International Journal for Quality Research 10(2) 341–354
ISSN 1800-6450

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VALIDATING QUALITY PROCESS MANAGEMENT INSTRUMENT FOR HIGHER EDUCATION USING STRUCTURAL EQUATION MODELLING

Article info:
Received 27.07.2015
Accepted 10.03.2016

UDC – 54.061
DOI – 10.18421/IJQR10.02-07

Abstract: *This study attempts to validate process management scale using rigorous validation procedures. An adapted questionnaire comprising 77 items was administered to faculty members in two public universities in Nigeria. The data gathered were analyzed using exploratory factor analysis and confirmatory factor analysis with SPSS 20.0 and SmartPLS 3.1.2 respectively. The findings of this study shows that process management is a third order reflective model with multidimensional constructs. The two dimension of process management administrative process and academic process has four and five dimensions respectively. The process management scale will therefore facilitate the identifications of elements that influence the effectiveness of higher education. The practical implications and methodological limitations are discussed.*

Keywords: *Instrument validation, process management, administrative process, academic process, higher education, PLS-SEM*

1. Introduction

The Ultimate business of any organization including higher education institutions is customer's satisfaction interms of quality. Quality has come to be the widespread concept in university education discussion (Lundquist, 1998). For the past two decades, university education all over the world have been under increasing internal and external pressure to be more efficient and effective in the provision of their services which have been pushing them in reshaping and renewing their management practices and organizational structure (Abdous, 2011; Seng and Churilov, 2003; Trapitsin, *et al.*, 2015; Vukšić *et al.*, 2014).

According to Kulshrestha (2012), a widely accepted total quality management (TQM) approach to understanding and improving operations is process management. Process management as stressed by Kulshreshtha (2012) requires how work is done and how value is provided to customers. It is a comprehensive integrated approach of analyzing operations and following all work activities in order to satisfy customers.

As the society are all relying on the university system in this era of globalization to be accountable in their services, most especially in terms of graduates they produces into the society (Kayode *et al.*, 2014). It becomes pertinent to critically

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examined their processes which previous researches has identified as the major determinant of its output (Calvo-Mora *et al.*, 2013; Sahney *et al.*, 2004). According to Kanji *et al.* (1999), process management have significant effect on the organizational critical results which are classified by Da Rosa *et al.* (2003); Calvo-Mora, Leal, and Roldán (2006) as administration and services; teaching and learning as well as research processes. Therefore, this study tends to validate the instrument for quality process management in higher education, building on previous researches.

2. Quality Improvement Approaches

Every excellent organization are bound to design, manage as well as improve its processes in order to generate improved value for its customers and other stakeholders (Calvo-Mora *et al.*, 2006). Previous researches have suggested that managing quality in university education context should be handled differently from how it is being handled in manufacturing or service sectors (Chua, 2004; Madu and Kuei, 1993). The need for quality supervision in university education arises because of the continuous increase in student population, restricted and better resources utilization, limited student involvement in teaching and learning, absence of commitment among staffs and the lack of accountability. Others include systematic internal monitoring and review procedure, students not possessing requisite capabilities especially generic skills in terms of problem solving, dependency, decision-making, inventiveness, adaptability and learning as well as the rising cost per unit. That is, efficiency, effectiveness and quality of university education is at a questionable state (Mohanty, 2013; Tulsi, 2001).

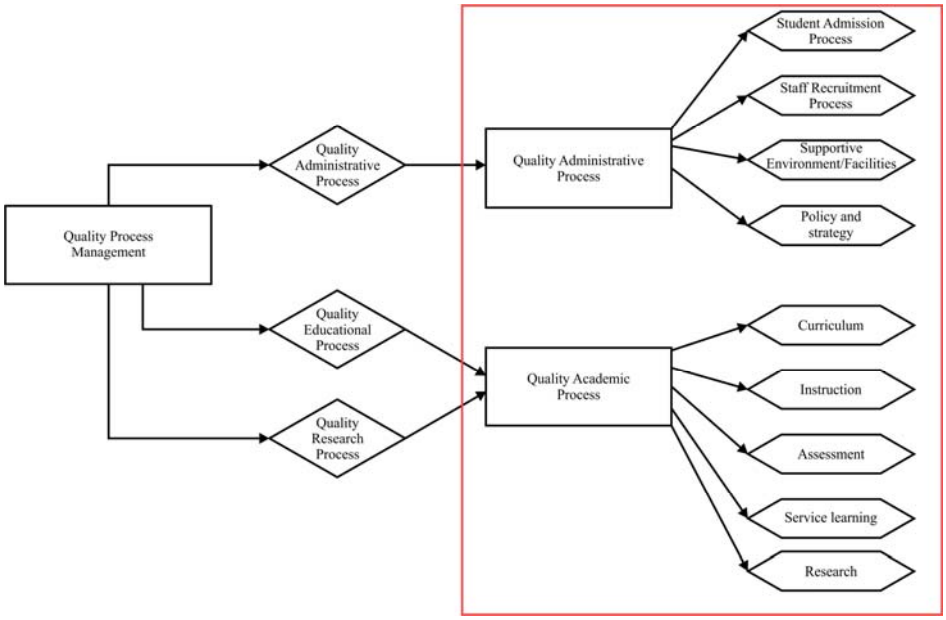
Systematic supervision of administrative and academic process is a necessity towards the process principle in education. Process supervision therefore encompasses the collection of behavioural and methodological exercise which were concentrated on behavior and undertakings rather than the outcomes (Ibrahim *et al.*, 2011). That is, process management is a systematic tactic in which all the resources owned by the universities are used in most efficient and effective manner for the achievement of a desired performance (Sit *et al.*, 2009). In a study of critical factors and performance measurement of total quality management, Motwani (2001) commented that process management stresses the value adding to a procedures, enhancing the productivity of every workers and improving the organizational quality. Several empirical studies have also proved positive relationship between process management and quality performance (Talib *et al.*, 2013).

