in: oversight, total quality management and advisory [15]. This regulatory requirement demands a methodical strategy to the evaluation of the performance of the institutions, and most who have developed the models are continuing to grapple with the real-life issues of standardised frameworks that constitute model and effective international total quality management [16]. Total quality management is a critical mechanism of ensuring that the education institutions are up to standard and fulfilling their mandate of providing relevant and high quality education to students [11]. These frameworks tend to place emphasis on the two objectives of accountability that involves ensuring that their institutions demonstrate their competency in fulfilling the expectations of the stakeholders on their part in terms of their educational performance and continuous quality improvement, which involves efforts that continue to advance the educational standards beyond the previous standard that has been measured [17]. The main method of attaining these objectives is the accreditation process as one of the formal recognition procedures to ensure that a specific institution or program is sufficiently ready to address the consensus on quality standards that should be achieved to assure individuals that it is trustworthy and academically sound [18]. Such sharing and disseminating of information will allow the public to make their own decisions since programs

that have been accredited are likely to be successful and those that do not deserve an accreditation status will ultimately be devalued [4]. As such, the sustainability of advanced learning institutions is founded on whether they were born with in terms of the accreditation process, which is the aggregate review of the institutions mission, resources and process to be capable of measuring up to the standards supported in the threshold [19].

This dichotomous aspect of accreditation decisions and resultant determinations that tend to be either yes/no decision-making on whether to accredit or not, makes the stakes of the total quality management processes they are charged to take high given they are giving by regulatory authorities to be able to operate based on thorough consideration of the credibility to grant permission to operate based on accredited outcomes and findings Gweupe & Mwanza, 20 The advantage of accreditation over other total quality management protocols is entitled based on its use of a wide array of parameters to make a determination of an institution or programme's accountability to the various standards [20]. This total quality management process has become near-universal and is growing thanks to a number of factors, such as the tremendous growth of student enrolment which has prompted an institution to encourage pedagogical change to boost academic performance and completion rates [21]. This growth has necessitated a shift more towards dynamic and responsive total quality management systems that can track and evaluate educational outcomes in a viable way at scale [22]. Responding to the requirements of institutions with greater efficiency and accuracy, e-commerce have become an increasingly powerful tool in this respect, offering advanced data gathering, analysis, and reporting tools that enable the management of the process of total quality management [23, 24]. These technological innovations are already assisting in the Continuous observation of the performance indicators within institutions in real-time and simplifying the accreditation process by automating the data collection of evidence needed in complying reviews [21,25].

Applied E-commerce and Advanced Education

The introduction of e-commerce into the practices of advanced learning has entirely transformed how institutions are addressing the administrative tasks and educational provision with the demands of scalabilities in an era of massification and data based accountability [26]. This technological shift isn't just an answer to the pressure of the logistics but is in fact a transformative way of reconceptualising learning, knowledge creation and academic identities in the modern context of Universities. [27] The bureaucratisation of university operations has been on the rise with use of technology with support structures such as libraries witnessing huge changes in their operation with the use of these technological advancements [28]. Digitalisation concerns the process of introducing digital technologies into crucial infrastructure and services regarding education, research and management of the institutions to prepare the universities to be functional as data-based organisations, which mediate the effectiveness of the institutions and personalisation of learning and learning experience [29,30]. This change can further be contextualized by the broader notion of Industry 4.0 that has made the change in technology in the advanced learning inevitable and has spawned the Education 4.0 paradigm that involves the application of the advanced digital tools to the processes of quality management [31].

The availability of digital technologies to institutions in the data collection and analysis is a good sign in the development of total quality management process which involves numerous tasks and activities [31]. These systems help in the automated extraction, processing and interpretation of large volumes of data to inform management organizations with data-supported strategic decisions, are predictive of trends and optimizing ongoing management operations within the companies [32]. University leaders have also grown in restructuring their institutions as data organisations by which they can leverage data analytics and business intelligence or requires them to realise these efficiency benefits [30]. Artificial intelligence, generative artificial intelligence to be specific, is already impacting teaching, learning, university management and the sector in general [30]. Although digital transformation promotes greater levels of sophistication, scalability,

and procedural efficiencies, it comes with the fear of possible academic integrity breaches and loss of face-to-face interactions [29].

