

Determinants of Education Quality in Secondary Schools in Mogadishu Somalia Using Partial Least Squares Structural Equation Modeling

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Abstract

Education quality remains a critical challenge in developing and post-conflict countries, including Somalia, despite substantial improvements in access to secondary education. However, empirical evidence examining the combined influence of key educational determinants within the Somali context remains limited. This study examined the effects of teacher competence, student–teacher ratio, curriculum relevance, and parental involvement on education quality in secondary schools in Mogadishu, Somalia. A quantitative cross-sectional survey design was employed, and data were collected from 239 respondents, comprising students, teachers, parents, and school administrators selected through simple random sampling. Data was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The measurement model demonstrated satisfactory reliability and validity, while the structural model revealed that all four determinants significantly influence education quality. Curriculum relevance exhibited the strongest positive effect ($\beta = 0.303, p < 0.001$), followed by student–teacher ratio ($\beta = 0.273, p < 0.001$), parental involvement ($\beta = 0.213, p = 0.015$), and teacher competence ($\beta = 0.122, p = 0.038$). The model explained 58.5% of the variance in education quality ($R^2 = 0.585$), indicating moderate explanatory power. The findings support the Education Production Function Theory and Systems Theory by demonstrating that education quality is shaped by the interaction of instructional, institutional, and family-related factors. The study contributes context-specific evidence from Somalia and recommends strengthening curriculum implementation, enhancing teacher professional development, maintaining appropriate student–teacher ratios, and promoting stronger school–parent partnerships to improve the quality of secondary education.

Introduction

Education is widely recognized as a fundamental driver of human capital development, economic growth, social transformation, and national competitiveness (Hanushek & Woessmann, 2020). It equips individuals with the knowledge, skills, values, and competencies needed to contribute effectively to society and national development (Akongo et al., 2025). As countries increasingly transition toward knowledge-based economies, the emphasis has shifted from expanding educational access to ensuring the delivery of high-quality education (Kabay, 2021). This global commitment is reflected in the United Nations Sustainable Development Goal 4 (SDG 4), which advocates inclusive, equitable, and quality education for all learners (Gunawan, 2025). Quality education enables students to acquire critical thinking, creativity, problem-solving abilities, and lifelong learning skills necessary for addressing contemporary economic and social challenges. Consequently, improving education quality has become a strategic priority for governments, policymakers, educational institutions, and international development organizations worldwide (Afandi et al., 2025).

Despite considerable progress in increasing school enrollment over the past two decades, improving education quality remains a major challenge, particularly in developing and post-conflict countries (Hayat, 2025). International evidence suggests that increased access to education does not automatically result in better learning outcomes or educational effectiveness (Kyei et al., 2025). Many education systems

continue to experience poor student achievement, inadequate teaching quality, overcrowded classrooms, outdated curricula, and weak stakeholder participation despite substantial investments in the sector(Ochieng & Yeonsung, 2021). As a result, educational research has increasingly shifted its focus from school access to identifying the institutional, instructional, and environmental factors that determine education quality. This perspective recognizes that educational quality is influenced by the interaction of multiple components rather than by a single educational input(Zajda, 2021).

Education quality is generally regarded as a multidimensional concept encompassing effective teaching and learning, qualified teachers, relevant curricula, supportive learning environments, adequate educational resources, and measurable student learning outcomes(Gautam & Shailashri, 2025). According to UNESCO, quality education ensures that learners acquire meaningful knowledge, practical skills, and competencies through effective instructional practices within conducive learning environments. Similarly, the Organisation for Economic Co-operation and Development (OECD) argues that education quality extends beyond examination performance to include students' cognitive development, creativity, collaboration, critical thinking, and preparedness for higher education and employment(Bouckaert, 2023). These perspectives suggest that education quality results from the combined influence of several educational inputs and processes operating within schools(Belina et al., 2026).

Among the various determinants of education quality, teacher competence consistently emerges as one of the most influential factors affecting student learning(Hariri et al., 2024). Teacher competence encompasses professional qualifications, pedagogical knowledge, instructional skills, classroom management abilities, subject matter expertise, and teaching experience. Competent teachers employ appropriate instructional strategies, adapt lessons to students' diverse learning needs, create engaging classroom environments, and effectively assess learning outcomes(Gulasalxon, 2025). Numerous empirical studies have demonstrated that teacher competence positively influences students' academic achievement, classroom engagement, learning motivation, and overall educational effectiveness(Faza et al., 2026). Conversely, inadequate teacher preparation and limited professional development opportunities reduce instructional quality and negatively affect students' educational experiences. Consequently, strengthening teacher competence remains a central objective of educational reforms worldwide(Hrusa et al., 2020).

Another important determinant of education quality is the student–teacher ratio. The number of students assigned to each teacher directly influences classroom management, instructional effectiveness, student participation, and individualized learning support(Abidin & Muhammad, 2024). Smaller student–teacher ratios enable teachers to provide greater attention to individual learners, monitor academic progress closely, offer timely feedback, and implement learner-centered instructional approaches(An & Mindrila, 2020). In contrast, overcrowded classrooms increase teachers' workloads, reduce meaningful teacher–student interaction, and limit opportunities for individualized instruction. These challenges are particularly evident in developing countries, where rapid growth in school enrollment is often accompanied by shortages of qualified teachers and limited educational

infrastructure(Innocent & Saengamporn, 2026). Therefore, maintaining an appropriate student–teacher ratio remains an essential indicator of educational quality and school effectiveness(Anderson et al., 2024).

Curriculum relevance also plays a significant role in determining educational quality(Astuti et al., 2024). A high-quality curriculum equips learners with the knowledge, competencies, attitudes, and practical skills required to meet national development priorities and global labor market demands(Bhandari, 2025). Modern education systems increasingly emphasize competency-based curricula that promote innovation, digital literacy, communication, entrepreneurship, and problem-solving skills. A relevant curriculum enhances students' academic achievement while preparing graduates for higher education, employment, and responsible citizenship(Zairah et al., 2025). Conversely, curricula that fail to reflect technological advancement, societal needs, or local contexts may reduce students' motivation, weaken graduate employability, and limit overall educational outcomes(Fehintola et al., 2026).

Beyond school-based factors, parental involvement has been widely recognized as an important contributor to education quality(Peng et al., 2026). Parents support students' academic success through communication with teachers, monitoring academic progress, assisting with home-based learning, and participating in school activities(Damodaran & Sundram, 2026). Research consistently shows that students whose parents actively engage in their education demonstrate higher academic achievement, stronger motivation, improved attendance, and better behavioral outcomes(Lin, 2025). Effective partnerships between schools and families strengthen accountability, reinforce learning beyond the classroom, and create supportive educational environments. In contrast, weak parental involvement limits communication between schools and families and may reduce students' educational performance(Wieser, 2020).