Huitt (2003) grouped administrative and academic processes into: input, context and classroom practices. The input includes factors that influence teaching and learning outside the classroom; context are the lecturers' qualities and that of the students they teach in the classroom; classroom processes which are the behaviours of the lecturers and that of the students in the classrooms and other factors or variables like the classroom environment and the relationship of both the lecturers and the students. It is a means by which the university system manages designs and enhances teaching and learning so as to reinforce its strategy, policy and satisfy completely the stakeholders' rising need.

According to EFQM (2009), sub- criteria for process management include: methodological design and administration; improvement as required using novelty in order to absolutely satisfy and produce to the stakeholders a rising value; services and student produced are tailored towards the needs and expectation of the stakeholders; services rendered, product produced, deliver and return, and stakeholder relationships are improved. Three approaches to total quality management have been identified by Harris (1994) as: customer focus approach where

the idea of students' service is nurtured through staff training and development; staff focus approach that emphasis on enhancing the contribution of all members of staff towards school effectiveness. The third approach seeks to ensure conformity to requirement of certain strategic measureable facts of the educational process.

According to Lundquist (1998), educational process could be based on the resources that are inter-connected and undertakings in which inputs are transform into outputs. Such inputs include students' competency and those of their lecturers. Furthermore, Chua (2004) see educational process in higher education to include accuracy of curriculum content, instruction medium, assessment, teaching and learning, as well as content and delivery of course units. While, administration was sometimes understood to consist of three successive processes: vision, planning and policy (Krüger and Scheerens, 2012). However, administrative and academic processes begin even before the first day of the student in the classroom till his last day in the school; although numerous literature have limited academic process to curriculum, instruction and assessment.



Contribution of the study

Figure 1. Conceptual Framework

This study build on the dimentions of process management as suggested by Calvo-Mora *et al.* (2006) which are administrative process, educational process and research process. The findings of their study revelas that research process is negatively insignificant in process management in higher education. Therefore, this study identify administrative process and academic processes (education and research process) as dimension for process management and the research process was identified as one of the dimentions of quality academic process. This is consistent with the lean higher education (modified 11 june 2015) dimension of process management in higher education which are administrative process and academic process (Figure 2). According to lean higher education, the administrative process include admission, purchasing, facilities, hiring and budgeting; while academic process according to them include

course design, teaching, improving degree program, student feedback, handling of assignment (Emiliani, 2004, Emiliani 2005).

Figure 2. Quality Process Management

The dimension of process management in this study is also in line with Psomas *et al.* (2011) who examined the level of process management in certified companies. Using exploratory factor analysis, two factors were extracted from process management construct which they termed: core process management and the supporting quality tools. The core process management and the supporting tools are terms in this study quality academic process and quality administrative process respectively. Therefore, this study examine the administrative processes in terms of students' admission, staff recruitment, supportive resources, facilities and environment as well as policies and strategies while academic processes are examined viz-a-viz curriculum, instruction, service learning, assessment and research. This is shown in Figure 1.

3. Methodology

3.1. Population and sampling

The population of the study comprises of all the academic staffs in public universities in north-central, Nigeria. In order to determine the sample size for this pilot study, Hertzog (2008) suggested that the sample size should range between 10 and 40. According to Alreck and Settle (1995) which was supported by Hair et al (2010), any models

containing five or fewer variables with more than three observed variables requires a minimum of 100 sample size or more. Therefore, because of low response rate among lecturers, additional 60% was added to 100 and a total of 160 lecturers were determined to be the sampled size for this study. The study adopted a multi-stage sampling technique. The public universities in north central were first stratified into federal and state universities. One federal and one state university were then randomly selected. In each of the selected university, the respondents were grouped into eight strata according to faculties and 10 respondents were randomly selected in each of the faculty in the selected universities. A total of 160 respondents were selected for this study.

