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# Investigating the Relationship Between Total Quality Management and Primary School Academic Performance with Innovation as a Mediator Using SEM

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## Abstract

This study aims to examine the relationship between TQM (TQM) and primary school academic performance in Abu Dhabi with innovation as a mediator using SEM. A quantitative research design was utilized. A total of 342 teachers were chosen as a sample through quota and simple sampling technique. Data analysis using structural equation modeling was used. The results revealed that there was significant relationship between TQM and primary school academic performance was -0.50; significant relationship found between TQM and innovation. The further found that significant relationship was exist between innovation and primary school academic performance was 0.1.51 while TQM has significant relationship with innovation with .92. The result also found that innovation mediate on the relationship between TQM and primary school academic performance with partial mediation. It is hope of this study that TQM would be used by schools in Abu Dhabi region to improve primary schools' academic performance. The implication of this study suggested that TQM should be internalize and use it to improve primary school academic performance in Abu Dhabi. However, a further investigation should be examining into the role the TQM play on primary school academic performance.

**Keywords:** TQM, Innovation, Primary School Academic Performance, Education, School

## Introduction

A good TQM system helps the companies improve their competitive position and image both internally and externally (Kerzner,2017). It helps to systematize operations as innovations often occur that help the companies to make the company's processes more efficient. Not only it refers to different ways of doing things, but also it allows doing cost savings, detect idle resources, steps of processes that do not generate value, etc. TQM allows controlling the performance of the processes and of the organization itself (Evas, 2005; Sayyad, 2017). The TQM system helps to comply more adequately with the regulations related to the products and services. TQM improves the training of company workers; by having more information about the processes, they know them better and can approach their execution in a more agile way, with less waste, etc. (Kerzner, 2017). In addition, maintaining a good flow of information with the staff helps to increase the motivation and commitment of the staff.

More so, the TQM systems consider the requirements and expectations of the client, so their implementation has a positive impact on their satisfaction and, therefore, on their loyalty. Because of the organization is in a better position to achieve the following strategic and general objectives (Beckford, 2019). The improvement of the image affects a better market position with respect to the competition. It could even be a shock to start an internationalization trajectory if it were the case. Adopting a TQM system in an organization is a signal to all the agents that interact with organization about our commitment to quality and continuous improvement. In the meanwhile, it increases, after all, the competitive position of the company, its possibilities of sustainability over time and its leadership (Joseph & Okwara Michael and Ajowi, 2017).

Additionally, TQM is a constant effort in the search for continuous improvement of quality and performance that meets or even exceeds the expectations of customers (Goetsch & Davis, 2014). The TQM is an approach of management that aims to achieve continuing success and essentially affects the management and measurement of the overall quality of a company, including the processes of management and development of quality, control, maintenance, improvement and quality guarantee. The TQM approach considers all possible actions that have an impact on quality, and all the departments and employees of the company participate at all levels (Imai, 2012).

The government of Abu Dhabi keeps education as its top priority (ADEC, 2010). The quality of the education system in Abu Dhabi is central to attain the long term

economic and social transformation of the Emirate. Abu Dhabi Education Council created Agenda of Abu Dhabi Education Policy in 2008 to frame the guiding principles, vision, and objectives for Abu Dhabi's education system. The policy agenda, developed in coordination with key stakeholders from government, industry, and academia, set the goals and defining principles of public policy of Abu Dhabi in education. It offers a wider framework for framing policies in education and policy priorities educational sectors. These priorities are captured in each of strategic plans of ADEC for P-12 education, private education, higher education (ADEC, 2010).

As a result of the effort put in place by government of Abu Dhabi in the provision of quality education, The TQM is still not popular in Abu Dhabi schools among the school leaders. As TQM was practices in oil industries and manufacturing company, the study of it is still dearth in primary schools in Abu Dhabi. The academic performance of primary school students in the last five years was not encouraging. The ministry of education (MoE) and UAE government were concerned about what cause reduction in the academic performance. Likewise, the parents have asked intrigued questions from the school leaders about what cause reduction in the performance of the students. Although, the performance was not so bad but MoE and government expecting more performance than previous one. The results of the students have not meet government expectation. This is gapping the researcher intended to fill in this study. Based on this argument, the following objective were emerged.