These determinants are particularly important in fragile and post-conflict countries where education systems continue to experience institutional, financial, and human resource constraints(Group, 2017). Somalia has made significant progress in rebuilding its education sector following decades of conflict and political instability(Mohamud, 2023). Through the combined efforts of the Federal Government of Somalia, private educational institutions, communities, and international development partners, access to secondary education has expanded considerably, particularly in Mogadishu(Idris et al., 2026). Nevertheless, concerns regarding education quality remain substantial. Many secondary schools continue to experience shortages of qualified teachers, overcrowded classrooms, inconsistent curriculum implementation, limited teaching resources, and varying levels of parental involvement, all of which may undermine students' learning outcomes(Mzimela et al., 2025).

Although the international literature provides valuable insights into the determinants of education quality, important research gaps remain(Abdullah & Sahid, 2023). Much of the existing evidence originates from developed countries, limiting its applicability to fragile and post-conflict contexts such as Somalia(Omar, 2021). Furthermore, previous studies have often examined teacher competence, student–teacher ratio, curriculum relevance, and parental involvement independently rather than investigating their combined

influence within a unified analytical framework(Sidow, 2022). Addressing these limitations, the present study examines the determinants of education quality in secondary schools in Mogadishu by investigating the influence of teacher competence, student–teacher ratio, curriculum relevance, and parental involvement using Partial Least Squares Structural Equation Modeling (PLS-SEM)(Idris et al., 2025b). By integrating these determinants into a single structural model, the study provides a more comprehensive understanding of the factors shaping education quality in Somali secondary schools(Idris et al., 2025b).

This study contributes to the literature in three important ways. Theoretically, it integrates the major determinants of education quality into a comprehensive conceptual framework suitable for developing and post-conflict contexts(Adekunle et al., 2026). Methodologically, it applies PLS-SEM to simultaneously examine multiple latent constructs and their relationships, providing more rigorous evidence than conventional statistical approaches(R. R. Ahmed et al., 2024). Practically, the findings will inform policymakers, the Ministry of Education, Culture and Higher Education of Somalia, school administrators, teachers, curriculum developers, parents, and development partners in designing evidence-based strategies to strengthen teaching effectiveness, improve classroom conditions, enhance curriculum implementation, increase parental engagement, and ultimately improve the quality of secondary education in Mogadishu and across Somalia(Abdi & Idris, 2024).

General Objective

To examine the determinants of education quality in secondary schools in Mogadishu, Somalia, by investigating the effects of teacher competence, student–teacher ratio, curriculum relevance, and parental involvement using Partial Least Squares Structural Equation Modeling (PLS-SEM).

To examine the effect of teacher competence on education quality in secondary schools in Mogadishu.

To assess the influence of the student–teacher ratio on education quality in secondary schools in Mogadishu.

To determine the effect of curriculum relevance on education quality in secondary schools in Mogadishu.

To examine the influence of parental involvement on education quality in secondary schools in Mogadishu.

Research Hypotheses

H1

Teacher competence has a significant positive effect on education quality in secondary schools in Mogadishu.

H2

Student–teacher ratio has a significant negative effect on education quality in secondary schools in Mogadishu.

H3

Curriculum relevance has a significant positive effect on education quality in secondary schools in Mogadishu.

H4

Parental involvement has a significant positive effect on education quality in secondary schools in Mogadishu.

Conceptual Framework

Literature Review

2.1 Theoretical Foundation

This study is anchored in the Education Production Function Theory and the Systems Theory of Education, both of which explain how educational inputs interact to determine education quality. The Education Production Function Theory conceptualizes education as a production process in which educational outcomes are generated through the effective combination of various inputs, including qualified teachers, appropriate curricula, learning resources, school management, and family support. According to this theory, improvements in educational outputs such as student achievement and education quality depend on the quality and efficiency of these educational inputs. In the present study, teacher competence, student–teacher ratio, curriculum relevance, and parental involvement represent key educational inputs expected to influence education quality.

Complementing this perspective, Systems Theory views schools as open systems comprising interconnected components that function collectively to achieve educational objectives. Educational inputs—including teachers, students, curriculum, infrastructure, leadership, and parental support—are transformed through teaching and learning processes into educational outputs such as academic achievement and school effectiveness. The theory argues that improving one component of the educational system in isolation is unlikely to produce substantial improvements unless other components also function effectively. Consequently, examining multiple determinants simultaneously provides a more comprehensive understanding of education quality. Guided by these theories, the present study investigates how teacher competence, student–teacher ratio, curriculum relevance, and parental involvement jointly influence education quality in secondary schools in Mogadishu.

2.2 Education Quality

Education quality has become a central concern in educational research because it determines the extent to which education systems develop learners' knowledge, competencies, and skills required for personal and national development(Barokah et al., 2025). Although educational access has expanded considerably across many developing countries, increasing enrollment alone does not guarantee meaningful learning outcomes(Kaffenberger & Pritchett, 2022). Consequently, policymakers increasingly emphasize improving educational quality alongside expanding access(Kyei et al., 2025).

Education quality is widely recognized as a multidimensional concept encompassing effective teaching, qualified teachers, relevant curricula, supportive learning environments, adequate educational resources, effective school leadership, and positive learning outcomes(Appels et al., 2022). UNESCO defines education quality as education that enables learners to acquire relevant knowledge, practical skills, values, and competencies through effective instructional processes(Sayed & Moriarty, 2020). Similarly, the OECD emphasizes learners' cognitive development, critical thinking, creativity, collaboration, and lifelong learning competencies as indicators of quality education(Vincent-Lancrin et al., 2019).

Previous empirical studies consistently demonstrate that high-quality education improves students' academic achievement, employability, critical thinking, and socioeconomic development(Hermita et al., 2025). Conversely, poor educational quality contributes to low academic performance, increased school dropout, unemployment, and reduced economic productivity(Obiols-Homs & Sánchez-Marcos, 2018). In developing countries, however, education quality continues to be constrained by shortages of qualified teachers, overcrowded classrooms, inadequate instructional resources, and weak stakeholder participation(Pholphirul et al., 2023).

