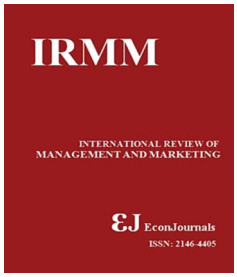

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Exploring the Items for Measuring the Marketing Information System Construct: An Exploratory Factor Analysis

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ABSTRACT

One of the most important factors that affect the decision-making process is the Information system (IS) in any given institution. Accordingly, IS in any institution is closely matching the heart role in a human body. The aim of this research is to perform instrument validation through exploratory factor analysis (EFA). The questionnaire used in this study is adapted from two different studies: Bahloul (2011) and Al-Adamat (2015). It consists of of seven sub-constructs; after the questionnaire was distributed, 100 responses were collected to do the EFA. EFA was done for each construct separately. The results show that all of the seven constructs have one component or dimension, The factor loading for every item in each construct is >0.6, Bartlett's Test of Sphericity was <0.05 for all the constructs, which is Significant (P-value < 0.05). Kaiser-Meyer-Olkin Measure of Sampling Adequacy was higher than 0.6 for all the constructs, and this means that the sample size is adequate. Cronbach's Alpha test was higher than 0.7 for the entire constructs' items, which means that these items are all reliable. This study found a valid and reliable instrument for measuring the effectiveness of marketing IS components in the decision-making process.

Keywords: Exploratory Factor Analysis, Marketing Information System, Decision-making Process, Information Technology
JEL Classifications: M31, M30

1. INTRODUCTION

When an excess of possible actions are available, a decision must be taken. A decision is a conscious choice from among at least two options (Brest et al., 2018). Actually, there is no institution or business organization that can work and competes without information system (IS). Marketing IS (MIS) can be defined as computer-based systems that work in combination with other functional IS in order to support the firm's management in solving all problems that correlate to marketing actions, analyses and provide them to the marketing manager for making effective decisions (Keller and Kotler, 2016). Basically, all parts of MIS should run concomitantly in order to achieve the overall efficiency of the whole system (Harker et al., 2015). Thus there is a need to measure the effectiveness for MIS in any organization, and its role in the decision-making process, which represents the aim of this study to find a validated instrument measuring MIS effectiveness in the decision-making process.

2. MATERIALS AND METHOD

Data collection in this study, is self-administered survey. The questionnaire is adapted from two different studies first: Bahloul (2011), second Al-Adamat (2015). The questionnaire was adapted and customized to suit the field of this study, and it will be directed by all marketing managers, deals administrators and all individuals working in marketing or decision-making area. The survey composed from 7 constructs (after the demographical data concerning the respondent): The first and second construct was related to Information technology (The moderator), first construct The intended hardware used in the system (8 items using the scale of 10). Second construct: The intended Software ingredients (8 items using the scale of 10). Third construct: Internal records and its' use (11 items using the scale of 10). Fourth construct: Marketing intelligence and its' use (12 items using the scale of 10). Fifth construct: Marketing Research and its' use (14 items using the scale of 10). Sixth construct: Decision Support

System (DSS) and its' use (12 items using the scale of 10). Seventh construct: Decision-making process (7 items using the Likert scale of 10). As stated by Awang et al., (2016) that 10 points of Likert scale are more effective than 5 points of Likert scale in operating of the measurement model (Awang et al., 2016). Accordingly, this study will apply the interval scale of 10, in which a person selects a statement among several statements from 1-10 which is considered to reflect the perceived quality of the subject. Where number 1 stands for strongly disagree, while, number 10 stands for strongly agree. According to Awang et al. (2010; 2012; 2014; 2015) and Awang et al. (2018), the researcher should apply a Likert Scale without a label because this measure would give an interval type of data that is continuous and fit the data presumption for parametric analysis. As per Awang (2010; 2012; 2014; 2015) and Hoque et al. (2017; 2018), if the analyst adjusted instruments from past studies and altered accordingly, at that point the scientist needs to direct both pre-test and pilot-test for these "changed items" so as to approve them before it tends to be utilized in the final study. Content validity, face validity, and criterion validity were done as a pre-test for this questionnaire, content validity was done through content experts, and face validity was done through English language experts, criterion validity was done through a statistical expert, after these validation tests are completed, the researcher distributed the instrument to 10 respondents, in order to gather their comments, and check the consistency in their responses.