3.2. Instrumentation

Items for this study were randomly selected from previous work and literatures. The instrument are in two form: quality administrative processes which are in four dimensions and; quality academic process which has five dimensions.

Table 1. Measurements for Administrative process

S/N	Dimension	No. of items	Source (s)	Cronbach's α
1.	Staff recruitment Process	5	Sule and Ugoji (2013)	Not reported
2.	Students admission process	6	Chukwurah (2011)	0.75
3.	Supportive Environment/Facilities	9	Akporehe (2011); Patterson et al. (2005); Ramsden (1991)	Ranges between 0.76 to 0.89
4.	Policy and Strategy	10	Calvo-Mora et al. (2006)	0.78

Table 2. Measurements for quality academic process

S/N	Dimension	No. of items	Sources	Cronbach's α
1.	Curriculum	16	Jenkins (2012)	.73
2.	Instructions	7	Ramsden (1991)	.76
3.	Service learning	8	Steinberg et al. (2010)	.53
4.	Assessment	9	Ramsden (1991)	.74
5.	Research and development	7	Calvo-Mora et al. (2006)	.605

The first aspect of the instrument measures quality administrative process. It was adapted from the research of different studies reviewed which include both empirical conceptual articles. The quality administrative process in this study includes staff recruitment process, student admission, Supportive Environment/Facilities and Policy and Strategy.

The second instrument is tagged "Quality Academic Process Questionnaire" (QAPQ) which were adapted from various studies review. It was used to draw out information from the academic staffs as regards their views concerning the academic process in their respective institutions. The quality academic process has five dimensions in compliance with the Research framework. Table 2 is the analysis of the meausres and its source.

3.3. Face and Content validity of items

The face and content validity was conducted at the preliminary stage of this study. In order to ascertain the face validity of the instrument, four copies of the questionnaire for this study were given to expert in the field of education testing services, teaching/lecturer evaluation consultant and a professor of curriculum and instruction; each where given a copy of the adapted questionnaire for validation. They were ask to print out the soft copy sent to them and make necessary comments on the hard copy and send a scan copy back to the researcher.

Their suggestions were effected and 10 copies were further administered to lecturers who are not part of the sampled to examine their understanding of the itmes and to seek their opinion about the appropriateness of the items' statement interms of their wordings, the instructions, general formatting and understability of the scales in order to detect if there is any difficulties that may arise in filling the questionnaire. Therefore, some suggestions made were effected before sending out the final draft.

3.4. Data collection procedures and analysis

Data were collected personally by the researchers through a cross-sectional survey. In the guide line provided by Stanley and Wise (2010), this study emphasized the ethical issues in maintaining privacy, guaranteeing anonymity, and guaranteeing confidentiality.

The data collected was analysed using SPSS and SmartPLS statistical packages. The data collected were screened before analysis. Missing data was not an issue in this study as the researchers administered the questionnaire to the respective participant and make sure the questionnaire is appropriately field in the process of collecting it. The non-response bias was tested as the returned questionnaire was grouped into early responses and late responses and the data was analyse to check if there is any significant difference in the set of responses. The mean value and the levene's test for equality of variance shows that there is no significant difference which means that, the non response rate is not a problem in this study. As SEM_PLS was used as the analysis techniques which also handles non-normal data, normality test was not conducted in this study. The SEM-PLS has two approaches: measurement model and structural model. as this study was carried out to validate an instrument, only the measurement model are applicable in this study.

3.4. Respondents' profile

The analysis of the respondents' profile shows that 74.3 % of the respondents are male while 25.7 were female. The analysis also revealed that 59.41 % of the respondents are master degree holder while 38.61% are PhD degree holder. The respondents cut across eight different faculties in which management science has the highest number of respondents (20.8%) while faculty of vetinary has 4 respondents (4%) as the faculty with the least number of respondents. The participant cut across the seven cadre of academic staff positions in Nigerian universities. The highest number of respondents fall within lecturer I and lecturer II with 47 (46.5%) and 23 respondents (22.8%) respectively. The graduate assistant and professorship position has the least number of respondents with 2% and 3% respectively. The details are shown in Table 3.

4. Findings

Smartpls 3 .1.2 (Ringle *et al.*, 2005) was used to validate process management as third order reflective hierarchical construct. Analysis of data using partial least square are in two stages measurement model and structural model. for the validation of instrument, only the measurement model was assessed in this study. The confirmatory factor analysis was conducted to assess the properties of the measurement scales in order to evaluate the validity and reliability of the instrument. Therefore, as suggested by Hair *et al.* (2010), the measurement model was assessed through the indicator reliability, composite reliability (internal consistency reliability), convergent validity and discriminant validity.