Somalia faces similar challenges despite recent progress in expanding secondary education(S. A. S. Ahmed, 2023). Many schools continue to experience teacher shortages, inconsistent curriculum implementation, inadequate learning resources, and limited parental participation(Theelen & van Breukelen, 2025). These challenges highlight the need to identify the factors that most strongly influence education quality(Mejía-Rodríguez & Kyriakides, 2022). Accordingly, this study conceptualizes education quality as the outcome variable influenced by teacher competence, student–teacher ratio, curriculum relevance, and parental involvement(Anwar, 2025).

2.3 Teacher Competence

Teacher competence is widely regarded as one of the strongest determinants of education quality because teachers directly influence students' learning experiences and academic achievement(Maajeeny, 2019). Teacher competence encompasses professional qualifications, pedagogical knowledge, subject matter expertise, classroom management skills, instructional practices, assessment competence, communication skills, and professional ethics. Competent teachers create supportive learning environments, implement effective instructional strategies, motivate students, and continuously assess learning outcomes(Baroroh & Sudana, 2025).

The Education Production Function Theory identifies teacher competence as a critical educational input influencing learning outcomes, while Systems Theory considers competent teachers essential components within the educational system that interact with curriculum, students, and school resources to improve educational quality (Burroughs et al., 2019). Educational research consistently demonstrates that teacher competence enhances instructional effectiveness, student engagement, classroom participation, and academic performance (Prananto et al., 2025). Teachers possessing strong pedagogical knowledge and professional confidence are better able to facilitate learner-centered instruction, encourage critical thinking, and improve students' conceptual understanding (Pan, 2023).

Within Sub-Saharan Africa, teacher competence remains a major challenge because many education systems continue to experience shortages of qualified teachers and limited opportunities for professional development (Taylor & Robinson, 2019). Somalia faces similar constraints following decades of conflict that weakened teacher preparation and professional training systems (Idris et al., 2024a). Although educational reforms have prioritized teacher development, empirical evidence examining the direct influence of teacher competence on education quality within Somali secondary schools remains limited (Idris et al., 2024b). Therefore, the present study proposes that teacher competence positively influences education quality (Hariri et al., 2024).

H1

Teacher competence has a significant positive effect on education quality in secondary schools in Mogadishu.

2.4 Student–Teacher Ratio

The student–teacher ratio represents the number of students assigned to each teacher and is widely used as an indicator of educational quality and resource availability (Hanushek & Woessmann, 2016). Lower student–teacher ratios enable teachers to provide individualized instruction, monitor students' progress more effectively, and create interactive learning environments (Borgen et al., 2025). Conversely, overcrowded classrooms increase teacher workload, reduce classroom interaction, and limit opportunities for personalized learning (Gqwabaza, 2025).

The Education Production Function Theory considers the student–teacher ratio an important educational input affecting instructional efficiency, while Systems Theory emphasizes its influence on classroom management and teaching effectiveness (Gage & MacSuga-Gage, 2017). Empirical studies consistently report that smaller classes are associated with higher student achievement, stronger classroom participation, and improved educational outcomes (Filges et al., 2018). Nevertheless, some scholars argue that reducing class size alone may not improve education quality unless accompanied by competent teachers and effective instructional practices (Meng, 2023).

In Somalia, increasing enrollment has often exceeded teacher recruitment, resulting in relatively high student–teacher ratios in many secondary schools (Abshir, 2020). Overcrowded classrooms continue to

challenge effective teaching and learning, particularly in urban schools(A. A. Mohamed, n.d.). Despite these concerns, limited empirical research has examined the relationship between student–teacher ratio and education quality within the Somali context. Therefore, this study hypothesizes that higher student–teacher ratios negatively affect education quality(Farah & Farah, 2022).

H2

Student–teacher ratio has a significant negative effect on education quality in secondary schools in Mogadishu.

2.5 Curriculum Relevance

Curriculum relevance refers to the extent to which educational content, learning experiences, instructional methods, and assessment practices align with learners' needs, national priorities, and labor market demands(Motsepe et al., 2026). Contemporary curricula increasingly emphasize competency-based education, digital literacy, critical thinking, creativity, communication, and problem-solving skills necessary for success in rapidly changing societies(Otieno, 2020).

According to the Education Production Function Theory, curriculum constitutes an essential educational input that shapes learning outcomes(Khalid-naciri, 2021). Systems Theory similarly identifies curriculum as a central component interacting with teachers, students, and educational resources to produce quality educational outcomes(Basid et al., 2024). Empirical research consistently demonstrates that relevant curricula enhance student motivation, academic performance, critical thinking, and employability(Temitayo & Temitope, 2023). Conversely, outdated curricula often reduce students' engagement and fail to prepare graduates for higher education and employment(Wright, 2025).

Somalia has recently introduced a standardized national curriculum aimed at improving educational consistency and learning outcomes(Jama et al., 2020). However, variations in teacher preparedness, instructional materials, and school resources continue to affect curriculum implementation(Adan, n.d.). Consequently, empirical evidence examining curriculum relevance as a determinant of education quality remains limited within Somali secondary schools(R. A. Mohamed, 2023).

H3

Curriculum relevance has a significant positive effect on education quality in secondary schools in Mogadishu.

2.6 Parental Involvement

Parental involvement refers to parents' active participation in supporting their children's education through monitoring academic progress, communicating with teachers, participating in school activities, and creating supportive learning environments at home(Sharma, 2024). Educational research recognizes

parental involvement as an important external factor contributing to students' academic success and overall education quality(Erdem & Kaya, 2020).

Both the Education Production Function Theory and Systems Theory identify parents as important stakeholders whose support complements school-based educational resources(Smith & Williams, 2024). Studies consistently demonstrate that students whose parents actively participate in their education achieve higher academic performance, exhibit stronger motivation, maintain better attendance, and demonstrate more positive attitudes toward learning(Smith & Williams, 2024). Effective communication between parents and schools also strengthens institutional accountability and reinforces students' educational development(Smith & Williams, 2024).

In Somalia, community participation has historically supported educational development, particularly during periods of institutional instability(A. M. Mohamoud, 2024). Nevertheless, economic constraints, urbanization, and limited school–parent communication continue to restrict parental engagement in many secondary schools(Katel & Katel, 2024). Existing research examining parental involvement within the Somali education system remains scarce, particularly using Structural Equation Modeling(Nurhalimah et al., 2025).

Although empirical evidence on parental involvement in Somalia remains limited, (Warsame et al., 2026).Provided one of the first Structural Equation Modeling studies examining parental involvement and student achievement in Mogadishu primary schools. Their findings confirmed that active parental engagement significantly contributes to improved educational outcomes, while also underscoring the need for further research in secondary education and other regions of Somalia.

H4

Parental involvement has a significant positive effect on education quality in secondary schools in Mogadishu.