Critics believe that the excessive degree of technocratic government undermines the tradition of shared governance and the possibilities and spontaneity of the academic society, so, to achieve efficiency with the help of digital technology, there should be a balance in favor of the institutional values [33]. Nonetheless, the more rapid adoption of such technologies causes immense ethical concerns, in particular, regarding any impending dangers of a potential digital redlining or impeded right to privacy when advanced learning institutions start relying more on AI tech to meet their needs with balanced budgets and in competitive relationships [30]. The multifaceted challenges that universities face in their path to becoming a data-driven organisation, such as lack of technological infrastructure, data quality and multidimensional legal considerations regarding privacy and security also complicate the implementation of digital total quality management systems [30]. The widespread use of generative artificial intelligence enhances these issues with the additional risk of data privacy, discrepancies in authenticity and transparency of decision-making, which institutions must manoeuvre to maintain the confidence of the population [34].

Practical Challenges

Although the potential of e-commerce in the process of total quality management is acknowledged, it appears that more developed learning institutions experience significant barriers to productive combining the two technologies, which is usually met with opposition among staff and contradicts the existence of legacy systems that narrows the actualisation of efficient, transparent, and data-driven quality control processes [5,35]. Particularly, the absence of integration between applications of technology and organizational readiness is often the cause of the data ecosystems that are compartmentalized and do not provide the entirety inference needed to reach a state of continuous improvement and strategic planning. Research reports that attaining a successful digitization can streamline the workflows and cut the jobs involved in performing them by up to 70

percent, simultaneously enhancing the quality of the information by 30 percent lower error rate and opening up the process to real-time analytics. Nonetheless, there are numerous obstacles to the implementation of these advantages, such as challenges in adapting them to ease of use by the first user, the resources of infrastructure, and the constant data privacy issues, imposing a challenge in switching to the fully-automated total quality management environment [5]. A rapid creation of technology at an extremely rapid pace and of a scale that is far too large is one of the key challenges and cannot enable HEIs to handle the educational and academic quality of work due to the necessity to continuously adapt and become more innovative [36]. Furthermore, incorporating artificial intelligence into these digital ecosystems also raises about complex ethical dilemmas concerning data privacy, algorithmic bias and potential human workflow loss from human supervisors requiring its need to be so farmed to ensure sustainable improvement in total quality management process [5, 37].

Technology dissonance in schools and higher education is one of the most common phenomena a product of which is a general disjointed state of technology, which puts a strain on efficiency of the administrative system and even more on the effectiveness of the educational one [38]. This fragmentation is not only heightened by the need to comply with the labour market requirements but also with the expectations of students and digital transformation being met at the same time, in order to ensure economic stability in their networks [39]. The fact that the software products, created by different software sellers, are not compatible can limit the efficient transfer of data requiring institutions to create resources to the structuring of data and their unique ability to blend [38,40]. This failure to integrate not only makes managing the data hard but also prevents the institutions to have a bird-eye view of what is going on in their sphere, thereby preventing the accomplishment of strategic plans as well as resource allocation [41]. When talking about shepherding students and staff through technology overload, the concept of one-sign on and integrated applications that would make life easier on the side of both the student and staff are diluted by the fact that not all technologies seem to get along [38]. The absence of a range of standardized

data formats between different systems makes the process of data migration and integration difficult which requires institutions to tackle the technical issues and simultaneously ensure that stakeholders are trained to properly manage and interpret the integrated data in the system [41].

Additionally, there are also unskilled human resources who lack necessary technical skills to align to the regulatory forces of the advanced learning bodies, which also complicates the implementation [10]. Institutions are often burdened with the resource-heavy realities of having to tend to high-tech digital tools, because the dedication of financial and technical resources to digital implementations can place great strains on already tight budgets amid competitive pressure. The high implementation costs of initial technologies frequently result in financial constraints with an institution caught in a circle of indecision rather than achieving the anticipated efficiency returns [38,42].