After all the required changes according to pre-test results have been done, the researcher distributed the questionnaire to gather minimum of 100 responses to be able to run the exploratory factor analysis (EFA), according to many researchers for example: Awang (2010, 2012, 2014, 2015), Hoque et al. (2017, 2018), Noor et al. (2015), Awang et al. (2018) and Yahaya et al. (2018) ensures that EFA should be done for each construct to explore for changes in dimensionality of items from past studies due to changes in the characteristics of population from the past.

3. RESULTS AND DISCUSSION

EFA should be done for each construct to check for the dimensionality of items has changed from past studies due to different conditions between the present and the past.

3.1. The EFA for the First Construct: The Abundance of Hardware Utilized in the Hotel

This construct was measured using 8 items listed in Table 1 as AQ1 to AQ8, and each item was measured using Likert-scale of 10, where 1 stand for strongly disagree and 10 stands for strongly agree, the mean response, standard deviation, and item statement, for each item, are listed in Table 1.

EFA using Principal Component Analysis as an extraction method performed for these 8 items to measure The Abundance of Hardware utilized in the Hotel construct. The results in Table 2 shows Bartlett's Test of Sphericity which is Significant since it's <0.05. Kaiser-Meyer-Olkin Measure of Sampling Adequacy higher than 0.6 which is for the first construct 0.930, and this means that the sample size is adequate (Awang, 2010; 2012; 2014; 2015; Hoque et al., 2017; 2018; and Noor et al., 2015). Accordingly, the current data are acceptable.

The scree plot in Figure 1 shows that only one component is emerged from the EFA, accordingly all items in this construct will belong to one component.

The results in Table 3 the components or dimension for each item is shown in this table, as it's clear all items are belonging to one component, The factor loading for every item should be >0.6 in order to be retained (Awang, 2010; 2012; Awang et al. (2018) and Yahaya et al., 2018). Thus all items will be retained.

Figure 1: The scree plot for the first construct

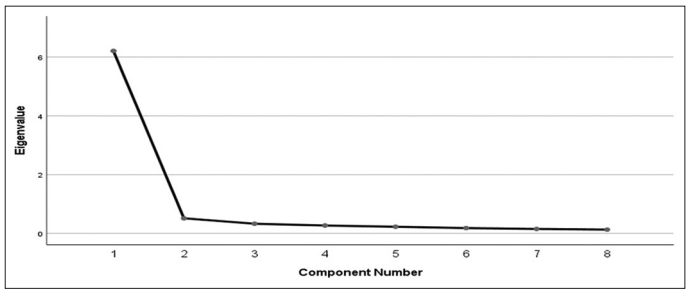


Table 1: The mean and standard deviation for items measuring the abundance of hardware utilized in the hotel

Descriptive statistics				
	Item	Item statement	Mean	Std. deviation
1	AQ1	Current marketing information system your hotel utilizes is based primarily on the computer	8.42	1.610
2	AQ2	Devices that your hotel Utilize are appropriate with the nature of work.	8.36	1.630
3	AQ3	Your hotel utilizes sophisticated equipment with efficiency and high quality	8.39	1.673
4	AQ4	The hardware utilized has a high limit of storage/ conservation efficiently.	8.43	1.652
5	AQ5	Your hotel use equipment which is flexible and can be adjusted and maintained.	8.48	1.630
6	AQ6	Input Units (mouse, keyboard and,.) is sufficient, and help in the process of entering data efficiently	8.67	1.769
7	AQ7	Output units (screen, printer,.) adequate, and aid in data directing and processing.	8.57	1.715
8	AQ8	The effectiveness of the hardware utilized as a part of the Hotel adds to the quality of Marketing decision.	8.52	1.749