2.7 Synthesis of Literature and Research Gaps

The reviewed literature indicates that education quality is influenced by multiple interconnected institutional and social factors. Teacher competence, student–teacher ratio, curriculum relevance, and parental involvement consistently emerge as key determinants of effective teaching, improved learning outcomes, and school performance. The Education Production Function Theory and Systems Theory further support the argument that educational quality results from interactions among multiple educational inputs rather than a single factor.

Despite substantial international evidence, several important gaps remain. First, most studies have been conducted in developed or relatively stable developing countries, while empirical evidence from fragile and post-conflict contexts such as Somalia remains limited. Second, previous studies have generally examined teacher competence, student–teacher ratio, curriculum relevance, and parental involvement separately, providing limited understanding of their combined influence on education quality. Third, many

investigations have relied on conventional regression techniques rather than Structural Equation Modeling, limiting their ability to examine complex relationships among latent constructs. Finally, few studies have specifically focused on secondary schools in Mogadishu despite ongoing educational reforms aimed at improving educational quality.

To address these theoretical, empirical, contextual, and methodological gaps, the present study investigates the effects of teacher competence, student–teacher ratio, curriculum relevance, and parental involvement on education quality in secondary schools in Mogadishu using Partial Least Squares Structural Equation Modeling (PLS-SEM). By integrating these determinants into a single structural framework, the study provides context-specific evidence that can inform educational policy, strengthen school improvement initiatives, and contribute to enhancing the quality of secondary education in Somalia.

Methodology

This study adopted a quantitative research approach to examine the determinants of education quality in secondary schools in Mogadishu, Somalia. Specifically, the study investigated the influence of teacher competence, student–teacher ratio, curriculum relevance, and parental involvement on education quality (Hassan & Wekesa, 2017). A descriptive cross-sectional survey research design was employed because it enables researchers to collect quantitative data from a large number of respondents at a single point in time and examine the relationships among multiple variables in their natural setting (Baumeister et al., 2026). The design was considered appropriate because the study aimed to explain the predictive relationships among the proposed constructs rather than manipulate experimental conditions.

The study population comprised students, teachers, parents, and school administrators from selected public and private secondary schools in Mogadishu, Somalia (Dirie, 2024). These respondents were selected because they represent the principal stakeholders directly involved in teaching, learning, school management, and parental support, thereby providing comprehensive perspectives on factors influencing education quality. A simple random sampling technique was employed to ensure that every eligible respondent had an equal chance of being selected, thereby minimizing sampling bias and improving the representativeness of the sample. Public and private secondary schools were included to capture variations in institutional characteristics and educational practices across the Somali education sector (R. A. Mohamed, 2023).

A total sample of 239 respondents participated in the study. The sample size satisfies the recommendations for Partial Least Squares Structural Equation Modeling (PLS-SEM), which suggest that the minimum sample should exceed ten times the maximum number of structural paths directed at an endogenous construct. Since Education Quality received four structural paths, the required minimum sample size was substantially exceeded, providing sufficient statistical power and stable parameter estimates for hypothesis testing (Ocheredko et al., 2023).

Data were collected using a structured self-administered questionnaire distributed both physically and electronically over the study period. Prior to data collection, respondents were informed about the purpose of the study, voluntary participation, confidentiality, and anonymity. Only participants who provided informed consent were included in the study. Completed questionnaires were screened for completeness, consistency, and missing values before data coding and statistical analysis. The study was conducted within the context of secondary schools in Mogadishu, where improving education quality remains a national priority amid ongoing educational reforms.

All questionnaire items measuring the study constructs were assessed using a five-point Likert scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The measurement items were adapted from well-established and validated instruments used in previous studies on education quality, teacher competence, curriculum effectiveness, parental involvement, and school performance. The questionnaire was subsequently refined to ensure contextual relevance and clarity within the Somali secondary education environment. A pilot assessment confirmed the suitability of the instrument prior to the main survey.

The reliability and validity of the measurement instrument were rigorously evaluated following recommended PLS-SEM procedures. Internal consistency reliability was assessed using Cronbach's alpha, rho_A, and Composite Reliability (CR), while convergent validity was evaluated using the Average Variance Extracted (AVE). Indicator reliability was examined through standardized outer loadings, whereas discriminant validity was assessed using the Fornell–Larcker criterion, cross-loadings, and the Heterotrait–Monotrait Ratio (HTMT). The results demonstrated that all constructs satisfied the recommended thresholds for reliability and validity, confirming the adequacy of the measurement model for structural model evaluation .

Because all variables were measured using a single self-reported questionnaire administered at one point in time, the possibility of common method bias (CMB) was considered. To minimize this risk, several procedural remedies were implemented, including assuring respondent anonymity, emphasizing that there were no right or wrong answers, and reducing respondents' evaluation apprehension. Furthermore, Harman's single-factor test was conducted to assess common method variance. The results indicated that no single factor accounted for the majority of the total variance, suggesting that common method bias was not a significant concern in this study.

Statistical Technique

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed as the primary analytical technique because of its suitability for prediction-oriented research, its ability to estimate complex relationships among multiple latent constructs simultaneously, and its robustness when analyzing moderate sample sizes without requiring multivariate normality assumptions (Hair et al., 2022). Given that the study sought to examine the predictive effects of teacher competence, student–teacher ratio,

curriculum relevance, and parental involvement on education quality, PLS-SEM was considered the most appropriate analytical approach.

Data analysis was performed using IBM SPSS Statistics Version 27 and SmartPLS 4. IBM SPSS was used to analyze respondents' demographic characteristics and generate descriptive statistics, including frequencies, percentages, means, and standard deviations. SmartPLS 4 was used to estimate both the measurement model and the structural model. The measurement model was evaluated using indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. The structural model was subsequently assessed by examining the path coefficients (β), coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and bootstrapping procedures to determine the significance of the hypothesized relationships. Bootstrapping with 5,000 subsamples was performed to obtain t-values, p-values, and confidence intervals, thereby providing robust statistical evidence for testing the proposed hypotheses.

Result

Demographic Characteristics of Respondents

The demographic characteristics of the respondents were examined to provide an overview of the study sample. The analysis considered respondents' age group, gender, highest level of education completed, role in the education system, and type of institution. A total of 239 respondents participated in the study, representing students, teachers, parents, and school administrators from both public and private secondary schools. The diversity of the respondents enhances the representativeness of the sample and provides a comprehensive perspective on the factors influencing education quality. The demographic distribution of the respondents is presented in Table 1.

