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A PROTOTYPE INSTRUMENT FOR MEASURING SERVICE QUALITY BY GENERATION X PARENTS: A CASE STUDY AT THE INTERNATIONAL SCHOOL OF MACAO

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ABSTRACT

This quantitative research aimed to advance the use of the service quality construct to measure the perceived service quality of K-12 international schools by Generation X parents. It proposed an approach that contextualised previously published scale items for private healthcare into educationally relevant scale items. The revised scale items were developed and confirmed through an Item Objective Congruence Test (IOC) by industry experts. The instrument was tested for reliability through a pilot test and then administered to 499 parents in a school. The results used Exploratory Factor Analysis (EFA) to reduce the complexity of the standard 5 service quality (SERQUAL) factors into 3 factors: Responsibility, Assurance and Professionalism, Empathy and Facilities which accounted for 65% of the variance of the SERVQUAL variables amongst Generation X parents at The International School of Macao. The revised instrument can be used to effectively measure parents' perception of service quality in an international school setting.

Contribution/ Originality: This research contributes to the existing literature of service quality by revising the instrument to contextually and reliably measure parents' perception of service quality in an international school setting. School leadership can reliably use the tool in school surveys to identify areas for improvement in service quality.

1. INTRODUCTION

Despite being a service industry, there is a shortage of reliable instruments available to measure parents' perception of the service they receive while their children attend school. Parents' satisfaction is often measured on an annual basis but there is no reliable method for measuring parents' perceived service quality. Satisfaction and perceived service quality are the two key components required to acquire a competitive advantage (Cronin, Brady & Hult, 2000; Zeithaml, Berry & Parasuraman, 1996). While research has been conducted on service quality in higher education (Annamdevula & Bellamkonda, 2016a, 2016b; Nguyen, 2013; Shurair & Pokharel, 2019; Singh & Kumar, 2014; Sultan & Wong, 2012, 2014) there remains a noticeable gap in K-12 education. A deeper understanding of parents' experiences will enable the school to adapt and improve their services, which in turn will enable the school to not only meet but, hopefully, exceed parents' expectations. Therefore, the aim of this research is to develop a prototype instrument to measure parents' perception of service quality in a K-12 private school.

Objectives of this research:

1. To modify the SERVQUAL instrument to suit the specific context of Generation X parents in The International School of Macao.
2. To explore the possibility of using a reliable, modified SERVQUAL prototype instrument to measure parents' perception of service quality.

2. LITERATURE REVIEW

As the aim of the study is focussed on modifying a current SERVQUAL instrument to fit the specific research context of the current study, the literature review is limited in scope. Limiting the scope will enable an increase in focus on the conversion of the instrument and less on the content of the larger research project for which the instrument will be used.

2.1. Service Quality

Service quality is most often based on the expectancy disconfirmation theory (Clow, Kurtz, Ozment & Soo, 1997; Gronroos, 1984; Parasuramam, Zeithaml & Berry, 1985). As such, it can be difficult to measure service quality. Two service quality models are typically accepted in the literature. In 1985, Parasuraman and colleagues proposed a model for measuring service quality that consisted of 5 dimensions: tangibles, reliability, responsiveness, assurance and empathy (Parasuramam et al., 1985). This model became known as the SERVQUAL model and has been used widely by researchers (Arasli, Mehtap-Smadi & Turan, 2005; Choudhury, 2014; Kassim & Abdullah, 2010; Marković, Lončarić & Lončarić, 2014; Sibarani & Riani, 2017) and specifically, to measure service quality in higher education (Barnes, 2007; Nguyen, 2013; Pariseau & McDaniel, 1997; Ruby, 1998). The SERVQUAL model is based on the premise that customers determine quality when the delivered service exceeds their expectation. While Gronroos developed a model focused on the technical and functional aspects of service quality (Gronroos, 1984; Teo & Soutar, 2012), researchers accept that SERVQUAL is an effective tool for measuring and evaluating service quality in higher education (Barnes, 2007; O'Neill & Palmer, 2004).