To determine the relationship between TQM and primary school academic performance in Abu Dhabi.

To determine the relationship between TQM and innovation in Abu Dhabi

To determine the relationship between innovation and primary school academic performance in Abu Dhabi.

To investigate the contribution of mediating role of innovation on the relationship between TQM and primary school academic performance in Abu Dhabi.

## **TQM**

TQM as a concept begin to gained popularity in 1950s and its approach consistently even more famous in all ramifications (Joiner, 2007; Bani, 2012; Ngambi & Nkemkiafu, 2015); Deming (1982) was the father of the TQM (TQM) because of its introduction in Japan after World War II. It was originally focused to re-build the devastated economy of Japan. In the 1980s, it has gained tremendous popular (Dahlgard & Mi Dahlgard, 2006). As the defining the quality is far from easy, TQM

refers to all-inclusiveness of culture, norms, attitude of an organization to succeed in providing the best services required by customers.

Besides, Hashmi, Ishak, and Hassan (2018) argued that workers are the life wire through which the management achieves its objectives. It is therefore configuration of this that make quality of the management flaunts (Ettayem & Al-Zu'bi, 2015). In fact, TQM is collectively and all-inclusive programme of an organization to create improvement based on customer's satisfactions with enshrining and sustain a culture of teamwork. Having been referred to as a paradigms or systematic approach to the substance of management practice, individual's attitude, belief and behavior need to be subdued to achieve a slated objective (Sadikoglu & Olcay, 2014; Alghamdi, 2018). For TQM to be properly effective, some of the elements must be put into consideration. The elements are strategic planning, students focus, human resource management, school leadership, training and knowledge and process management (Sadikoglu & Olcay, 2014; Ngambi & Nkemkiafu, 2015; Liantos & Pamatmat, 2016).

### **The Relationship between TQM and Primary School Academic Performance**

Numerous researchers have done a crucial research on the relationship between TQM and organizational performance. They consider TQM has strategy to meet customers' satisfaction. As a result of this, Akhtar, Zameer and Saeed (2014) investigated the impact of TQM and performance of organization in Pakistan. Based on the findings of the study, the total quality dimension significantly related to organizational performance. More so, study conducted in Turkey by Zehir, Ertosun, Zehir & Muceldilli (2012) on TQM effects on quality performance and innovative performance which show that TQM is the determinant of customer satisfaction. The findings of that study demonstrated that there was relationship between TQM and innovative performance with value of  $F=10,723$ ,  $R^2=261$ ,  $P=0.00$ . Equally, significant relationship was found between TQM and quality performance with value of  $F=28,153$ ,  $R^2=495$ ,  $P=0.0$ . The study further suggested that TQM should be adopted in an organization.

In another view on the relationship between TQM and organization performance. Alghamdi (2018) who examined TQM and Organizational Performance: a possible role of organizational culture discovers that relationship between TQM and organizational culture was significant and related with ( $\beta = 0.121$ ,  $P < 0.05$ ). Arshad, Halipah, & Omar (2018) found that significant relationship between TQM and organizational culture using regression analysis with  $R = .762$ ,  $R \text{ square} = .581$ ,  $\text{Adjusted } R \text{ square} = .580$ ,  $\text{std. error of the estimate} = .271$ . This shows that relationship exist between TQM and primary school academic performance.

## **The Relationship between TQM and Innovation**

Innovation is the result of the integration of different activities, such as marketing, organizational restructuring, employee development, research and development, resource management, process development and design (Szeto, 2000; Mitra, 2000). In the field of management, TQM and innovation has become a debatable issue whether positive relationship between TQM and innovation exist. Scholars such as (Wind & Mahajan, 1997; Tidd, Bessant, and Pavitt, 1997; Slater, Narver, 1998; Kim & Marbougne, 1999) supported that TQM can improve innovation but the result of Thai Hoang, Igel & Laosirihongthong (2006) oppose the notion that TQM can hinder innovation.