The aspect of technical compatibility issues is particularly outstanding in case the institutions are attempting to integrate the modern digital solutions with the current infrastructure since the previous systems are often not compatible among one another to exchange data without any charges [30,43]. This causes a chaotic scenario such as uneven data formats that must be manually processed to retrieve the required data and third-party solutions to control various systems such as the finance or library systems will raise security concerns and functionalities not fully compatible with the digital infrastructure [38]. Most disparate software systems are usually designed as an intricate tangle of inefficient operations and individual applications that have siloed data points, with the discoveries related to institution issues hidden within several fragmented systems [44].

This leads to colossal inefficiencies and mistakes in the decision-making process by the university as they continue to keep themselves in loops of slownesses and repetitions even with the promise of using data [38]. Such inefficiencies have acquired an institutional status due to conventional practices of making decisions based on both anecdotal information and previous data sets rather than with strong data-driven

knowledge to result in poor resource allocation and uneven provision of student support services [45]. This dependence on suboptimal evidence, but it is further complicated by certain fundamental challenges inherent with the management of data volume, velocity, variety and veracity, which pose major hurdles to the efficient use of data, addition of features of grande warehousing and addition of features elements of mathematical institutions, that publicly-available [46]. Budgetary constraints often limit the ability of institutions to invest in the necessary digital tools, software and infrastructure which results in outdated computer laboratories, lack of suitable internet speed and suitable services for IT support [47].

Academic Context

Total quality management in advanced learning is based on various conceptualizations from the conventional values of the concept, such as excellence and standards, to more practical ones like fitness for purpose and value for money [48]. The paradigm of fitness of purpose is concerned with determining quality based on how well an institution is fulfilling its mission and objectives, and the paradigm of value of money is based on the ability to utilize resources effectively to transform them into desirable results in education [49]. Nevertheless, the performance of such structures is frequently backed with the so-called little data or no data paradox where the usage of the conventional relational database curbs the possibility to take the full advantage of the big data in terms of detailed evaluation, which makes the need of sound models of metrics to guarantee meaningfulness and validity examination [50]. To address these constraints, business intelligence and analytics architectures have emerged as an important enabler to address the issues of transforming the raw institutional data into actionable insights to aid strategic decision making and performance Continuous observation [51,52]. These architectures support aggregating and processing enormous amount of information from disparate sources so that the institutions can go beyond static reporting in the total quality management process to dynamic and evidence-based evaluation of their processes [51,52].

With the help of sophisticated dashboards and real-

time information systems, the institutions can visualize the performance metrics against the set quality parameters that would see the quality of the service rendered consistent with the institutional goals [38,53]. These indicators of quality were put by Schindler et al. under four general sections such as Administrative Indicators, Student Support Indicators, Instructional Indicators, and Student Performance Indicators which compose a comprehensive framework to evaluate the quality of the work of the institution in terms of its effectiveness [53]. It is a top to bottom approach, as it allows a micro-level granular analysis (evaluations of individual courses), yet also a macro-level strategic analysis with aggregate performance indicators [53].

Progression of the E-commerce for Advanced Learning

An application of e-commerce to advanced learning has developed to complex integrated ecosystems out of the straightforward administrative and automation applications to sustaining the complex Total Quality management and Continuous observation processes. These systems capitalize on the strength of big data processing systems to develop multi-purpose designs with data acquisition, data cleaning, complete quality evaluation, and report production [53]. The use of Business Intelligence tools has also contributed to this technological development, not only to provide feedback features in real-time and interactive dashboards where stakeholders can view the complex areas of performance, but also to identify trends in the quality of institutions [51,52]. Although these tools are useful, the existing frameworks on the Continuous observation of advanced learning performance are typically not sufficient to encompass the extensive breadth of activities and processes of total quality management, needing additional assessment to determine the most appropriate elements to implement in the framework design [53]. To fulfill these design requirements, researchers have suggested comparative frameworks to evaluate platform capabilities based on concrete criteria like data extraction capabilities, visualization capabilities and fit to institutional requirements, which enables the addition of the right tools to be chosen to create analytical solutions [32].