While the SERVQUAL model has been used extensively in many industries, its use in education has been limited to higher education (Nguyen, 2013; Quinn, Lemay, Larsen & Johnson, 2009) and rarely used in K-12 education. In universities students receiving the service are also the ones determining if the service meets their expectations (Hill, 1995). In K-12 education, parents determine if the service meets their expectations though they may have only received some of the services directly and some of the services indirectly. As such, there is a need for a different measurement instrument that addresses this gap. The subdomains and scale items associated with the SERVQUAL model must be contextualized to the international K-12 market and be based on the parent as the customer.

2.2. Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) is a useful procedure to execute on the correlation matrix between multiple observed variables to investigate the structural equivalence (Fontaine, 2005). By analysing the correlations between the variables, EFA seeks to extract the maximum variance from the data and reliably reduce the complexity of the variables (Chatfield & Collins, 2017). EFA can be a valuable process prior to Confirmatory Factor Analysis (CFA) (Anderson & Gerbing, 1988; Gerbing & Hamilton, 1996).

Within EFA, several different extraction and rotation methods are available. While Principal Component Analysis (PCA) is the most common method mentioned in the literature, it may not always provide the best results for the given data (Costello & Osborne, 2005). Component analysis is typically seen as a data reduction strategy. Factor analysis is intended to reveal any latent variables that cause the manifest variables to have covariance (Costello & Osborne, 2005). In SPSS, factor analysis is called Principal Axis Factoring (PAF) and when the data is

normally distributed, Maximum Likelihood (ML) or PAF will typically yield the best results. The most common method of rotation is Varimax.

EFA has successfully been used to identify the underlying latent variables that significantly determine service quality in hospitality (Sivesan, 2020) health care (Jakupovic, Solakovic, Celebic & Kulovic, 2018) higher education (Camgoz-Akdag & Zaim, 2012; Nguyen, 2013; Singh & Kumar, 2014) and in university libraries (Velnamby & Sivesan, 2013).

2.3. Generation X

Parents of international school students span multiple generations. Generation X parents, born between 1965 and 1980 inclusively, may be more interested in the advantages of their own child than the overall well-being often espoused by the Baby Boomer generation and expect "schools to be run like customer-oriented businesses" and will "evaluate the transaction on the basis of the value it appears to offer" (Howe, 2010).

While the SERVQUAL model has been around for many years and used in many industries, its use has been limited in K-12 education, even in higher education where focus on student perspective is not directly transferable to the K-12 sector where the customer is the parent and not the student. As such, it is essential that researchers contextualize their instruments by using IOC and EFA.

2.4. Research Hypothesis

It is anticipated that the contextualization of the SERVQUAL model will provide a reliable instrument to measure parents' satisfaction with K-12 international schools.

3. METHODOLOGY

To develop the prototype instrument to measure service quality in an international school, scale items from private health care were first modified to meet the educational context. The 23 scale items developed by Lam (1997) and operationalized by Cham, Lim, Aik and Tay (2016) were selected based on reliability as evidenced by its Cronbach Alpha value of 0.839 (Cham et al., 2016). The scale items used the same subdomains previously identified with the SERVQUAL model.

The researcher converted the scale items to fit the K-12 education context and the conversion was verified through an Item Objective Congruence test (IOC) featuring 3 experts in the K-12 education sector. The IOC maintained the original 5 sub-domains while creating 27 scale items and highlighted the fact that teachers, school leadership and support staff played significant roles in providing service to parents and students.

The IOC Test featured three experts in international education: a dean of education at the University of Macau, a former associate dean of education at the University of Alberta and the program leader for the Alberta Accredited International Schools at Alberta Education. The experts were asked to determine the suitability of the construct to measure the given variable. Items that did not achieve a majority approval (>0.6) were revised based on the expert feedback and resubmitted during the second round. Table 1 presents the results of the IOC.