The results in Table 4 show there are one dimension or component emerged from the EFA procedure based on the computed Eigenvalue >1.0. The total variance explained for measuring this construct is 77.583%. The total variance explained is acceptable since it exceeds the minimum 60% (Awang, 2010, 2012; 2014; 2015; Noor et al., 2015; Hoque et al., 2017; 2018; and Yahaya et al., 2018).

Table 2: The KMO and Bartlett's test score

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		0.930
Bartlett's test of sphericity	Approx. Chi-square	845.906
	Df	28
	Sig.	0.000

Table 3: The components and their respective items

Component matrix[a]	
	Component 1
AQ1	0.900
AQ2	0.899
AQ3	0.862
AQ4	0.841
AQ5	0.875
AQ6	0.877
AQ7	0.869
AQ8	0.919

Extraction method: Principal component analysis
a. 1 components extracted

Table 4: Total variance explained

Total variance explained			
Component	Extraction sums of squared loadings		
	Total	% of variance	Cumulative %
1	6.207	77.583	77.583

Extraction method: Principal component analysis

Table 5: The internal reliability for the abundance of hardware utilized in the hotel construct

Reliability statistics	
Cronbach's alpha	No. of items
0.958	8

3.1.1. The internal reliability for the instrument measuring the abundance of hardware utilized in the hotel

The last test that should be done is the internal reliability of each construct. As Table 5 shows that Cronbach's Alpha test is 0.958, higher than 0.7, which means that these items are reliable.

3.2. The EFA for the Second Construct: The Abundance of the Software Ingredients

This construct was measured using 8 items listed in Table 6 as BQ1 to BQ8, and each item was measured using Likert-scale of 10, where 1 stands for strongly disagree and 10 stands for strongly agree, the mean response, standard deviation and item statement, for each item, are listed in Table 6.

EFA using principal component analysis as an extraction method performed for these 8 items to measure The abundance of the software ingredients construct. The results in Table 7 shows Bartlett's Test of Sphericity which is Significant since it's <0.05. Kaiser-Meyer-Olkin measure of sampling Adequacy higher than 0.6 which is for the 2nd construct 0.949, and this means that the sample size is adequate (Awang, 2010; 2012; 2014; 2015; Hoque et al., 2017, 2018; Noor et al., 2015). Accordingly, the current data are acceptable.

The scree plot in Figure 2 shows that only one component is emerged from the EFA, accordingly all items in this construct will belong to one component.

The results in Table 8 the components or dimension for each item is shown in this table, as it's clear all items are belonging to one component, The factor loading for every item should be >0.6 in order to be retained (Awang, 2010; 2012; 2014; 2015; Awang et al., 2018 and Yahaya et al., 2018). Thus all items will be retained.

Table 6: The mean and standard deviation for items measuring the abundance of the software ingredients

Descriptive statistics				
	Item	Item statement	Mean	Std. deviation
1	BQ1	Your hotel uses programs which facilitate the communication process among different users at the same time.	8.47	1.803
2	BQ2	There is a protection system for the marketing database to prevent it from nonauthorized person to access the system.	8.50	1.653
3	BQ3	There is the flexibility of exchanging marketing information among system's users in your hotel systems.	8.32	1.889
4	BQ4	The programs utilized by your hotel have the ability of storage, summarizing, retrieval and modification the marketing information	8.23	1.862
5	BQ5	The software product your hotel utilizes contributes to minimizing the over usage of papers among sections.	8.44	1.743
6	BQ6	The software utilized by your hotel is the most recent and advanced software products.	8.38	1.689
7	BQ7	The software package your hotel utilizes is proficient and effective.	8.57	1.797
8	BQ8	The abundance and efficiency of the software in the hotel affect the quality of a marketing decision.	8.65	1.808

The results in Table 9 show there are one dimension or component emerged from the EFA procedure based on the computed Eigenvalue >1.0. The total variance explained for measuring this construct is 76.289%. The total variance explained is acceptable since it exceeds the minimum 60% (Awang, 2010; 2012; 2014; 2015; Noor et al., 2015; Hoque et al., 2017, 2018; and Yahaya et al., 2018).