These analytical solutions are increasingly being leveraged to realize automation of gathering and synthesizing performance metrics, both in the administrative, instructional and student support domains, to reduce the manual burden of total quality management activities, and improve the degree of accuracy and timeliness of institutional reporting [53,54]. Through these platforms, the quality assessment bodies are able to design and distribute different reports including audit results, as well as provide meaningful aggregated past information to the governing bodies to respond to tactical initiatives and find timely, data-driven solution in all their departments [32]. Digital classroom platforms merge with tools for research, registration, communications, credentialing, finances and other academic purposes to inform institutional decision making and operations [55]. Particular instances of their application include the use of business intelligence dashboards to process the vast amounts of data generated by entities of higher education, thus addressing the issue related to data aggregation and quality Continuous observation [52]. Intuitive dashboards represent aggregated information in a graphical form that allows university leadership to track and analyse trends and performance on key performance indicators and recognise hidden patterns and anomalies in the data.

Existing E-commerce Applications

E-commerce are already implemented on institutions of higher learning and are contributing towards better learner performance by monitoring student activity, targeting at-risk learners, and Continuous observation student performance and predicting student graduation rates [32]. They involve using predictive analytics to detect possible risk of attrition and initiate interventions in time, as well as allowing the visualisation of the quality of the assessments through quality-related dashboards at the module level to facilitate continuous improvement cycles [53]. In addition to the student-centric Continuous observation functions notification, there is a growing use of the platforms on the programme Continuous observation, Continuous observation and evaluation of student learning via automation wherein Information Systems-based tools of enhancing the quality and timeliness

of evaluation outcomes are applied on data analytics and automation [56]. As an example, the Information Systems models can be used to combine Course Learning Outcomes with key performance indicators to assess the quality of the program in an efficient and accurate manner to support both the accreditation processes and the making of informed decisions [8]. Moreover, the analytics tools can also increase the institutional-level awareness of student performance among leaders and allow them to track learning patterns at the institutional level as well since they have access to an aggregation of student achievement data [32]. But to practice these technologies, the introduction of data warehouses and the mining of information of different sources up to its final presentation into the structure of institutional decisions need to be carefully thought out [32].

An excellent data governance model will enable the possibility of real-time integration of various systems and databases and then based on them more interactive dashboards of structured and publicly available insights can be constructed that can be customized to be used by various stakeholder profiles. Such visualization tools usually have both color-generated pointers and comparative graphs (bar charts and radar graphs) to bring complicated data to people who are non-technical and indicate gaps in standards of attainment against set benchmarks [8]. The following visualization possibilities are supported by sophisticated data analytics models that enable complete analysis of learning outcome data by integrating performance data of various sources, thereby aiding in improvement of curriculum and accreditation texts [8].

The power of these capabilities is further enhanced by machine learning algorithms that access the information of the granular interaction to generate real-time risk profile data, which guide the faculty to identify at-risk students and make a specific intervention which has proven to greatly boost graduation rates. In spite of these advancements, the existence of considerable obstacles with respect to technical infrastructure, data privacy concerns and organizational readiness has allowed large-scale machine utilization of such advanced analytics through the implementation

of a new technology. These barriers have to be circled around by the institutions; the introduction of such data governance structures and investment in technical infrastructure to enable integration of disparate systems through them safely. This process of integration typically incorporates a structural analysis of current processes, such as the selection of appropriate data to be processed, data warehouse implementation and bridging of relevant data sources to deliver the successful adoption of the data-driven decision culture [39].

Contests and Prospects

Digital total quality management systems introduction has exceptional opportunities to enhance the efficiency of an institution since research-based evidence shows that a highly enforced action plan increased the efficiency of the workflow and reduced the time by up to 70% to complete a task and lower data processing error by 30% [5]. However, meeting these efficiency gains comes at the expense of high barriers, both technical and infrastructural, data security apprehensions, and organizational preparedness [5,39]. Socio-technical issues, like alignment of the stakeholders, and cultural change have frequently been stated as important variables in which the lack of consideration leads to the slight effects of positive influence on quality improvement [57]. Among the key technological challenges is that the lack of information and communications technologies tools does not allow establishing digital total quality management mechanisms successfully [58]. Although these systems produce a lot of data, the accuracy and integrity of data are sometimes overly ambitious since it is overwhelming to have teachers and administrators verify that the accuracy and integrity of data exist because inconsistencies can result in poor decision-making [59]. Moreover, with the increased collectivity of student data, there are escalating concerns regarding privacy, security, consent, and appropriate use of student data, as people grow fearful of profiling, over-monitoring, and using student data to stereotype or discriminate against certain groups [33].