Table 1. Results of the item objective congruence test.

Item	1st Expert	2nd Expert	3rd Expert	Total Scores	IOC Scores	Result
SQT 1	1	1	1	3	1	Accepted
2	1	1	1	3	1	Accepted
3	1	-1	1	1	0.33	Revised and resubmitted
3 revised	1	1	1	3	1	Accepted
4	1	-1	1	1	0.33	Revised and resubmitted
4 revised	1	1	1	3	1	Accepted
5	1	1	1	3	1	Accepted
SQR 1	1	1	0	2	0.67	Accepted

Item	1st Expert	2nd Expert	3rd Expert	Total Scores	IOC Scores	Result
2	1	1	1	3	1	Accepted
3	1	1	0	2	0.67	Accepted
4	1	1	1	3	1	Accepted
5	1	1	0	2	0.67	Accepted
SQ Resp 1	1	0	1	2	0.67	Accepted
2	1	1	1	3	1	Accepted
3	1	0	1	2	0.67	Accepted
4	1	0	1	2	0.67	Accepted
5	1	1	1	3	1	Accepted
SQA 1	1	1	1	3	1	Accepted
2	1	0	1	2	0.67	Accepted
3	1	1	1	3	1	Accepted
4	1	1	1	3	1	Accepted
5	1	1	1	3	1	Accepted
6	1	1	1	3	1	Accepted
SQEmp 1	1	0	1	2	0.67	Accepted
2	1	0	1	2	0.67	Accepted
3	1	1	1	3	1	Accepted
4	1	1	0	2	0.67	Accepted
5	1	1	1	3	1	Accepted
6	1	1	1	3	1	Accepted

In the end, the 23 items and 5 subdomains of Cham et al. (2016) were converted to 27 items and the original 5 subdomains were retained. Table 2 presents the revisions of the scale items to fit an educational K-12 setting.

Table 2. Conversion of Cham et al. (2016) SERVQUAL to K-12 context.

Subdomain	Original Scale Item	Revised Scale Item
Tangible	This hospital has up-to-date equipment	This school has up-to-date equipment.
	The physical facilities of this hospital are visually appealing	The physical facilities of this school are visually appealing.
	The staff of this hospital appearance are neat	The teachers at this school present and conduct themselves in a professional manner. The office and support staff at this school present and conduct themselves in a professional manner.
	The materials associated with this hospital are visually appealing	The educational materials associated with this school are visually appealing.
Reliability	The staff of this hospital perform the medical service right on the first time	The school performs the educational service well.
	The staff of this hospital provide dependable services as promised	The school provides dependable services as promised.
	The staff of this hospital are sincere to solve my problems	The school is sincere in solving my problems.
	The staff of this hospital provide services at the appointed time	The school provides meetings and events as scheduled.
	This hospital keeps accurate medical records	This school keeps accurate educational records.
Responsiveness	The staffs of this hospital are never too busy to respond to my requests	The school responds to my requests promptly.
	The staffs of this hospital tell me when the services will be performed	The school tells me when the school events and activities will occur.
	The staffs of this hospital are always willing to help me	The teachers of this school are always willing to help me or my child. The staff of this school are always willing to help me or my child.
	I received prompt service from the staffs of this hospital	I received prompt service from the school.
Assurance	The staffs of this hospital are trustworthy	This school is trustworthy.
	I feel safe in receiving services from the staffs of this hospital	I feel positive about receiving education and support services from the school.
	The staffs of this hospital are consistently	The teachers are consistently courteous to

Subdomain	Original Scale Item	Revised Scale Item
	courteous to me	me. The office and support staff are consistently courteous to me.
	The staffs of this hospital have the knowledge to answer my questions	The teachers of this school have the knowledge to answer my questions. The staff of this school have the knowledge to answer my question.
Empathy	The staffs of this hospital give individual attention to me	The office and support staff of this school give individual attention to me or my child. The teachers of this school give individual attention to me or my child.
	This hospital has convenient operating hours for my needs	This school schedules meetings that are convenient for my needs.
	This hospital has my best interests at heart	This school has the best interests of my child at heart.
	The staffs of this hospital understand my specific needs	The teachers of this school understand my child's specific needs. The staff of this school understand my child's specific needs.