3.2.1. The internal reliability for the instrument measuring: The abundance of the software ingredients

The last test that should be done is the internal reliability of each construct. As Table 10 shows that Cronbach's Alpha test is 0.955, higher than 0.7, which means that these items are reliable.

3.3. The EFA for the Third Construct: Internal Records

This construct was measured using 11 items listed in Table 1 as IVQ1 to IVQ11, and each item was measured using Likert-scale of 10, where 1 stands for strongly disagree and 10 stands for strongly agree, the mean response, standard deviation, and item statement, for each item, are listed in Table 11.

Table 7: The KMO and Bartlett's test score

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy.		0.949
Bartlett's test of sphericity	Approx. Chi-square	782.684
	df	28
	Sig.	0.000

Table 8: The components and their respective items

Component matrix[a]	
	Component
	1
BQ1	0.866
BQ2	0.843
BQ3	0.795
BQ4	0.875
BQ5	0.918
BQ6	0.885
BQ7	0.884
BQ8	0.915

Extraction method: Principal component analysis
a. 1 components extracted

Table 9: Total variance explained

Total variance explained			
Component	Extraction sums of squared loadings		
	Total	% of variance	Cumulative %
1	6.103	76.289	76.289

Extraction method: Principal component analysis

Table 10: The internal reliability for the abundance of the software ingredients construct

Reliability statistics	
Cronbach's alpha	No. of items
0.955	8

EFA using principal component analysis as an extraction method performed for these 11 items to measure the internal records construct. The results in Table 12 shows Bartlett's Test of sphericity which is significant since it's <0.05. Kaiser-Meyer-Olkin measure of sampling adequacy higher than 0.6 which is for the third construct 0.947, and this means that the sample size is adequate (Awang, 2010; 2012; Hoque et al., 2017; 2018; and Noor et al., 2015). Accordingly, the current data are acceptable.

The scree plot in Figure 3 shows that only one component is emerged from the EFA, accordingly all items in this construct will belong to one component.

The results in Table 13 the components or dimension for each item is shown in this table, as it's clear all items are belonging to one component, The factor loading for every item should be >0.6 in order to be retained (Awang, 2010; 2012; and Yahaya et al., 2018). Thus all items will be retained.

The results in Table 14 show there are one dimension or component emerged from the EFA procedure based on the computed Eigenvalue >1.0. The total variance explained for measuring this construct is 77.866%. The total variance explained is acceptable since it exceeds the minimum 60% (Awang, 2010, 2012, 2014, 2015; Noor et al., 2015; Hoque et al., 2017, 2018; and Yahaya et al., 2018).

3.3.1. The internal reliability for the instrument measuring: Internal records

The last test that should be done is the internal reliability of each construct. As Table 15 shows that Cronbach's Alpha test is 0.971, higher than 0.7, which means that these items are reliable.