Further, Thai Hoang, Igel & Laosirihongthong (2006) conducted research on the relationship between TQM and innovation in Vietnamese industry. In the study, confirmatory factor analysis and structural equation modeling were used to test the relationship between TQM and innovation. The findings confirmed that TQM is considered as a set of practices and has a positive contribution on the organizational innovativeness with regression weight of .300, p-value .000.

## **Relationship between Innovation and Primary School Academic Performance**

The role of education is to develop critical skills for improved conditions for innovations in the country which requires innovations within the educational sector itself (Falch & Mang, 2015). The use of technology in teaching is not a panacea for improved students' achievement but also to transform educational system. The introduction of computers in classrooms is often referred to as the most significant innovation (OECD, 2018, Abu-Shreah & Zidan, 2017). Educational innovations can improve learning outcomes and the quality of education provision. The arrival of computers, tablets, and the Internet has led to the re-thinking of many traditional teaching practices and is generally seen as an opportunity for improvement (The Economist, 2013).

The new technologies increase the transparency of student progress and allow teachers to monitor and adapt to students more easily. Without the need of manually checking homework or quizzing the class during lessons, teachers can track where each and every student stand (Falch & Mang, 2015). Innovation in the school system has been a good mechanism that can lead to primary school academic performance (Shen, 2008). The education sector should therefore introduce the changes it needs to adapt to societal needs. For example, education systems need to adopt teaching,

learning or organizational practices that have been identified as helping to foster skills for innovation (OECD, 2017).

### **The Relationship among TQM, Innovation and Primary School Academic Performance**

Numerous studies across the world have empirically demonstrated that the TQM are positively related to innovation which in turn lead to organizational performance (Abrunhosa, Moura, & Sa, 2008; Teh, Yong, Arumugam & Ooi, 2009; Martinez-Costa & Martinez-Lorente, 2008; Zakuan, Yusof, Laosirihongthong & Shaharoun, 2010; Prajogo & Hong, 2008; Saberi & Romle, 2015; Abu-Shreah & Zidan, 2017). TQM elements are now widely adopted in primary education. The process of incorporating TQM elements into teaching have shown to improve performance and also the overall quality of the teaching for students and teachers improvement (Saberi & Romle, 2015; Farkhondehzadeh, Karim, Azizi, Roshanfekar, Hatami, 2013). With this contribution, TQM has become the most prestigious quality indicator for measuring the overall quality of an educational system.

In another development, TQM emphasizes on improving organizational effectiveness and responsiveness to students' needs (Fernandes & Lourenço, 2011). The goals of TQM are the organizational distinction and the students' satisfaction (Han et al., 2018). Innovation is related with the adoption and application of new knowledge and practices, including the ability of an organization to adopt or create new ideas and implement these ideas in developing new products, services, and working processes and procedures and improving those already established (Bates & Khasawneh 2004). Primary school academic performance means measurable trait and discernable character of a person in a particular condition especially in empirical investigation (Al-Ettayem & Al-Zu'bi, (2015).