3.1. Reliability of Modified SERVQUAL Scale Items

A pilot test of the modified scale items was conducted by directly emailing 99 parents of current students and the line was closed after 36 responses were received, of which 33 responses were complete and considered valid. The collected data were used to test the reliability of the modified scale items. Each of the 5 subdomains passed the reliability test and the whole SERVQUAL construct achieved a Cronbach Alpha value of 0.956 which indicated that the items were internally consistent and reliably indicated the service quality construct. Table 3 presents the reliability test results following the pilot test.

Table 3. Reliability test results of modified scale items after pilot test.

Variable	Scale Items	Cronbach's Alpha	
SQT	5 items	0.832	
SQR	5 items	0.850	
SQResp	5 items	0.860	0.956
SQA	6 items	0.817	
SQEmp	6 items	0.789	

4. RESULTS

Given the reliability of the modified scale items after the pilot test, the prototype instrument was administered to the Gen X sample of parents at The International School of Macao. The teachers requested their students' parents to complete the survey in either English or Chinese and this resulted in 499 valid responses.

4.1. Demographics

Of the 499 valid responses from parents, 59.7% (298) were female, 39.7% (198) were male and 0.6% (3) preferred not to state their gender.

4.2. Reliability of Survey Results

The collected data were analysed again using SPSS to ensure content validity. The larger sample yielded higher Cronbach Alpha values and reaffirmed the content validity of the instrument. Table 4 presents the reliability test results after the survey.

Table 4. Reliability test results of modified scale items after sample survey.

Variable	Scale Items	Cronbach Alpha	
SQT	5 items	0.846	0.968
SQR	5 items	0.883	
SQResp	5 items	0.897	
SQA	6 items	0.915	
SQEmp	6 items	0.909	

4.3. Exploratory Factor Analysis

To examine the factor structure of the variables, an Exploratory Factor Analysis (EFA) was done using SPSS. The objective of EFA was to reduce the number of dimensions necessary to describe the relationships among the variables. Bartlett's Test of Sphericity was conducted to ensure that the data were suitable for factor analysis. Bartlett's Test of Sphericity is a statistical test that estimates the overall significance of all correlations within a correlation matrix. The results shown in Table 5 indicate a highly significant value (Sig. = 0.000) and indicate that the factor analysis process is suitable for testing the data's multi-dimensionality. According to the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO), the sampling adequacy was 0.964 and thus considered acceptable, as the minimum acceptable value is 0.6 (Kim & Mueller, 1978).

Table 5. KMO and Bartlett's test measure of service quality.

Test	Measure	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.964
Bartlett's Test of Sphericity	Approx. Chi-Square	11075.927
	Df	351
	Sig.	0.000

Exploratory factor analysis using Principal Axis Factoring (PAF) with Varimax rotation was used to identify the underlying structure. PAF is useful when the variable cannot be measured directly in the data, so only factors with eigen values greater than one were retained, and the rotation sums of squared loadings accounted for 61.387% of cumulative variance as seen in Table 6.

Table 6. Results of PAF on service quality.