To test the indicator reliability, the individual loadings and cross loadings of the items were examined. As suggested by Hair *et al.* (2014), all the loadings in this study are more than the threshold value of 0.7. therefore, the items for the instrument are said to meet the indicator reliability (table 4).

Table 3. Demographics of participant

Profile	Description	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	75	74.3	74.3	74.3
	Female	26	25.7	25.7	100.0
Qualification	First Degree	2	1.98	1.98	1.98
	Master Degree	60	59.41	59.41	61.39
	PhD Degree	39	38.61	38.6	100.0
Faculty	Arts	13	12.9	12.9	12.9
	Education	13	12.9	12.9	25.7
	Engineering	8	7.9	7.9	33.7
	Law	12	11.9	11.9	45.5
	Science	13	12.9	12.9	58.4
	Social Science	17	16.8	16.8	75.2
	Management Science	21	20.8	20.8	96.0
	Vet. Medicine	4	4.0	4.0	100.0
Rank	Graduate Assistant	2	2.0	2.0	2.0
	Assistant Lecturer	13	12.9	12.9	14.9
	Lecturer II	23	22.8	22.8	37.6
	Lecturer I	47	46.5	46.5	84.2
	Senior Lecturer	6	5.9	5.9	90.1
	Associate Professor	7	6.9	6.9	97.0
	Professor	3	3.0	3.0	100.0
Length of Service	0-4 years	1	1.0	1.0	1.0
	5- 9years	63	62.4	62.4	63.4
	10-14 years	19	18.8	18.8	82.2
	15-19 years	8	7.9	7.9	90.1
	20 years and above	10	9.9	9.9	100.0
Age	31-40 years	37	36.6	36.6	36.6
	41-50years	42	41.6	41.6	78.2
	51-60 years	20	19.8	19.8	98.0
	61 years and above	2	2.0	2.0	100.0

Table 4. Loadings and Cross Loadings

	Assessment	**Curriculum**	**Instruction**	**Policy and strategy**	**Research**	**Student Admiss. Process**	**Service Learning**	**Staff Recruit. Process**	**Supportive Environment/Facilities**
ASS1	**0.860**	0.229	0.445	0.483	0.421	0.289	0.763	0.212	0.312
ASS2	**0.865**	0.232	0.451	0.400	0.488	0.406	0.639	0.292	0.398
ASS3	**0.709**	0.408	0.458	0.164	0.325	0.057	0.588	0.056	0.027
ASS4	**0.811**	0.117	0.215	0.260	0.250	0.335	0.415	0.347	0.282
ASS8	**0.765**	0.393	0.596	0.473	0.511	0.443	0.663	0.498	0.449
CUR10	0.195	**0.822**	0.417	0.317	0.322	0.010	0.390	0.212	0.176
CUR12	0.233	**0.910**	0.517	0.230	0.508	0.095	0.341	0.252	0.246
CUR13	0.324	**0.891**	0.528	0.279	0.556	0.078	0.405	0.212	0.223
CUR14	0.313	**0.844**	0.509	0.299	0.471	0.125	0.413	0.234	0.267
CUR15	0.326	**0.931**	0.537	0.369	0.442	0.035	0.458	0.229	0.239
CUR16	0.205	**0.815**	0.523	0.456	0.361	0.214	0.322	0.326	0.372