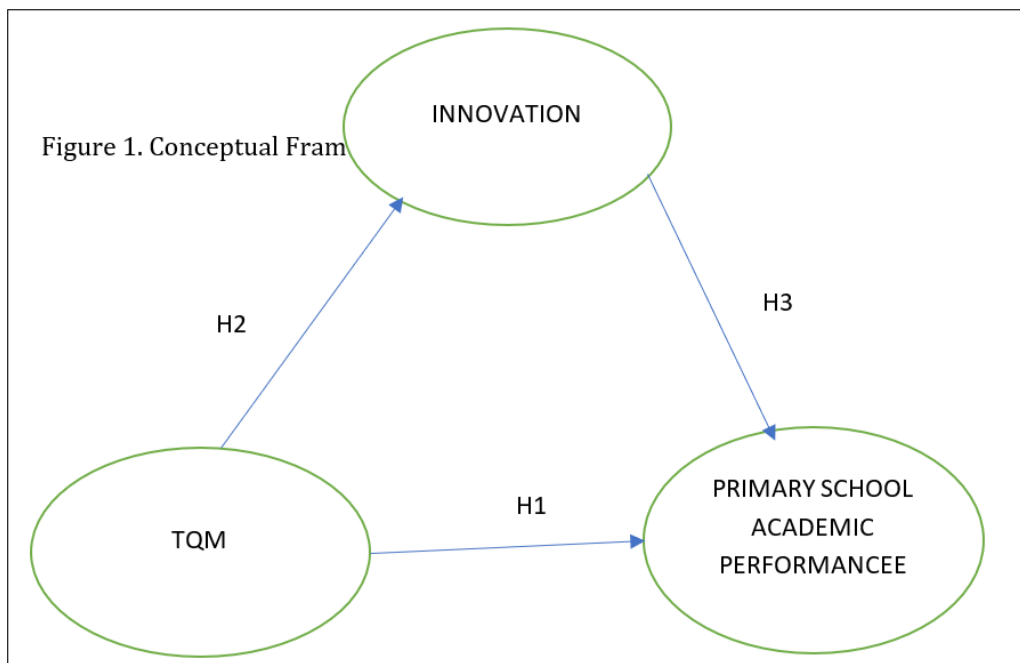
Furthermore, school management must be involved in the effectiveness of TQM, innovation and they must provide vision, reinforce values emphasizing quality, set goals, allow free flow of information, ensure training and development of staff, deploy resources for the quality programs and monitor the progress of the students (Harold & Heinz, 2010). Quality management is a source of enhancing school performance through continuous improvement in school activities (Teh, Yong, Arumugam & Ooi, 2009). School management influences how students learn, and good management helps ensure that school funds are used prudently (U.S.A.I.D, 2008). Related literature also show that students focus is critical in TQM (Arumugam, Ooi & Fong, 2008; Zakuan, Yusof, Laosirihongthong & Shaharoun, 2010; Alison, & Hon Keung, 2011). With all the foregoing discussion, relationship exist among TQM, innovation, and

primary school academic performance. Based on the development, this conceptual framework was emanated.

Based on above quality discussions on TQM. TQM has now been a key concept for the improvement of primary school academic performance in UAE. By supporting TQM in the schools in UAE, the aims and objectives of to which primary schools was set up would be accomplish. TQM is not something to be underrated but it must internalize by the top management of the school as well as teachers working in the system. It is believe of this study that if TQM is adequately practice in the UAE schools, UAE schools would be counted as part of performing schools in the world.

### Conceptual Framework of the Study

As shown in the Figure 1, the conceptual framework demonstrated the direct relationship between TQM and primary school academic performance. Also, it is also showing mediating role of innovation on the relationship between TQM and primary school academic performance. H1, show the relationship between TQM and primary school academic performance. H2 in the framework show the relationship between TQM and innovation. The H3 explain the association that exist between innovation and primary school academic performance. H4 denote mediating role of innovation on TQM and primary school academic performance.



## **Methodology**

Methodology of this study showed how the research would be carried out. The following were discussed, namely: research design, structural equation modeling (SEM), population, sample size, sampling procedure, instrument of the study and data analysis

## **Research Design**

This study is determined to collect accurate data for TQM and Primary school academic performance (primary school academic performance). Because of this, the study used survey method. Creswell (2007) defined survey method as a technique in gathering and analyzing huge amount of data with the purpose of draw inference. Therefore, this study is to investigate the relationship between tqm and primary school academic performance with innovation as a mediator using SEM.