Table 1 presents the demographic characteristics of the respondents. Most participants were aged 20–30 years (87.4%, $n = 209$), followed by 30–40 years (8.8%, $n = 21$) and 40 years or older (3.8%, $n = 9$). The sample was relatively balanced by gender, comprising 54.8% males ($n = 131$) and 45.2% females ($n = 108$).

Regarding educational attainment, 67.4% ($n = 161$) had completed secondary school, 26.8% ($n = 64$) held a bachelor's degree, and 5.9% ($n = 14$) possessed a master's degree or higher. Students represented the largest stakeholder group (74.1%, $n = 177$), followed by teachers (13.8%, $n = 33$), parents (6.3%, $n = 15$), and school administrators (5.9%, $n = 14$). Additionally, respondents were drawn from both public (53.1%, $n = 127$) and private schools (46.9%, $n = 112$), ensuring balanced institutional representation.

Figure 2 presents the measurement model, illustrating the relationships between the latent constructs and their indicators. Indicator loadings ranged from 0.659 to 0.821. Although a few loadings were slightly below the recommended threshold of 0.70, they were retained because all constructs demonstrated satisfactory Composite Reliability (0.805–0.876) and Average Variance Extracted (0.508–0.587), confirming adequate reliability and convergent validity (Hair et al., 2022).

The model further shows that the four predictor constructs explain 58.5% of the variance in Education Quality ($R^2 = 0.585$), indicating moderate explanatory power. Curriculum Relevance ($\beta = 0.303$) emerged as the strongest predictor, followed by Student–Teacher Ratio ($\beta = 0.273$), Parental Involvement ($\beta = 0.213$), and Teacher Competence ($\beta = 0.122$). These relationships were confirmed as statistically significant through bootstrapping analysis.

Table 2
Measurement Model

Teacher Competence	Items	Loadings	Alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	(AVE)
	TC1	0.777	0.823	0.834	0.876	0.587
	TC2	0.821				
	TC3	0.666				
	TC4	0.799				
	TC5	0.757				
Student–Teacher Ratio	STR1	0.750	0.786	0.793	0.853	0.537
	STR2	0.681				
	STR3	0.727				
	STR4	0.782				
	STR5	0.722				
Curriculum Relevance	CR1	0.782	0.807	0.812	0.866	0.565
	CR2	0.809				
	CR3	0.719				
	CR4	0.755				
	CR5	0.687				
Parental Involvement	PI1	0.703	0.682	0.680	0.805	0.508
	PI2	0.712				
	PI3	0.699				
	PI4	0.738				
Education Quality	EQ1	0.755	0.723	0.731	0.828	0.547
	EQ2	0.791				
	EQ3	0.659				
	EQ4	0.747				

Table 2 shows that standardized indicator loadings ranged from 0.659 to 0.821. Five indicators with loadings slightly below the recommended threshold of 0.70 were retained because their removal did not improve construct reliability or convergent validity. As recommended by Hair et al. (2022), indicators with loadings between 0.40 and 0.70 may be retained when Composite Reliability and AVE are satisfactory.

Internal consistency reliability was established, with Cronbach's alpha ranging from 0.682 to 0.823, rhoA from 0.680 to 0.834, and Composite Reliability from 0.805 to 0.876, all meeting acceptable thresholds. Convergent validity was also confirmed, as AVE values ranged from 0.508 to 0.587, exceeding the recommended minimum of 0.50. Overall, the measurement model demonstrated satisfactory indicator reliability, internal consistency, and convergent validity, supporting its suitability for structural model analysis.

Table 3
Discriminant Validity

CR	CR	EQ	PI	STR	TC
	0.752				
EQ	0.697	0.740			
PI	0.646	0.610	0.713		
STR	0.679	0.653	0.527	0.733	
TC	0.579	0.534	0.468	0.502	0.766

The Fornell–Larcker criterion was employed to assess discriminant validity. As presented in Table 3, the square roots of the AVE for all constructs (0.713–0.766) were greater than the corresponding inter-construct correlations. This indicates that each construct shares more variance with its own indicators than with other latent constructs, confirming adequate discriminant validity. Therefore, the latent variables are empirically distinct and measure different theoretical concepts (Hair et al., 2022).

Table 4
Cross loadings.

CR1	CR	EQ	PI	STR	TC
	0.782	0.580	0.430	0.515	0.448
CR2	0.809	0.544	0.521	0.530	0.516
CR3	0.719	0.532	0.505	0.463	0.413
CR4	0.755	0.503	0.465	0.552	0.402
CR5	0.687	0.448	0.521	0.497	0.389
EQ1	0.473	0.755	0.432	0.511	0.370
EQ2	0.636	0.791	0.504	0.509	0.498
EQ3	0.507	0.659	0.424	0.446	0.306
EQ4	0.423	0.747	0.438	0.463	0.386
PI1	0.527	0.495	0.703	0.419	0.381
PI2	0.525	0.470	0.712	0.473	0.351
PI3	0.391	0.360	0.699	0.284	0.285
PI4	0.360	0.384	0.738	0.285	0.294
STR1	0.451	0.547	0.365	0.750	0.367
STR2	0.408	0.396	0.358	0.681	0.332
STR3	0.572	0.468	0.433	0.727	0.415
STR4	0.610	0.533	0.452	0.782	0.396
STR5	0.430	0.422	0.314	0.722	0.326
TC1	0.460	0.405	0.398	0.392	0.777
TC2	0.462	0.394	0.341	0.381	0.821
TC3	0.335	0.328	0.262	0.320	0.666
TC4	0.543	0.490	0.404	0.447	0.799
TC5	0.384	0.406	0.365	0.366	0.757

The cross-loading analysis further supports discriminant validity. Each measurement indicator loaded highest on its intended construct compared with all other constructs. For instance, TC2 (0.821) loaded highest on Teacher Competence, STR4 (0.782) on Student–Teacher Ratio, CR2 (0.809) on Curriculum Relevance, PI4 (0.738) on Parental Involvement, and EQ2 (0.791) on Education Quality. This pattern

confirms that the indicators adequately represent their respective constructs and are sufficiently distinct from the remaining constructs.

Table 5
Heterotrait Monotrait Ratio (HTMT)

CR	CR	EQ	PI	STR	TC
EQ	0.899				
PI	0.855	0.848			
STR	0.849	0.855	0.696		
TC	0.698	0.677	0.606	0.618	

To provide a more rigorous assessment of discriminant validity, the HTMT criterion was examined. The HTMT values ranged from 0.606 to 0.899, all falling below the recommended threshold of 0.90 (Hair et al., 2022). Although the HTMT value between Curriculum Relevance and Education Quality (0.899) approached the upper limit, it remained within the acceptable range, indicating that discriminant validity was not violated. Accordingly, the HTMT results provide additional evidence that the latent constructs are conceptually and empirically distinct.