CUR2	0.226	**0.795**	0.482	0.220	0.290	0.012	0.337	0.166	0.214
CUR6	0.519	**0.818**	0.538	0.589	0.472	0.250	0.563	0.372	0.457
CUR7	0.354	**0.857**	0.624	0.430	0.455	0.133	0.465	0.232	0.320
CUR8	0.270	**0.727**	0.434	0.467	0.444	0.299	0.264	0.421	0.370
CUR9	0.306	**0.796**	0.559	0.371	0.661	0.298	0.366	0.338	0.381
INS3	0.588	0.588	**0.867**	0.298	0.538	0.240	0.719	0.167	0.255
INS5	0.419	0.262	**0.689**	0.247	0.341	0.121	0.568	0.026	0.171
INS6	0.232	0.528	**0.723**	0.397	0.563	0.453	0.250	0.548	0.492
PS1	0.394	0.266	0.350	**0.822**	0.209	0.708	0.209	0.666	0.854
PS10	0.491	0.377	0.419	**0.840**	0.260	0.467	0.471	0.533	0.621
PS3	0.332	0.376	0.308	**0.863**	0.180	0.538	0.268	0.622	0.693
PS4	0.257	0.378	0.298	**0.898**	0.159	0.458	0.230	0.526	0.624
PS5	0.267	0.329	0.351	**0.845**	0.257	0.376	0.231	0.488	0.524
PS6	0.366	0.544	0.318	**0.820**	0.182	0.248	0.429	0.431	0.450
PS7	0.439	0.329	0.344	**0.815**	0.364	0.484	0.415	0.582	0.607
PS8	0.405	0.430	0.242	**0.763**	0.270	0.296	0.454	0.458	0.529
PS9	0.495	0.337	0.386	**0.858**	0.303	0.461	0.495	0.550	0.654
RD4	0.505	0.474	0.651	0.260	**0.895**	0.174	0.557	0.139	0.179
RD6	0.207	0.465	0.415	0.454	**0.788**	0.307	0.199	0.379	0.372
RD7	0.536	0.458	0.514	0.091	**0.862**	0.207	0.594	0.131	0.137
SA2	0.310	0.239	0.319	0.561	0.179	**0.846**	0.140	0.768	0.774
SA3	0.397	0.132	0.384	0.412	0.323	**0.871**	0.249	0.656	0.678
SA4	0.249	0.019	0.186	0.262	0.129	**0.789**	0.101	0.507	0.559
SA5	0.230	0.171	0.210	0.534	0.164	**0.903**	0.116	0.802	0.855
SA6	0.439	0.100	0.350	0.495	0.289	**0.794**	0.280	0.632	0.686
SL1	0.408	0.431	0.690	0.224	0.427	0.130	**0.736**	0.202	0.213
SL2	0.616	0.494	0.796	0.350	0.645	0.200	**0.860**	0.189	0.200
SL3	0.750	0.352	0.565	0.384	0.496	0.201	**0.875**	0.241	0.219
SL4	0.704	0.485	0.681	0.269	0.626	0.159	**0.862**	0.161	0.141
SL5	0.732	0.405	0.508	0.415	0.441	0.178	**0.927**	0.180	0.224
SL6	0.752	0.324	0.510	0.441	0.361	0.229	**0.894**	0.194	0.302
SL8	0.783	0.370	0.457	0.446	0.355	0.169	**0.894**	0.164	0.246
SR1	0.416	0.308	0.244	0.500	0.263	0.706	0.222	**0.871**	0.652
SR2	0.388	0.290	0.364	0.551	0.296	0.719	0.212	**0.878**	0.669
SR3	0.251	0.315	0.268	0.585	0.123	0.683	0.196	**0.875**	0.717
SR4	0.195	0.217	0.210	0.517	0.225	0.751	0.096	**0.832**	0.758
SR5	0.238	0.232	0.201	0.602	0.063	0.568	0.202	**0.760**	0.696
SS1	0.292	0.181	0.209	0.613	0.128	0.827	0.133	0.740	**0.880**
SS2	0.285	0.287	0.323	0.632	0.203	0.814	0.136	0.815	**0.911**
SS3	0.362	0.418	0.344	0.623	0.136	0.663	0.267	0.693	**0.812**
SS4	0.346	0.156	0.402	0.479	0.244	0.751	0.287	0.574	**0.811**
SS5	0.404	0.318	0.353	0.749	0.290	0.778	0.246	0.790	**0.917**
SS6	0.124	0.345	0.239	0.686	0.087	0.527	0.188	0.534	**0.718**
SS8	0.340	0.374	0.391	0.568	0.362	0.576	0.235	0.621	**0.735**

The internal consistency reliability was also assessed. The composite reliability as suggested by Hair *et al.* (2014) was assessed using the threshold value of 0.7. The composire reliability of the instrument in this study are between 0.806 and 0.963. Therefore there is internal consistency reliability in the measurement model. this is evident in Table 6. The convergent validity was also assessed using the average variance extracted (AVE) which reflects the overall amount of variance in the indicators

accounted for by the latent construct. In this study, the AVE are within the range of 0.583 and 0.749 which is above the recommended value of 0.5 as suggested by Hair et al. (2010). Therefore, we can conclude that there is presence of convergent validity in the measurement model of this study as shown in Tables 5 and 6.

Table 5. Reliability of the higher order constructs

Model	Construct	CR	AVE
Third order	Quality Process management	0.843	0.728
Second order	Quality administrative process	0.935	0.783
	Quality academic process	0.828	0.529