## **Structural Equation Modeling (SEM)**

Structural Equation Modeling (SEM) was used using AMOS (Version 21) model-fitting program to test all the research hypotheses formulated in the study. SEM has been a popular and comprehensive tool for analysis complex relationship independent variable, dependent variable as well as their items (Hair et al., 2010). This is fundamental for the assessment of complex relationship among the variable to be used. It is necessary for the researcher to test a set of regression equation at a time (Bryne, 2012; Kline, 2008) and as well as analyze multiple layers of the linkages among the variables at a period of time (Bullock, Harlow & Mulaik, 1994).

## **Population**

In Abu Dhabi emirate, the three emirates exist which are Abu Dhabi Island, Al-Ain and Al-Dhafra. The total number of primary schools in Abu Dhabi emirate was 102 schools. Out of these 102 schools in Abu Dhabi emirate, the Abu Dhabi Island got 43 schools, Al-Ain got 38 schools and Al-Dhafra got 21 schools. In the same vein, total numbers of primary schools' teachers in Abu Dhabi emirate were 6982. Out of this number, Abu Dhabi Island got 3193 teachers, Al-Ain got 3036 teachers and Al-Dhafra got 753 respectively. Therefore, the focus population of this current study covered Abu Dhabi Island with 3193 teachers. From this population 342 teachers were selected with 43 schools in Abu Dhabi.

## **Sample Size and Sampling Procedure**

Sampling technique is important in any research, and it is used to draw out the sample of the population. By defining sample size. It is important for a researcher to consider



whether the sample size is adequate to provide enough accuracy to base decisions on the findings with confidence (Chuan (2006). Thus, having look at Krejcie and Morgan's (1970) table for determining sample size, for a given population of 3193, a sample size of 342 respondents were needed to represent a cross-section of the population. However, this mean that in this study, the total sample size used was 342 based on the sample size Table. Based on sample size of 342 needed, quota random sampling technique was adopted to select the representatives of the population. Quota random sampling technique is a method of non-probability sampling in which samples are choosing in line with probability proportionate to the population of a variable in the population of stated in the study (Babbie, 2010). Therefore, Quota sampling technique was used to select 342 teachers from 3193 teachers (population). To get this, subjects for the nth unit will be selected starting from the first n subject. One of usefulness of quota sampling technique was because data collection can be done in a very short period of time. For each of the school to adequately represent without bias, this formula was used. The sample size is divided by the number of populations. For instance,  $342 \div 3193$  multiply by 100 which gave 0.107% (Chua, 2012, Bryman, 2016). This means each school has equal quota of 0.107%. Having determine the quota for each school, simple random sampling technique was used to select teachers' that would partake in the exercise. In this study, two sampling techniques were used i.e., quota and simple random technique.

### **Instrument of the study**

TQM was measure with school leadership (five items), students focus (five items), human resource management (five items) and strategic planning (five items), training (five items) and knowledge and process management (five items). Some of the items were adapted from these following scholars (Prajogo and McDermott, C. M); Ndibe & Campus 2014; Gemechu (2014). Second, the third section of the questionnaire was innovation with 4 dimensions such as students' center approach (five items), blended learning, innovation management (five items) and transformational leadership (five items). The items were adapted from Idris, 2016; Ja'ashan, 2015; Donmez & Toker, 2017; Bauk, 2015; Oyeronke, & Fagbohun, 2013; Ghavifekr & Rosdy, 2015; Toytok, 2016). The last section of the questionnaire was measured with 3 dimensions which include primary school academic performance (five items), completion rate of students (five items) and learning facilities (five items). All the items were adapted from notable scholars like MolokoMphale & Mhlauli, 2014; Akessa, & Dhufera 2015. Meanwhile, some of these constructs were measured with five-points Likert scale ranging from 1 strongly disagree, 2 disagree, 3 neutral, 4 agree to 5 (strongly agree).