Figure 2: The Scree Plot for the second construct

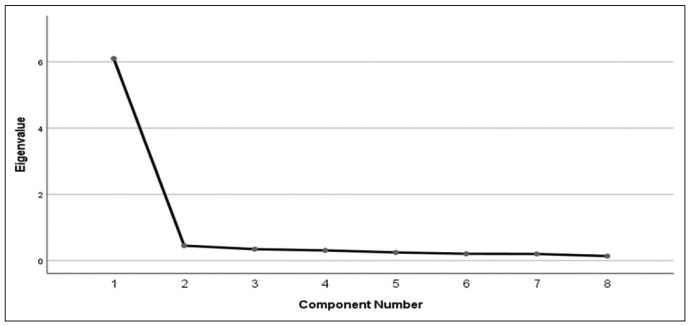


Figure 3: The Scree Plot for the third construct

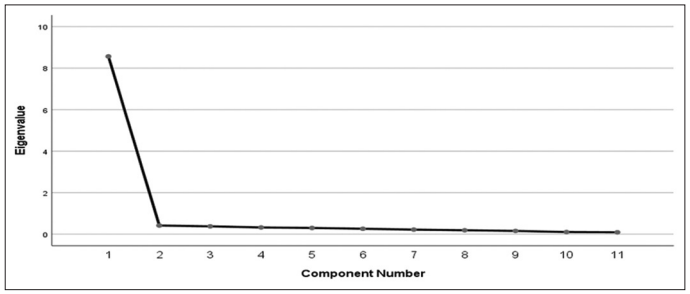


Table 11: The mean and standard deviation for items measuring internal records

Descriptive statistics				
	Item	Item statement	Mean	Std. deviation
1	IVQ1	Your hotel has multiple and comprehensive internal marketing database.	8.39	1.983
2	IVQ2	Each department in the hotel keeps the information in the internal database.	8.51	1.705
3	IVQ3	The internal records of the hotel give essential data on the performance of customers.	8.46	1.653
4	IVQ4	The internal records of the hotel give essential data on sales and purchases.	8.50	1.897
5	IVQ5	The marketing information in the hotel's internal records is considered accurate enough	8.41	1.905
6	IVQ6	The marketing information in the Hotel's internal records fit with the purpose of being used for.	8.58	1.870
7	IVQ7	The hotel maintains all the information received from the intelligence and market research in the internal records.	8.44	1.881
8	IVQ8	The hotel is continually refreshing and updating the internal records.	8.54	1.623
9	IVQ9	The hotel depends on the internal records to identify problems.	8.51	1.682
10	IVQ10	An internal marketing database is less expensive than other information sources.	8.55	1.710
11	IVQ11	The computerized records and internal reports of the hotel influence the decision-making process	8.64	1.897

Table 12: The KMO and Bartlett's test score

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		0.947
Bartlett's test of sphericity	Approx. Chi-square	1303.494
	df	55
	Sig.	0.000

Table 13: The components and their respective items

Component matrix[a]	
	Component
	1
IVQ1	0.887
IVQ2	0.870
IVQ3	0.875
IVQ4	0.897
IVQ5	0.823
IVQ6	0.916
IVQ7	0.914
IVQ8	0.877
IVQ9	0.835
IVQ10	0.879
IVQ11	0.929

Extraction method: Principal component analysis.
a. 1 components extracted.

3.4. The EFA for the Fourth Construct: Marketing Intelligence

This construct was measured using 12 items listed in Table 16 as VQ1 to VQ12, and each item was measured using Likert-scale of 10, where 1 stands for strongly disagree and 10 stands for strongly agree, the mean response, standard deviation and item statement, for each item, are listed in Table 16.

EFA using Principal Component Analysis as an extraction method performed for these 12 items to measure the Marketing Intelligence construct. The results in Table 17 shows Bartlett's Test of Sphericity

Table 14: Total variance explained

Total variance explained			
Component	Extraction sums of squared loadings		
	Total	% of variance	Cumulative %
1	8.565	77.866	77.866

Extraction method: Principal component analysis

Table 15: The Internal Reliability for Internal Records construct

Reliability statistics	
Cronbach's alpha	No. of items
0.971	11

which is Significant since it's <0.05. Kaiser-Meyer-Olkin Measure of Sampling Adequacy higher than 0.6 which is for the 4th construct 0.968, and this means that the sample size is adequate (Awang, 2010; 2012; Hoque et al., 2017; 2018; Yahaya et al., 2018 and Noor et al., 2015). Accordingly, the current data are acceptable.