Table 6
Results of path analysis

Hypothesis	Relationship	Beta	Mean (M)	Standard d deviate on (STDEV)	T values	P values	Decision
H1	TC -> EQ	0.122	0.126	0.059	2.071	0.038	Supported
H2	STR -> EQ	0.273	0.278	0.066	4.127	0.000	Supported
H3	CR -> EQ	0.303	0.304	0.084	3.609	0.000	Supported
H4	PI -> EQ	0.213	0.209	0.088	2.434	0.015	Supported

The structural model results indicate that all four hypothesized relationships are positive and statistically significant, supporting the proposed conceptual framework. Teacher Competence positively influences Education Quality ($\beta = 0.122$, $t = 2.071$, $p = 0.038$), supporting H1. Student–Teacher Ratio ($\beta = 0.273$, $t = 4.127$, $p < 0.001$) and Curriculum Relevance ($\beta = 0.303$, $t = 3.609$, $p < 0.001$) also have significant positive effects, with Curriculum Relevance emerging as the strongest predictor, supporting H2 and H3. Similarly, Parental Involvement significantly enhances Education Quality ($\beta = 0.213$, $t = 2.434$, $p = 0.015$), supporting H4. Overall, the findings demonstrate that instructional, classroom, curricular, and family-related factors collectively improve education quality.

Table 7
Results of R-square

	R-square	R-square adjusted
EQ	0.585	0.578

Table 7 shows an R^2 value of 0.585 and an adjusted R^2 of 0.578 for Education Quality, indicating that the four predictor constructs explain 58.5% of the variance in the endogenous construct. According to Hair et al. (2022), this reflects moderate explanatory power and satisfactory predictive capability. The small difference between the R^2 and adjusted R^2 values (0.007) further suggests that the model is parsimonious with minimal overfitting, supporting the robustness of the findings.

Figure 3 presents the bootstrapping results of the structural model. All measurement indicators are statistically significant ($p < 0.001$), confirming the reliability of the measurement model. The structural analysis shows that all four hypothesized relationships are significant at the 5% level. Teacher Competence positively influences Education Quality ($p = 0.038$), while Student–Teacher Ratio ($p < 0.001$), Curriculum Relevance ($p < 0.001$), and Parental Involvement ($p = 0.015$) also have significant positive effects, supporting H1–H4. The model explains 58.5% of the variance in Education Quality ($R^2 = 0.585$), indicating moderate explanatory power and satisfactory predictive capability (Hair et al., 2022). These findings provide strong empirical support for the proposed conceptual framework.

Discussion

This study examined the determinants of education quality in secondary schools in Mogadishu, Somalia, by investigating the effects of teacher competence, student–teacher ratio, curriculum relevance, and parental involvement using PLS-SEM (R. A. Mohamed, 2023). The findings demonstrate that all four determinants significantly influence education quality, confirming the multidimensional nature of educational quality proposed by the Education Production Function Theory and Systems Theory (Garira, 2026). Collectively, these factors explained 58.5% of the variance in education quality, indicating that improvements in instructional, institutional, and family-related factors substantially enhance educational outcomes in Somali secondary schools (A. J. Mohamoud, 2019).

Curriculum relevance emerged as the strongest predictor of education quality (Angeles, 2020). This finding suggests that aligning the curriculum with learners' needs, national development priorities, and labor market requirements contributes significantly to improving teaching effectiveness and student learning outcomes (JATAU et al., 2026). The result supports previous studies that emphasize curriculum relevance as a fundamental determinant of educational effectiveness and learner achievement. In Somalia, where curriculum reforms have recently been introduced, the findings indicate that successful implementation of a relevant curriculum is essential for improving the quality of secondary education (R. A. Mohamed, 2023).

The study also found that the student–teacher ratio significantly influences education quality. This finding implies that maintaining manageable class sizes enhances teacher–student interaction,

classroom management, and individualized instruction(Juldiz, 2025). The result is consistent with previous research demonstrating that appropriate student–teacher ratios improve students' academic performance and classroom participation(Etomes & Lyonga, 2020). Given the rapid expansion of secondary education in Somalia, the findings highlight the need to recruit additional qualified teachers to reduce classroom overcrowding(Matsepe et al., 2019).

Parental involvement also exerted a significant positive influence on education quality(Likuru & MwansaMwila, 2022). This finding reinforces the importance of school–family partnerships in supporting students' academic achievement(MEHMEDI et al., 2026). Parents who actively monitor learning, communicate with schools, and participate in educational activities contribute to more supportive learning environments(Gu & Zhang, 2023). This result is consistent with previous studies showing that parental engagement enhances students' motivation, attendance, and academic success(Lin, 2025). Strengthening collaboration between schools and families should therefore remain a priority for education policymakers in Somalia(Idris et al., 2025a).

Although teacher competence recorded the smallest standardized effect, it remained a statistically significant predictor of education quality. This finding confirms that competent teachers continue to play a central role in improving instructional quality and student learning outcomes(Mubarok, 2024). The relatively smaller effect may reflect the influence of broader institutional factors, including curriculum implementation and classroom conditions, which collectively shape educational quality. Nevertheless, the result is consistent with studies identifying teacher competence as a key driver of effective teaching and school performance.

Overall, the findings demonstrate that education quality in Somalia cannot be improved through isolated interventions. Rather, enhancing educational outcomes requires integrated strategies that simultaneously strengthen curriculum implementation, improve classroom conditions, develop teacher competencies, and promote meaningful parental engagement(Idris et al., 2025a).

Limitations of the Study

This study has several limitations. First, the research employed a cross-sectional design, which limits the ability to establish causal relationships among the study variables. Future studies could adopt longitudinal designs to examine changes in education quality over time. Second, the study focused exclusively on secondary schools in Mogadishu, limiting the generalizability of the findings to other regions of Somalia with different educational and socioeconomic conditions. Third, the study relied on self-reported questionnaire data, which may be affected by respondents' perceptions and social desirability bias despite procedural measures taken to reduce common method bias. Finally, although the model explained 58.5% of the variance in education quality, approximately 41.5% remains unexplained, suggesting that additional factors such as school leadership, educational resources, digital infrastructure, government policy, school climate, and teacher motivation should be incorporated into future research to develop a more comprehensive model of education quality.