Factor	Initial Eigen Values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.088	55.883	55.883	14.71	54.5	54.471	9.083	33.642	33.642
2	1.325	4.907	60.79	0.983	3.64	58.112	4.629	17.144	50.787
3	1.24	4.593	65.383	0.884	3.28	61.387	2.862	10.6	61.387

4.4. Factor Analysis of Service Quality

Factor analysis of service quality was conducted, and the component matrix was further rotated to improve the loadings. As can be seen in Table 7, the original 5 subdomains of service quality were not supported but reduced to 3 subdomains. Generally, factor loadings exceeding 0.5 are considered acceptable (Hair, Black, Babin & Anderson, 2010). However, even factor loadings as low as 0.3 can be considered moderately high (Kline, 2015). All the 27 items were retained with only 1 item failing to exceed the higher factor loading threshold of 0.5. However, it was retained along with 2 other items to complete the newly formed Facilities factor (FAC). This is acceptable as the Cronbach Alpha value with its inclusion is 0.802 and still exceeds the 0.7 recommended minimum for content validity. It is worth noting that the original Empathy subdomain (EMP) from SERVQUAL was retained in its

entirety, suggesting that this domain is important to parents. All the other items were combined into factors that are best described as Responsibility, Assurance and Professionalism (RAP).

Table 7. Factor loading of scale items and new classification.

Original SERVQUAL Subdomain	Scale Item	Responsibility, Assurance, Professionalism (RAP)	Empathy (EMP)	Facilities (FAC)
		SQ1	SQ2	SQ3
Tangible	This school has up-to-date equipment.	0.246	0.198	0.712
	The physical facilities of this school are visually appealing.	0.223	0.168	0.778
	The teachers at this school present and conduct themselves in a professional manner.	0.627	0.268	0.332
	The office and support staff at this school present and conduct themselves in a professional manner.	0.547	0.331	0.362
	The educational materials associated with this school are visually appealing.	0.466	0.305	0.489
Reliability	The school performs the educational service well.	0.676	0.297	0.319
	The school provides dependable services as promised.	0.662	0.327	0.34
	The school is sincere to solve my problems.	0.676	0.335	0.2
	The school provides meetings and events as scheduled.	0.657	0.23	0.291
	This school keeps accurate educational records.	0.57	0.234	0.287
Responsibility	The school responds to my requests promptly.	0.648	0.289	0.234
	The school tells me when the school events and activities will occur.	0.592	0.242	0.31
	The teachers of this school are always willing to help me or my child.	0.74	0.322	0.116
	The staff of this school are always willing to help me or my child.	0.674	0.375	0.195
	I received prompt service from the school.	0.687	0.334	0.285
Assurance	This school is trustworthy.	0.721	0.308	0.27
	I feel positive about receiving education and support services from the school.	0.667	0.347	0.178
	The teachers are consistently courteous to me.	0.664	0.347	0.178
	The office and support staff are consistently courteous to me.	0.597	0.343	0.19
	The teachers of this school have the knowledge to answer my questions.	0.736	0.365	0.14
	The staff of this school have the knowledge to answer my questions.	0.659	0.386	0.165
Empathy	The office and support staff of this school give individual attention to me or my child.	0.239	0.825	0.205
	The teachers of this school give individual attention to me or my child.	0.397	0.707	0.135
	This school schedules meetings that are convenient for my needs.	0.338	0.515	0.231
	This school has the best interests of my child at heart.	0.527	0.562	0.242
	The teachers of this school understand my child's specific needs.	0.488	0.636	0.205
	The staff of this school understand my child's specific needs.	0.36	0.687	0.238

The resulting 3 factors and their corresponding scale items were further analysed for content validity and met the minimum requirement of 0.7. Table 8 presents the content validity values after EFA.

Table 8. Cronbach Alpha values of new factors after EFA.

Variable	% of Variance	Scale Items	Cronbach Alpha	
SQ1 – Responsibility, Assurance, Professionalism (RAP)	55.583	18 items	0.963	0.854
SQ2 – Empathy (EMP)	4.907	6 items	0.909	
SQ3 – Facilities (FAC)	4.593	3 items	0.802	

The first factor, termed Responsibility, Assurance and Professionalism (RAP) accounts for most of the variance (55.583%) within the service quality construct. It is made up of all the scale items from the reliability, responsibility and assurance SERVQUAL subdomains along with two items previously associated with the Tangible subdomain. These two items speak directly to the professional presentation and conduct of the staff and teachers. This new combined factor must be heavily considered in any measurement of service quality in K12 education.