## **Data Analysis**

The cleaning and screening of data is one of the first method or technique when it comes to analysis data. This stage assists to know if there are problems with information gathered and validating the data before the actual data analysis. Also, cleaning and screening of the data are performed through the examination of specific descriptive statistics as well as the frequency distribution. In this study, EFA was examined to discover the contracts and underlying items. The purpose of performed EFA was to know which items will bring problems in the further analysis. Structural equation modeling was also used to analysis the relationship between independent and dependent variables of the study.

## **Findings of the Study**

The structural equation was used to hypothesis the relationship between TQM and primary school academic performance with innovation as a mediator using SEM. The results of SEM indicated that all the hypothesize models were significant and acceptable (Hair et al. 2010). In the study, direct and indirect effect were examined to determine the extent of the relationship among the variable. The direct effect is the effect from independent variable to dependent variable, while the indirect effect is the effect from independent variable to dependent variable that goes indirectly through the mediating variable (Zainudin, 2012). Thus, the direct effect between TQM and primary school academic performance was -0.50 which indicated significant. The indirect effect between TQM and primary school academic performance accounted for 0.92 which means significant while the indirect effect between Innovation and primary school academic performance accounted for 0.1.51 which indicated significant. This shows that relationship occur between two variables.

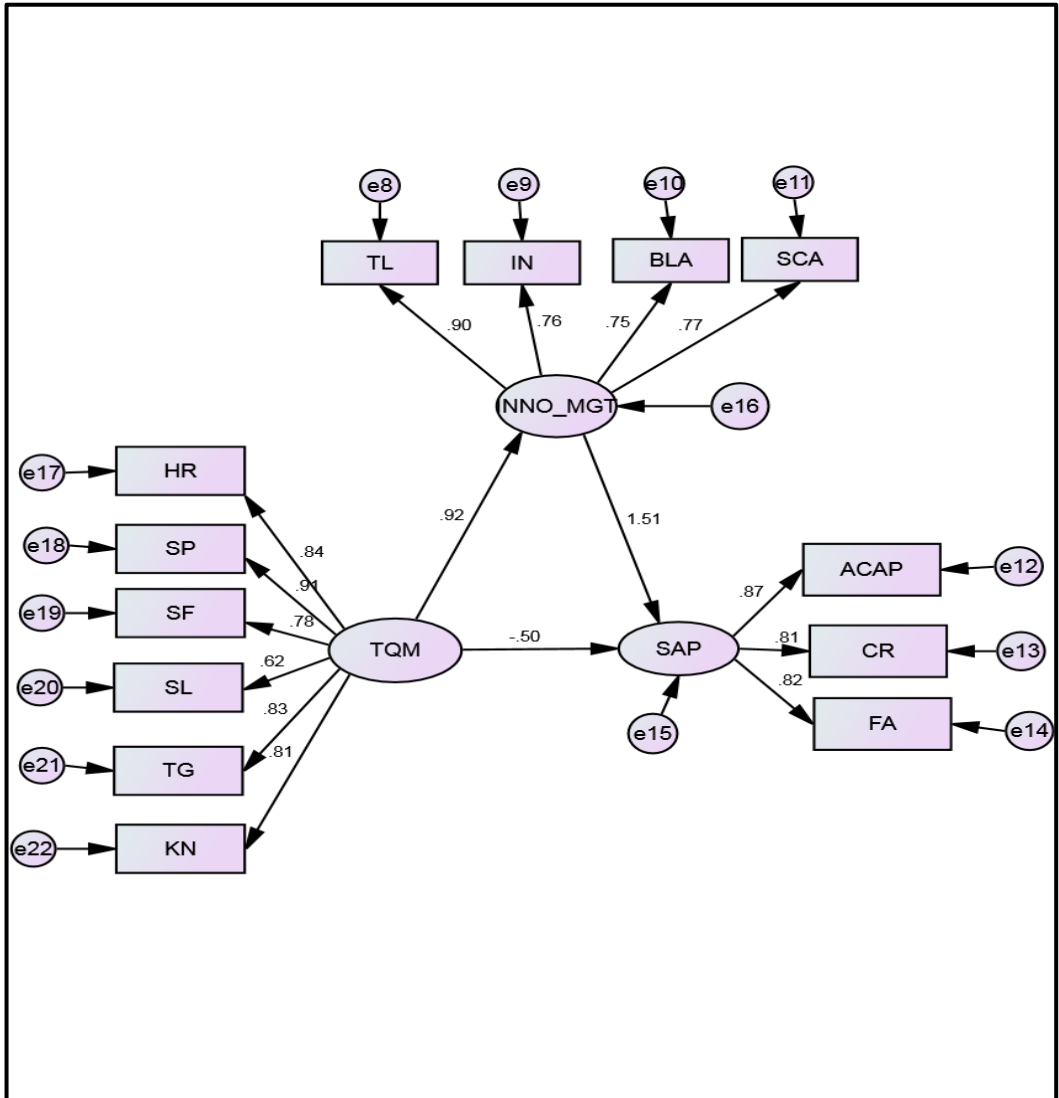


Figure 2. Structural equation model on the relationship between TQM and primary school academic performance

Therefore, the mediation occurs since indirect effect was less than direct effect. This type of mediation is partial mediation because direct effect still relevant after mediator enters the model. This explanation was the interpretation of the results obtained in Figure. This shows that when mediator enter the relationship between TQM and primary school academic performance, TQM still relevant and strong. Table 1 shows detail the direct and indirect results of the model.

The four hypotheses were tested and analyzed in this study. Direct and indirect

Construct		Construct	Estimate	S.E.	C.R.	P	Decision
Innovation	<- --	TQM	.917	.029	27.792	***	Significant
Primary school academic performance	<- --	TQM	-.501	.137	-3.557	***	Significant
Primary school academic performance	<- --	TQM	1.509	.160	10.323	***	Significant