Table 6. Psychometric properties for fisrt order constructs

Constructs	**Items**	**Loadings**	**CR**	**AVE**
Staff Recruitment Process	The laid down staff employment policies are strictly followed by my school	0.871	0.925	0.713
	The appointment policies in my school ensure that the most qualified candidates are appointed into the school system	0.878		
	The various demands of the academic departments' are always considered in the staff appointment process	0.875		
	Adequate number of lectures are recruited in the school	0.832		
	Only lecturers who have the zeal for teaching and are ready to impart knowledge are recruited by my school	0.760		
Student Admission Process	The student admission criteria are strictly followed by my school	0.846	0.924	0.709
	The admission criteria in my school ensure that the most qualified students are admitted into the school	0.871		
	The various academic departments are involved in the admission process	0.789		
	My school admits students in line with the nations' labour market demand	0.903		
	Number of students admitted is in line with the capacity of the school in terms of staff strength and facilities	0.794		
Supportive Environment/ Facilities	The physical environment of the classroom aid learning	0.880	0.939	0.688
	There is adequate mentoring for newly employed staff	0.911		
	Lecturers' professional development is encouraged and promoted by the school authority	0.812		
	Conditions of service for staff are very encouraging	0.811		
	Staff welfare is of paramount importance to my school authority	0.917		
	There is cordial relationship as well as cooperation among the staffs	0.718		
	Student support services are adequately provided	0.735		
Policy and strategy	The university's policies and strategies are in line with its mission, vision and values	0.822	0.955	0.700
	The formulation and revision of policies and strategies include the needs and expectations of the stakeholders	0.840		
	All the areas in my university are involved in the process of formulating and communicating the policies and strategies	0.863		
	There is a formal process of reviewing and updating policies and strategies	0.898		

	The university's policies and strategies are structured in a Strategic Plan	0.845		
	The university's goals are set out in writing and in a clear and quantifiable manner	0.820		
	The goals are communicated at all levels of the organization	0.815		
	The principles of quality are incorporated into all of the university's policies, strategies and goals	0.763		
	There is a procedure allowing for the deployment of the policies and strategies and for their being turned into short term plans	0.858		
Assessment	The assessment process at my school enables students to demonstrate the achievement of all the intended outcomes	0.860	0.901	0.646
	There is full confidence in the security and integrity of assessment procedures in my school	0.865		
	The external examiner enhances quality assessment process in my school	0.709		
	Good procedures are put in place for recording and verifying marks by the school	0.811		
	The assessment strategies adopted in my school have an adequate formative function in developing student abilities	0.765		
Curriculum	The curriculum is relevant to graduates seeking additional education in the same area	0.822	0.963	0.704
	The curriculum is relevant to graduates seeking employment.	0.910		
	The curriculum is relevant to graduates working in the field.	0.891		
	The curriculum is likely to enhance a high program graduation rate.	0.844		
	The curriculum is likely to lead to a high quality of instruction within the program.	0.931		
	The curriculum is likely to lead to a high quality assessment within the program.	0.815		
	The present curricular reflect what the students will come across after graduation	0.795		
	The curriculum is well designed and up to date	0.818		
	The curriculum integrates subject matter and high thinking skills	0.857		
	The curriculum content and process objectives are situated in real world tasks	0.727		
	The curriculum is designed based on a variety of research	0.796		
Instruction	In my school, teaching is all about providing a conducive environment in which students are encouraged to make the learning themselves	0.867	0.806	0.583
	Most lecturers have the potential to bring reality to the classrooms	0.689		
	Instructions are electronically integrated	0.723		
Service Learning	Service learning provides experience in a new domain	0.736	0.954	0.749
	Service learning gives students practical experience	0.860		
	Service learning exposes students to diverse stakeholders	0.875		
	Service learning exposes students to complex organizational problems	0.862		
	Service learning allows students to gain advocacy and problem solving skills	0.927		
	Service learning provides an opportunity for joy and	0.894		

	satisfaction through service			
	Through service learning, students commit themselves to become involved in new post university community life	0.894		
Research	The lecturers' research activity envisages the students' needs and expectations	0.895	0.886	0.722
	The lecturers' research activity envisages the companies' needs and expectations	0.788		
	The academic research activity envisages the needs and expectations of the community or the society as a whole	0.862		

Table 7. Fornell-Larcker Criterion

	1	2	3	4	5	6	7	8	9
1.Assessment	**0.804**								
2. Curriculum	0.362	**0.839**							
3. Instruction	0.565	0.617	**0.764**						
4. Policy & strat	0.458	0.438	0.402	**0.837**					
5. Research	0.515	0.544	0.631	0.289	**0.849**				
6. Serv. Learn.	0.787	0.475	0.698	0.417	0.560	**0.866**			
7. Staff Recruit.	0.351	0.323	0.306	0.653	0.230	0.219	**0.844**		
8. Stud. Admis.	0.384	0.167	0.345	0.552	0.257	0.209	0.813	**0.842**	
9. Supportive Environment/Facilities	0.373	0.355	0.386	0.751	0.249	0.253	0.828	0.827	**0.830**

Square root of the AVE on the diagonal (bold).

When the concergent validity has been ascertained in this study, the discriminant validity according to Fornell and Larcker (1981) was assessed by comparing the squared correlations between constructs and the average variance extracted for the construct. It is evident in Table 7 that the squared correlations for each of the constructs in this study were less than the average variance extracted by the indicators measuring that construct. Therefore, we can conclude that there is adequate discriminant validity in the measurement model. On the overall assessment, we can said the instrument is satisfactorily valid and reliable for measuring process management in higher education as it fulfill all measures of reliability and validty.