Even more complicated in terms of actual implementation are some challenges of data interoperability because heterogeneous sources of

data and organization often results in the fact that their standard sets of data required to objectively assess such systems are not present [60]. This breach is intensified by the presence of numerous vendors of the learning management and assessment systems in institutions that results in security challenges associated with the integration of these systems, and necessitates custom solutions to adapt systems that otherwise cannot integrate lessons [61,62]. In addition to technical integration, another key reason that leads to slow progress of digital total quality management frameworks is resistance to change in an organisation and digital illiteracy of staff that often necessitate a total change management strategy to implement has ensured that organisations are digital [63]. Resistance to change often appears in the form of skepticism by faculty and staff, who are used to and comfortable with the old ways of doing things, but may, out of fear of losing their jobs and assured reliability, perceive new systems as being complicated or superfluous [41]. Modern resistance is more subtle, happening as a result of changes that must be made to pedagogical methods, curriculum, issues around faculty workload, and cultural changes which involve technology induced teaching and learning practices. To counter this resistance, it is important to develop a common understanding of the importance of digital literacy and how it can complement and support traditional academic objectives [47].

Strategic Implementation

Switching to cloud-based systems must take into account the sensitivity around the storage and processing of sensitive data like student records and financial information, and data security and privacy issues are among the most significant challenges linked to these systems [41]. Such worries necessitate vigorous measures to combat sensitive data and opposition to change among the employees and faculty insist on efficient change management methods, that are based on communication and training [41]. One of the most important and massive barriers to the use of these advanced analytics is the unattainability of data literacy among the faculty and staff as individuals must have the basic capacity to read and act based on data to bring the full capability of those systems [41]. This data literacy deficiency is further compounded with

utilizing crude dashboards with gray analysis, which are incapable of showing subtleties and therefore, institutions must spend on full datasets education, which would provide data with a context and amplify their ability to analyze this data on a daily basis [64]. Thorough trainings on functionalities and benefits of e-commerce is key to easing the transition process, combined with building confidence among users, while institutional leadership has a pivotal role to play in terms of supporting this shift by active endorsements of new systems, as well as a clear vision for the digital transition [41]. The leadership should also handle psychological implications of anxiety and isolation of the resistance to facilitate supporting environment with unending dialogue and harmonious involvement with novelties [38].

Moreover, executives have consistently underestimated the complications of digital transformation and unwilling to implement the required changes, undermining the backing of the organization that is needed to successfully adopt digital transformation [38]. The challenges of change to digital also involve university leaders who must deal with the tensions between management and teachers, disciplinary differences in the use of technology, and different levels of digital literacy, which could inhibit change [65]. The economic and technical loads of operating petabytes of data including the escalating cost of data storage, as well as the logistics involved in housing digital ecosystems is increasingly challenging institutions to become data-driven organizations, and is further hewing into institutional resources [30]. The ethical considerations, e.g. informed consent and the potential of the culture of resistance, are most intense in the early adoption stage institutions, and the difficulties which can arise in the centralized leadership and lack of analytical capabilities are rather problematic in the more developed phase of the process [66]. Organisations with more progressive digitalisation should be thinking about the ways to fill these gaps, including maintaining a strong data governance and investing in the development of the advanced analytics that can support the production of evidence-based decision making [41,64]. To circumvent these multi-layered challenges, advanced learning institutions should pay closer attention to holistic efforts of faculty

development to enhance their competency in utilizing big data technologies in educational, research, and administration processes [67].