research hypotheses were performed through Structural model analysis. Mediation analysis was used to determine the indirect effects hypotheses. The results of the analysis indicate that TQM influence primary school academic performance and TQM has positive relationship with innovation. Penultimately, the research established that Innovation mediates the relationships between TQM influence primary school academic performance with partial mediation. The summary of hypotheses testing was shown in Table 1

Table 1. Standardized regression weight and its significant for each path

Note, S.E = standard error; C.R = critical region; P = probability Table 2. Summary of

Table 2. Summary of hypotheses testing for H1-H4

	Hypotheses	Results
<b>H1</b>	There is a significant relationship between TQM and primary school academic performance in Abu Dhabi	Supported
<b>H2</b>	There is a significant relationship between TQM and innovation in Abu Dhabi	Supported
<b>H3</b>	There is a significant relationship between innovation and primary school academic performance in Abu Dhabi	Supported
<b>H4</b>	There is a significant contribution of mediating role of innovation on the relationship between TQM and primary school academic performance in Abu Dhabi	Partial Mediation

## Discussion

This study tested the direct relationship between TQM and primary school academic performance using the structural analysis. The regression weight demonstrated that direct hypothesis between TQM and primary school academic performance was supported. The results revealed that the TQM has a significant effect on primary students' academic performance.

First, this study tested the direct relationship between TQM and primary school academic performance using SEM. Based on the regression weight of the analysis which showed direct effect between TQM and primary school academic performance was supported at -0.50 (acceptable value). The result showed that TQM has significant effect on primary school academic performance. This demonstrated that TQM has positive relationship with primary school academic performance. As the various scholars have asserted that TQM has strong relationship with academic performance of the student in an academic environment, the investigation has shown that TQM possibly made an improvement in the teaching profession of the students (Joseph, Okwara & Ajowi, 2017).

Second, the direct relationship between TQM and innovation with the using of SEM analysis was also tested. The regression weight for direct effect TQM and innovation was supported at 0.92 (acceptable value). The result showed that TQM has direct relation with innovation. This finding was in line with the point made by Szeto and Mitra (2000) innovation as the integration of different activities, well-coordinated in an organized setting with pooling of resources, research, restructuring and development. The findings of this study were in line with point suggested by Tidd, Bessant & Pavitt (1997); Slater & Narver (1998); Kim & Marbougne (1999) that TQM and innovation can lead effective performance in an organization.