Conclusion

This study examined the determinants of education quality in secondary schools in Mogadishu using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings demonstrate that teacher competence, student–teacher ratio, curriculum relevance, and parental involvement all have significant positive effects on education quality, with curriculum relevance emerging as the strongest predictor. Together, these determinants explain 58.5% of the variation in education quality, indicating that educational quality is influenced by a combination of instructional, institutional, and family-related factors rather than a single educational input.

The findings provide empirical support for the Education Production Function Theory and Systems Theory by demonstrating that educational quality results from the interaction of multiple educational components. From a practical perspective, the study suggests that policymakers, school leaders, and the Ministry of Education should prioritize curriculum implementation, strengthen teacher professional development, maintain appropriate student–teacher ratios, and promote stronger school–parent partnerships to improve educational outcomes. The study contributes context-specific evidence from Somalia and provides a foundation for future research aimed at developing more comprehensive models of education quality in fragile and developing education systems.

Declarations

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Clinical Trial Registration

Not applicable.

Ethical Approval

Ethical approval for this study was obtained from the Institutional Research Ethics Committee of the Centre for Research and Development, SIMAD University, Mogadishu, Somalia (Reference No. 0032), approved on 16 July 2026. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki (as revised in 2013) and the ethical guidelines of the Institutional Research Ethics Committee of SIMAD University for research involving human participants.

Consent to Participate

Written informed consent was obtained from all participants before data collection. Participation was voluntary, and respondents were informed of the purpose of the study, the confidentiality of their responses, and their right to withdraw from the study at any time without penalty. This is consistent with the approved ethics protocol.

Consent for Publication

Not applicable. The manuscript does not contain any identifiable personal data or images of participants.

Competing Interests

The authors declare that they have no competing interests.

Availability of Data and Materials

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Author Contributions

Omar Abdi Mohamud (OAM): Conceptualization, supervision, methodology, project administration, corresponding author, writing—review and editing.

Leila Mohamed Warsame (LMW): Conceptualization, investigation, data collection, formal analysis, data curation, writing—original draft, visualization, and writing—review and editing.

Mohamed Jamac Mohamed (MJM): Literature review, instrument development, data validation, and writing—review and editing.

Abdirahman Ibrahim Abdi (AIA): Methodological support, data analysis, interpretation of results, and manuscript editing.

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Table 1

Table 1 is available in the Supplementary Files section.

Figures

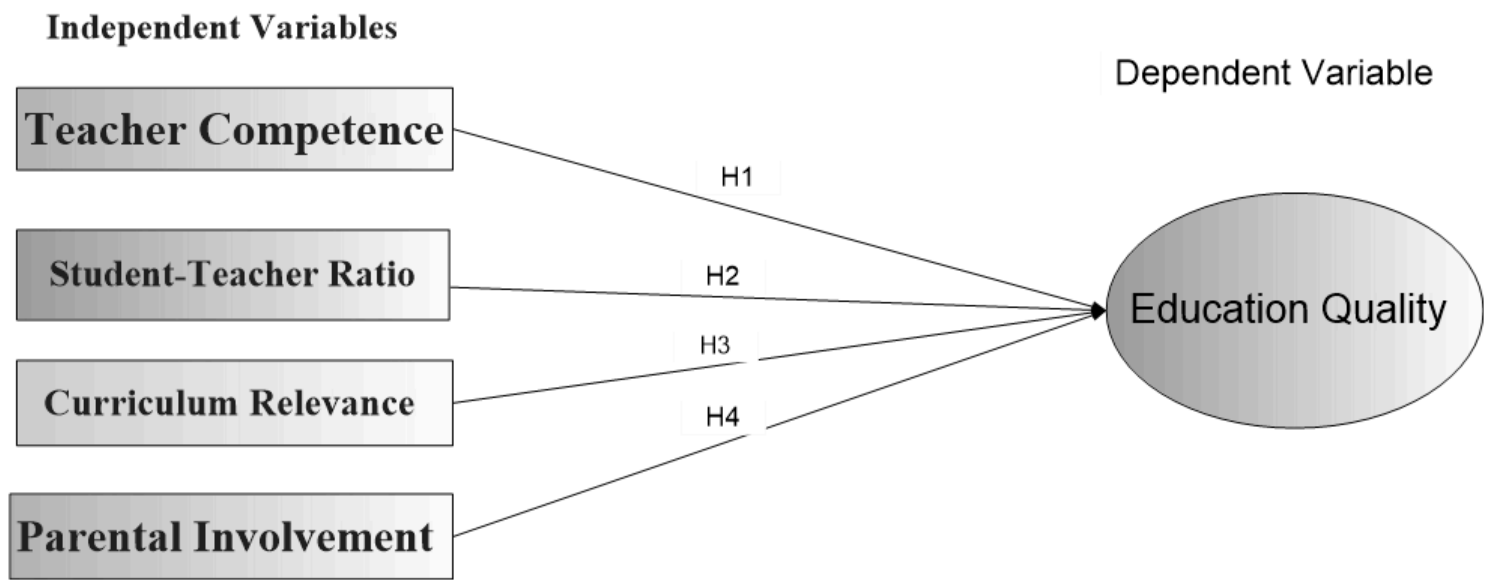


Figure 1

Conceptual framework showing the hypothesized relationships between teacher competence, student–teacher ratio, curriculum relevance, parental involvement, and education quality.