Argument

The synthesis of evidence points out that while the e-commerce show potential for being transformational in enhancing total quality management, their integration and successful functioning heavily depends on deciding and making a choice in the interaction between technicalities, human factors, and strategic governance. Namely, the literature available on this topic demonstrates that the absence of digital skills among educators, unwillingness to incorporate digital sources, and incessant transformation of digital infrastructure often pose challenges to successful integration [68]. It is this needs-to-dynamics of the environment that makes institutions reflecting on the implementation of your Learning Management System the moving target and necessitates strategies that adjust dynamically changing technology on a fast footing and still maintain Quality [68,69]. In addition, algorithmic decision-making may endanger the sensitivity of the needs of single students and, as such, resulting in a learner alienation in case a universal solution carries the day [38]. Thus to effectively engage with the analytical power of an automated system, in addition to the judgment power of human expert(s) of the student experience, institutions need to trade-off the efficiency of automated analytics with the contextual judgment power of human expert(s) to ensure that total quality management processes are responsive to the complexity and variety of student experience [38,67]. However, finding this balance is further complicated by the existence of duplicate digital services and shadow systems which have disjointed how data is handled and undermined the trustworthiness of comments and reports produced for internal and external holders, [38]. To address these problems of fragmentation, institutions need to focus on strategic infrastructure investments and developing a robust and comprehensive training system that would build digital literacy among their faculty and staff, as well as provide the culture of digital literacy that would lead to equitable access to technology and sustained innovation [38,70]. This requires a holistic approach for not only upgrading the hardware

and software but also addressing the digital divide by equitable access to technological gadgets and a strong and available network connectivity for everyone concerned [71,72]. The balance between automation and human management will help sophisticated learning institutions ensure sustainable improvements in the entire quality management processes [5].

The success of these digital initiatives down to effective leadership and engagement of stakeholders with the development as well as a culture of innovation with student learning outcomes at the helm of the motive as well as institution-wide goals [73]. The institutions must therefore adopt strong total quality management systems whereby digitalization and e-learning tools that can be employed to closely monitor and enhance educational outcomes can be implemented [31]. They have to be part of a strategic management process, in order to ensure that the issues of total quality management and assessment will not be brought to a stop as administrative functions, but will be the tools of the institutional progress [39]. This integration needs to look beyond periodic compliance checks to ongoing and data-based cycles of improvement and optimization that is used to actively identify and address arising quality problems using real-time analytics [5]. A move like this demands the advanced learning institutions to implement measures that feature the use of digital tools alongside the already established quality thresholds, as in fact, ensure that digitalization and e-learning become a major determinant of the quality of education delivery [31]. Digitalization process in advanced learning can enhance the dynamics, data-driven, and stability of the total quality management as a component, as continuous development and enhancement of the education systems is facilitated [31]. Total quality management processes cannot be described as just a technical task in an institution but rather, requires developing an institutional culture that believes in continuous improvement and adapts to the changing digital world environment [31].

Conclusion

This research has presented arguments that application of e-commerce within the total quality management system is a radical shift in the manner with which institutions of advanced learning are attempting to

track, assess and enhance the educational quality. Total quality management is not a culmination of the teaching and learning process in each and every advanced learning institution, but instead it is one of the strategic process through which institutions may attain the goals and fulfill the expectations of different stakeholders. To sustain this strategic orientation mechanism, we need to deploy systems of information which are designed to integrate systems of total quality management and strategic management that enable the Continuous observation of the performance of institutions and how the processes can be improved. In addition, such an integration demands a good supportive management that would facilitate the unification of the strategic management, process management and measurements of Continuous observation systems so that the implementation of these parts of management will respond workably towards improving institutions. To have the acquisition it is necessary to have the advanced learning institutions put-up fully-fledged information systems including incorporation of total quality management operations and ability to do strategic management to produce assessable information, thus being able to gain more success. Based on the results, advanced learning institutions should concentrate their efforts on developing their information systems that support total quality management processes that also integrate with the strategic management for data-driven decision-making and continuous improvement of the institution. In order to render this integration operational, the institutions ought to take on a rational roadmap on which to integrate with: a focus on Total Quality Management as a journey, rather than a destination. The combination of technical implementations with meaningful strategies addressing the issue of the cultural change should be used by institutions, however, to be sure that digital total quality management systems do not generate additional excluding sensibility of interaction with users and understanding of greater workload among users.