Third, equally, the study has tested the direct relationship between innovation and primary school academic performance but the regression weight between innovation and primary school academic performance was supported at 1.050 (acceptable value). This is showed that innovation has influence and significant relationship with Primary School Academic Performance. This finding is also in line with the result of the studies conducted by Falch and Mang (2015) that the primary objective of education is to provide innovative ideas through which other critical skills would develop in order to enhance the educational sectors to thrive. An organization that internalizes innovation would yield better performance. Based on ongoing discussion, Shreah & Zidan (2017) pointed that the use of technological tools as part of innovation

mechanism in schools will do help in transforming the educational for betterment, but to propose an aggressive policy on education through the improvement of TQM.

Lastly, the current study also tested mediating role of innovation on the relationship between TQM and primary school academic performance. The mediator testing explained that the relationship between tqm and primary school academic performance could be explaining with innovation. In fact, most previous studies only examined TQM and organizational performance, TQM and leadership but innovation was not integrated. The SEM analysis revealed that innovation mediate the relationship between TQM and primary school academic performance. This because when the mediator entered the relationship tqm and primary school academic performance, TQM still relevant. The finding was in line with Akhtar, Zameer and Saeed (2014) who investigated the impact of TQM and performance of organization which revealed significant relationship and it is determinant of performance. TQM and innovation have been coming a debatable issue whether positive and negative relationship between TQM and innovation exist. Based on this finding, scholars such as (Wind & Mahajan, 1997; Tidd, Bessant, and Pavitt, 1997; Slater, Narver, 1998; Kim & Marbougne, 1999) positioned their opinion that TQM can hinder innovation but the result of Thai Hoang, Igel & Laosirihongthong (2006) oppose the TQM and innovation worked together for benefits of school performance.

### **Recommendation for Policy Maker and School Heads**

The TQM and primary school academic performance in Abu Dhabi: Innovation as a mediator has scientifically been examined and findings also outlined. Based on the investigations and findings so far, the study basically recommended among the following.

It would be a huge advantage for the students and teachers if decision-makers and other constituted authorities can endeavour to make available the financial assistance for procuring the latest sophisticated technology that will aid school academic performance through innovation so that TQM would be guaranteed. Based on this recommendation, Adeboyeje (2000) expressed that technology and facilities provided in the school system increase the performance of students. Further explained that it is necessary for school management to look into that area.

As leadership of school is important to the survival of the school, policymakers and other related agencies should attempt to subject teachers to rigorous training to be effective in TQM in order to improve in teaching method so that primary school academic performance will increase as an innovative gesture. This recommendation

was in line with the work done by Katcher and Snyder (2003) that training in an organization are based on three needs such as reducing supervision, for employees to meet specification with job and needs of organization and to increase productivity.

This study recommends that procurement of innovative materials and other facilities like computers, electronic gadgets and internet outfits should be available in all schools in Abu Dhabi in order for students to explore them for academic advantage like those in Europe and United States and this will result to increment in TQM. In line with this recommendation, Falch & Mang, (2015) pointed that new technology is something that increase students' progress and allow teachers to monitor and adapt to students more easily.

### **Conclusion**

TQM is a key factor that determine the realization of primary school academic performance. Many developing countries are currently aspiring toward higher quality education systems. This study examined the relationship between TQM and primary school academic performance with innovation as a mediator in Abu Dhabi using SEM. The findings of the study revealed that significant relationship was found between tqm and primary school academic performance; TQM and innovation; innovation and primary school academic performance. Also, innovation serves as partial mediator between TQM and primary school academic performance. All the three objectives formulated in the study were fulfilled. The conceptual model of this study was developed from relevant literature which covers some of the key variables such as TQM, primary school academic performance and innovation as well.

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