The second factor, termed Empathy (EMP) mirrors the scale items of the original SERVQUAL model and accounts for 4.9% of the variance. The third factor, termed Facilities (FAC) includes 3 of the 5 items in the original Tangible subdomain of SERQUAL and includes scale items about the building, equipment and materials and accounts for 4.6% of the variance.

5. DISCUSSION

The purpose of this study was to develop a contextualized and reliable instrument for determining the perceived level of service quality provided to parents of K-12 international schools. While service quality has been researched in higher education (Nguyen, 2013; Quinn et al., 2009; Singh & Kumar, 2014) there are very few studies of service quality being measured in K-12 schools. As such, the focus of this research has been on the scientific process of building the instrument.

Nguyen (2013) used a qualitative study to adapt the SERVQUAL scale items, whereas the current research used a more quantitative method, namely the Item Objective Congruence Test (IOC). However, both studies confirmed all five dimensions previously identified by Parasuramam et al. (1985) were relevant in the K-12 context. The use of the IOC to contextualize the scale items for service quality in a K-12 international education setting and the use of Exploratory Factor Analysis (EFA) on the results yields a reliable prototype instrument. The IOC process highlighted the importance of asking parents about their experiences with the school in general as well as specifically with the teachers and the support staff. Parents are the customers of the international school, and it is important to recognize that parents and students receive service from both teachers and support staff, which may affect their perception of service quality. The EFA process builds upon the work done to contextualize the SERVQUAL model for higher education (Camgoz-Akdag & Zaim, 2012).

Throughout the development of the tool, the scale items and the construct itself were measured for internal consistency. The Cronbach Alpha values demonstrate that the construct and scale items were reliable. The original scale value was 0.839; after the pilot test it was 0.956; after the survey of Generation X parents the value was 0.968 and again after the EFA process it was 0.854.

The development of the reliable scale items can be used in future research that can either use the traditional SERVQUAL model or the modified SERVQUAL model that has been presented. Future studies may wish to retain the original 5-dimension model or may implement the new 3 dimension model that focuses more on the professional characteristics of the school – responsibility, assurance and professionalism (RAP) instead of the tangible domains such as facilities, equipment and materials. By using EFA, the current research was able to reduce the complexity of the service quality variable; as previously suggested by Chatfield and Collins (2017), the modified SERVQUAL model can be used reliably as part of a measurement model and further used in the structural equation models (SEM) to identify causal relationships that use Service Quality as one of the constructs.

Analysis of the responses by the Generation X parents is part of a larger study and beyond the scope of the current paper. However, the data provided enables the instrument to be tested and confirmed for validity and reliability. The hypothesis was accepted as the findings of this study demonstrate that a reliable and contextually relevant instrument can be developed by using the SERVQUAL model and applying IOC and EFA to the scale items is valid.

6. CONCLUSION AND RECOMMENDATIONS

The findings indicate that it is necessary to contextualise the traditional SERVQUAL model based on the industry and application. Using industry experts, scale items were reliably contextualized. The findings indicate that the revised scale items corresponding to the traditional five factors are reliable and that the factors can be further reduced to three using EFA while still retaining their reliability. The developed scale items and the three factors provide a useful prototype of a measurement instrument that can be used to measure the service quality in international schools.

The development of such a measurement tool can be used reliably in a measurement model and, subsequently, in SEM, thereby providing a reliable methodology for empirical quantitative analysis.

As the current study is limited to a specific case study of a single international school and further limited to a specific population within the larger parent population, it would be necessary to verify the use of the prototype instrument with other populations and within multiple international school settings. Such developments could yield a more acceptable and accurate tool for future research.

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