Suggestions for Advanced learning Institutions

To enable continuous improvement and generate measurements that can be evaluated of the performance

in the institutions, advanced learning institutions ought to incorporate elaborate information systems and integrate total quality management processes with the strategic management processes, process management processes and measuring-Continuous observation systems. These systems must be directed towards assisting the senior executives in terms of executive information system and decision support system to monitor the key performance indicators to strategic goals so as to make informed decisions and provide long term strategic planning. Further studies are needed on the effect of artificial intelligence and machine learning algorithms to the long-term viability of the prediction capacity of total quality management systems and the ethical consequences of automated decision-making in the academic governance. In future studies, it is also necessary to examine the potential effectiveness of assimilating various channels with an unbroken quality Continuous observation experiences across various touchpoints within the institutions to enable that digital-derived insights can be repeatedly made uniform and precise across the educational ecosystem. Future research should be conducted to improve the paper by looking at long term impacts of artificial intelligence and machine learning algorithms on predictability of total quality management systems and also, ethics of automated decision-making systems in academic governance. The future research needs to explore the possibility of utilizing Capability Maturity Model Integration as a tool to assess the maturity of digital total quality management agencies, particularly in developing settings where total quality management models have not been widely applied [74].

In this respect, the research questions in the future ought to embrace challenging the real life practice of these maturity models in order to ensure that sub-dimensions are empirically feasible and methodologically precise [75]. The ways that integrating varied channels may be effectively employed with continuous and uninterrupted quality experiences of Continuous observation through multiple institutional touchpoints should also be further researched in the future to allow the digital-derived knowledge to be constantly applied and consistent in quality across the educational ecosystem. The

potential effects of the emerging standards of quality management, e.g. ISO 21001:2018, on the traditional frameworks, to determine the adaptability and effects of the new standards in various educational and cultural settings, should also be the subject of future research. Detailed case studies of various kinds of educational establishments under various cultural and socioeconomic conditions are essential to provide a more in-depth perspective of where the standard can be applied and implemented in various contexts [76]. The research to be undertaken in the future has to be centered around longitudinal measures of the effectiveness of e-commerce, shaping of ethical models to regulate automated total quality management, and applications of such technologies in various educational contexts to incorporate institutional change. Longitudinal directions should be given preference in future studies, to determine affectedness of subsequent use of ecommerce on transformation of advanced learning results, and to unearth the boundaries of distinctions within which these reconfigured technologies encode quality of service.

Forthcoming implications

Future study must be carried out to look at the input of quality service management in distance advanced learning institutions in particular the contribution of interaction of tutor, student and content in enhancing the student success in academic attainment like enrichment of GPA and time to be taken in completion. In addition, researchers need to pay a more special attention to the correlation between the quality of service management and learning material preparation, support of learners and quality of assessment and the learning of the students. Longitudinal surveys Repeated survey of student experiences over a period of time can yield promising leads on the longitudinal effects of quality of service on student outcomes and institutional success. As another line of investigation, the scholars ought to explore the relationship between service quality, trust and loyalty across different cultures, implications of changing technologies on service quality perceptions, in a bid to understand how digital transformation is altering stakeholders' relationships. Finally, future research should be done based on the extension of the

use of quality management standards, like ISO 21001, to primary and secondary schools or major schools of training programs to evaluate their applicability and efficiency in a broader educational program. These studies would provide crucial data on the extent to which total quality management models can be scaled up and down at levels along the spectrum of the educational continuum. These expanded researches would result in feeding into a larger scale of knowledge of how e-commerce could be optimised to improve educational quality and institutional responsibility in educational provision across the topography of the global learning. Future studies will also explore the induction of remote teaching via digital and mobile learning technologies to the learning path of the students using various methodologies, sampling

frames and analytical techniques to offer more light on the implementation and success of remote learning. In particular, the researchers should examine how implementing totally virtual and remote course delivery impacts what the students learn and experience throughout the course. Also, further studies should employ both mixed methods and quantitative designs to find bigger voices of student on the phenomenon of service quality so that the gap experienced on the dimensions of tangibility and empathy as was overlooked in the present study gets address. It is these mixed-methods approaches that would provide a more complete view of student needs and well-being which will enable fine-tuned mechanisms to be put in place to reduce poor quality of service and maximize satisfaction.

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Citation: Maheswaran M. "Advanced learning in Sub-Saharan African nations in perspectives of E-commerce, Total quality management and Continuous observation." *J Glob Entrep Manage* (2026): 155. DOI: [10.59462/3068-174X.4.4.155](https://doi.org/10.59462/3068-174X.4.4.155).