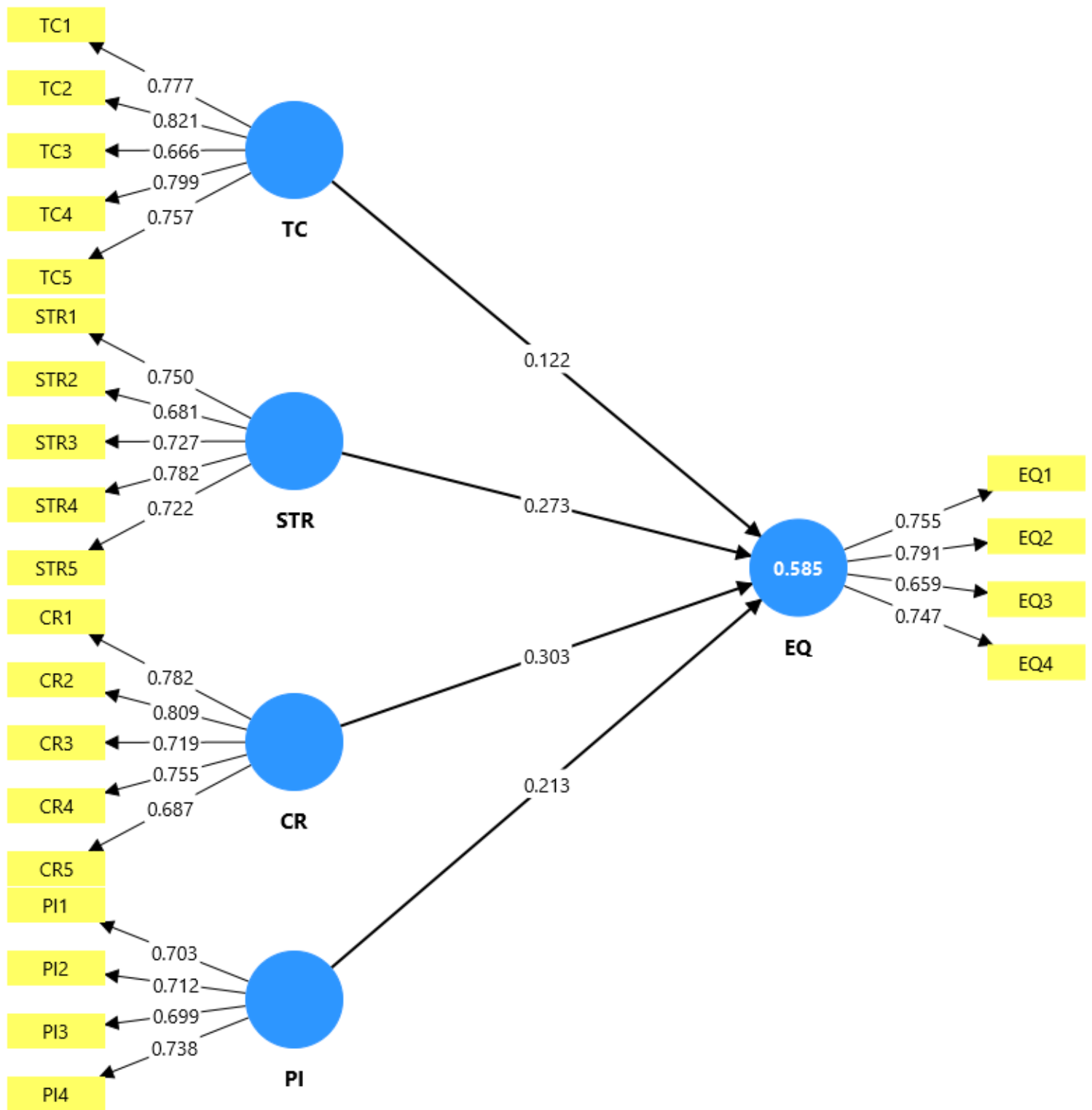


Figure 2

Measurement Model

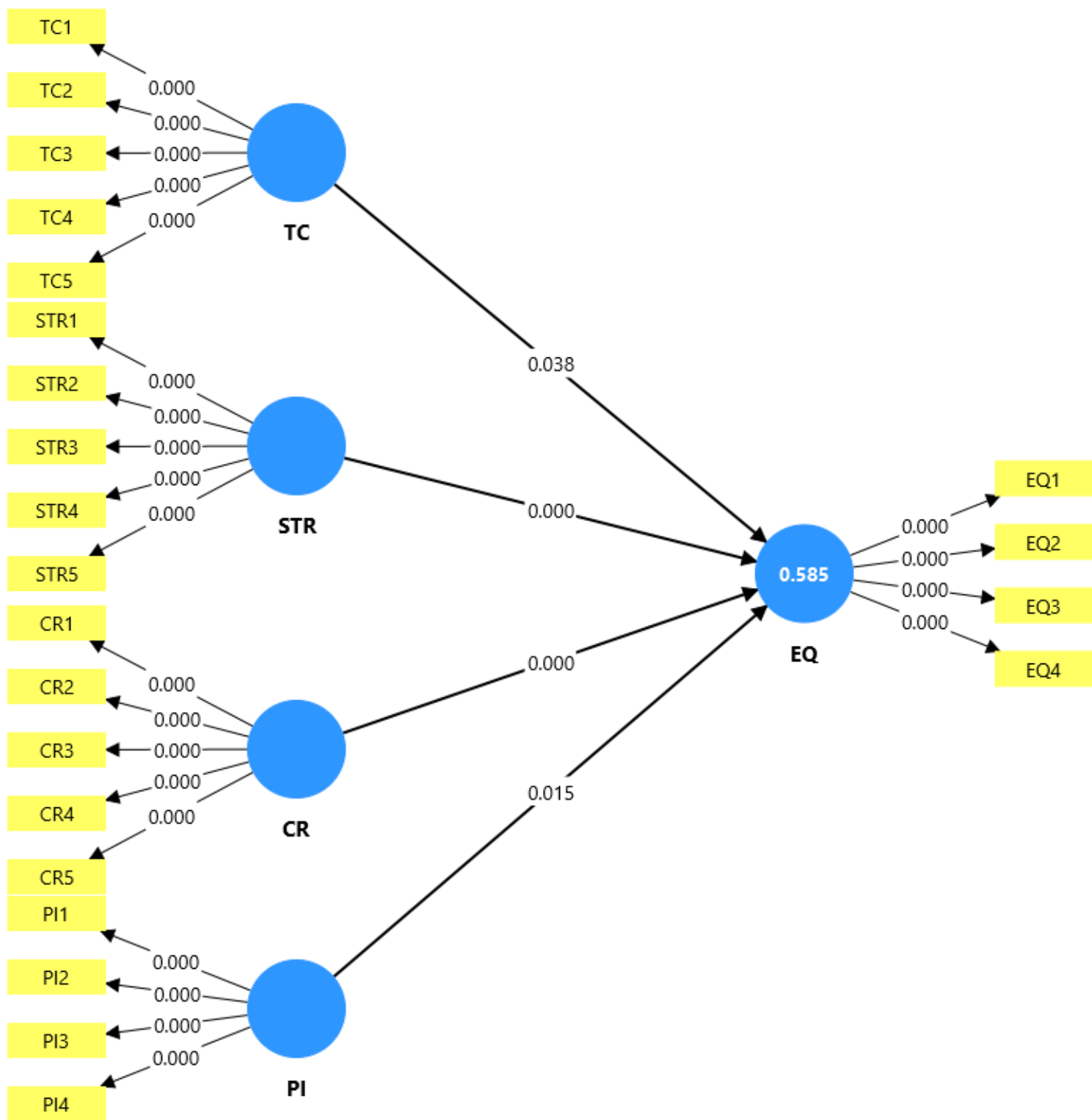


Figure 3

Structural Model (Bootstrapping Results

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Table1.docx](#)