5. Discussion and Conclusion

As revealed in the analysis of data collected for this study, the loadings and crossloadings as well as the fornel-Larker criterion signifies that the items used in this study are valid. Also, the composite reliability and the average variance extracted indicate that the instrument are relable. It is also evident from the second order analysis in this study that process management as third order construct has exhibited solid validity and reliability despite some little weaknesses. Therefore, this instrument will be a good measure of process management or any of its dimention as suggested in this study.

The result reveals that any university administrators that want to implement quality into their school must be conversant with the components of the two dimensions of process management (quality administrative pand academic processes). The four components of quality administrative process namely: staff recruitment, student admission, supportive environment/facilities as well as policy and strategy are all very significant in achieving a quality process management. Also, curriculum, instruction, service learning, assessment as well as research and development also plays a significant role in achieving university management process. As revealed in the analysis of this study,

process management as a third order construct was reflected in quality administrative process and quality academic process which explained 76% and 70% of the overall process management respectively. This implies that quality academic process has the greatest reflection of the overall process management.

As reported in previous research conducted by Calvo-Mora *et al.*, (2006), research and development was not significantly related to process management but in this study, when research and development were treated as second order construct to process management, it becomes significant. This justifies the inclusion research and development as a dimention under quality academic process which are also in line with Emiliani (2005). Therefore, this instrument will be very useful for researcher in the area of educational administration as well as higher education administrators.

The major limitation in this study is that the sample size was relatively small for the development of a psychological instrument. According to Jana-Masri and Priester (2007); factor analysis requires five to ten participants per item. Our instrument has 77 items and was validated with a sample size of 101. Although, the sample size is justifiable for PLS-SEM. However, further study should be carried out with a large sample size and in different country; and such studies should also include private universities as part of the sample size.

As previous studies has stressed the importance of process management towards institutional effectiveness, further studies shoud be conducted using this measures of process management to examine its effect of higher education effectiveness.

References:

Abdous, M.H. (2011). Towards a framework for business process reengineering in higher education. *Journal of Higher Education Policy and Management, 33*(4), 427-433. doi: 10.1080/1360080X.2011.585741

Akporehe, D.A. (2011). The impact of environment on productivity in secondary schools. *African Journal of Education and Technology, 1*(1), 116-122.

Calvo-Mora, A., Leal, A., & Roldán, J.L. (2006). Using enablers of the EFQM model to manage institutions of higher education. *Quality Assurance in Education, 14*(2), 99-122. doi: 10.1108/09684880610662006

Calvo-Mora, A., Picón, A., Ruiz, C., & Cauzo, L. (2013). The relationships between soft-hard TQM factors and key business results. *International Journal of Operations & Production Management, 34*(1), 115-143.

Chua, C. (2004). *Perception of quality in higher education.* Paper presented at the Australian universities quality forum, Melbourne.

Chukwurah, C.C. (2011). Access to higher education in nigeria: The university of calabar at a glance. *Canadian Social Science, 7*(3), 108-113.

Da Rosa, M.J.P., Saraiva, P.M., & Diz, H. (2003). Excellence in Portuguese higher education institutions. *Total Quality Management & Business Excellence, 14*(2), 189-197. doi: 10.1080/1478336032000051377

EFQM. (2009). The EFQM Excellence Model. Retrieved from: http://ww1.efqm.org/en/Home/aboutEFQM/Ourmodels/EFQMExcellenceModel/tabid/170/Default.aspx

Emiliani, M.L. (2004). Improving business school courses by applying lean principles and practices. *Quality Assurance in Education, 12*(4), 175-187. doi: doi:10.1108/09684880410561596

Emiliani, M.L. (2005). Using kaizen to improve graduate business school degree programs. *Quality Assurance in Education, 13*(1), 37-52. doi:10.1108/09684880510578641

Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Hair, J.F., Black, W., Babin, B., & Anderson, J. (2010). *Multivariate data analysis: A global perspective*. New Jersey: Pearson Prentice Hall.

Hair, J.F., Hult, G.T.M., Ringle, C., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Washington DC: SAGE Publications, Incorporated.

Harris, R.W. (1994). Alien or Ally? *Quality Assurance in Education, 2*(3), 33-39. doi: doi:10.1108/EUM0000000003968

Huitt, W. (2003). A transactional model of the teaching/learning process. *Educational Psychology Interactive*. Retrieved from: http://www.edpsycinteractive.org/materials/tchlrnmd.html

Ibrahim, I., Amer, A., & Omar, F. (2011). *The total quality management practices and quality performance*. A case study of pos malaysia berhad, kota kinabalu, sabah.

Jana-Masri, A., & Priester, P.E. (2007). The Development and Validation of a Qur'an-Based Instrument to Assess Islamic Religiosity: The Religiosity of Islam Scale. *Journal of Muslim Mental Health, 2*(2), 177-188. doi: 10.1080/15564900701624436

Jenkins, M.D. (2012). *The Effects of State System Wide Curriculum on Retention, Graduation, Employment, and Faculty Beliefs in a Large, Urban Institution of Higher Education.* (3518167 Ph.D.), Cardinal Stritch University, Ann Arbor. Retrieved from http://eserv.uum.edu.my/docview/1033339650?accountid=42599 ProQuest Dissertations & Theses Full Text database.

Kanji, G.K., Malek, A., & Tambi, B.A. (1999). Total quality management in UK higher education institutions. *Total Quality Management, 10*(1), 129-153. doi: 10.1080/0954412998126

Kayode, D.J., Yusoff, N. M., & Veloo, A. (2014). Assessing the effectiveness of university education in era of globalization:using the goal and strategic constituent approach. *African Journal of Higher Education Studies and Development, 2*, 230-252.

Krüger, M., & Scheerens, J. (2012). Conceptual Perspectives on School Leadership. In J. Scheerens (Ed.), *School Leadership Effects Revisited* (pp. 1-30): Springer Netherlands.

Kulshreshtha, N. (2012). *Total quality management*. New Delhi: Enkay Publishing House.

Lundquist, R. (1998). Quality improvements of teaching and learning in higher education: a comparison with developments in industrial settings. *Teaching in Higher Education, 3*(1), 51-62.

Madu, C.N., & Kuei, C.H. (1993). Dimensions of quality teaching in higher institutions. *Total Quality Management, 4*(3), 325-338. doi: 10.1080/09544129300000046

Mohanty, R. (2013). *Total quality management in university system*. International Conference on Tertiary Education (ICTERC 2013) Daffodil International University, Dhaka, Bangladesh 19-21 January 2013.

Motwani, J. (2001). Critical factors and performance measures of TQM. *The TQM Magazine, 13*(4), 292-300.

Patterson, M.G., West, M.A., Shackleton, V.J., Dawson, J.F., Lawthom, R., Maitlis, S., Wallace, A.M. (2005). Validating the organizational climate measure: links to managerial

practices, productivity and innovation. *Journal of Organizational Behavior, 26*(4), 379-408. doi: 10.1002/job.312

Psomas, E.L., Fotopoulos, C.V., & Kafetzopoulos, D.P. (2011). Core process management practices, quality tools and quality improvement in ISO 9001 certified manufacturing companies. *Business Process Management Journal, 17*(3), 437-460. doi: http://dx.doi.org/10.1108/14637151111136360

Ramsden, P. (1991). A performance indicator of teaching quality in higher education: The Course Experience Questionnaire. *Studies in Higher Education, 16*(2), 129-150.

Ringle, C.M., Wende, S., & Will, S. (2005). *SmartPLS 2.0 (M3) Beta*, Hamburg 2005.

Sahney, S., Banwet, D.K., & Karunes, S. (2004). Conceptualizing total quality management in higher education. *The TQM Magazine, 16*(2), 145-159.

Seng, D., & Churilov, L. (2003). *Business process-oriented information support for a higher education enterprise.* Paper presented at the 7th Pacific Asia Conf on Info Systems (M Lynne Markus and Trevor Wood-Harper 10 July 2003 to 13 July 2003).

Sit, W.Y., Ooi, K.B., Lin, B., & Chong, A.Y.L. (2009). TQM and customer satisfaction in Malaysia's service sector. *Industrial Management & Data Systems, 109*(7), 957-975.

Stanley, L., & Wise, S. (2010). The ESRC's 2010 Framework for Research Ethics: fit for research purpose? *Sociological Research Online, 15*(4), 12.

Steinberg, K.S., Bringle, R.G., Williams, M.J., Steinberg, K., Bringle, R., Williams, M., & Scotts Valley, C. (2010). *Service-learning research primer*. Scotts Valley, CA: National Service-Learning Clearinghouse.

Sule, O.E., & Ugoji, I.E. (2013). Impact of personal recruitment on organisational development: A survey of selected Nigerian workplace. *International Journal of Business Administration, 4*(2), 79.

Talib, F., Rahman, Z., & Qureshi, M. (2013). An empirical investigation of relationship between total quality management practices and quality performance in Indian service companies. *International Journal of Quality & Reliability Management, 30*(3), 280-318.

Trapitsin, S., Krokinskaya, O., & Timchenko, V. (2015). Quality assessment in higher education: Are Russian universities focused on the educational needs of students? *International Journal for Quality Research, 9*(2), 339-354.

Tulsi, P.K. (2001). *Total quality in higher education, reforms and innovations in higher education*. New Delhi: AIU

Vukšić, V.B., Bach, M.P., & KatarinaTomičić-Pupek. (2014). Process Performance Management in Higher Education. *International Journal of Engineering Business Management, 6*(11), 1-8. doi: 10.5772/58680

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