The scree plot in Figure 4 shows that only one component is emerged from the EFA, accordingly all items in this construct will belong to one component.

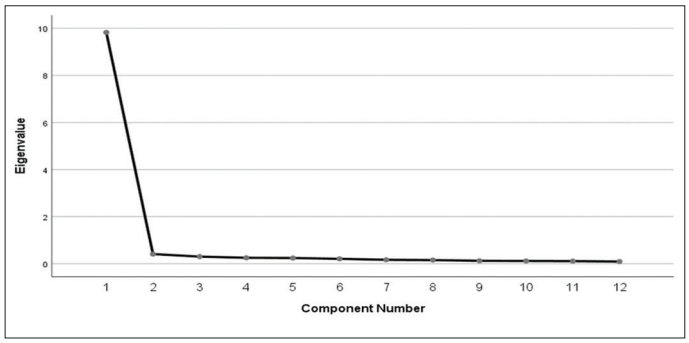
The results in Table 18 the components or dimension for each item is shown in this table, as it's clear all items are belonging to one component, The factor loading for every item should be >0.6 in order to be retained (Awang, 2012; 2014; and Yahaya et al., 2018). Thus all items will be retained.

The results in Table 19 show there are one dimension or component emerged from the EFA procedure based on the computed Eigenvalue >1.0. The total variance explained for measuring this construct is 81.888%. The total variance explained is acceptable since it exceeds the minimum 60% (Awang, 2010; 2012; Noor

Table 16: The mean and standard deviation for items measuring marketing intelligence

Descriptive statistics				
	Item	Item statement	Mean	Std. deviation
1	VQ1	The hotel benefits from the marketing intelligence techniques in knowledge and keeps abreast of the ongoing marketing of emerging circumstances.	8.50	1.871
2	VQ2	The hotel utilizes marketing intelligence regularly for collecting data about competitors.	8.56	1.802
3	VQ3	The hotel depends on the media to get data.	8.32	1.988
4	VQ4	Hotel customers offer useful information about the market and competitors	8.52	1.819
5	VQ5	Hotel depends on internal sources of information (managers, consultants, sales representatives, delegates of purchase).	8.34	1.759
6	VQ6	Marketing intelligence in the Hotel is considered substantial assets for understanding the nature of the market needs.	8.46	1.855
7	VQ7	Marketing intelligence in the hotel offers adequate and valuable data about the customers.	8.56	2.019
8	VQ8	Marketing intelligence in the hotel, help in acquiring the required information services.	8.49	1.912
9	VQ9	Marketing intelligence for the hotel help in the process of tracking and evaluating the performance of competitors catalog constantly.	8.61	1.757
10	VQ10	Marketing intelligence in the hotel helps in early warning of threats and opportunities.	8.43	1.818
11	VQ11	Marketing intelligence efficiency in the hotel is positively reflected in the marketing performance of the employee in the organization.	8.39	1.873
12	VQ12	The subsequent data of the marketing intelligence at the Hotel adds to the decision-making process.	8.67	1.822

Figure 4: The Scree Plot for the fourth construct



et al., 2015; Hoque et al., 2017; 2018; Awang et al., 2018 and Yahaya et al., 2018).

3.4.1. The internal reliability for the instrument measuring: Marketing intelligence

The last test that should be done is the internal reliability of each construct. As Table 20 shows that Cronbach's alpha test is 0.980, higher than 0.7, which means that these items are reliable.

3.5. The EFA for the Fifth Construct: Marketing Research

This construct was measured using 14 items listed in Table 21 as VIQ1 to VIQ14, and each item was measured using Likert-scale of 10, where 1 stands for strongly disagree and 10 stands for strongly agree, the mean response, standard deviation and item statement, for each item, are listed in Table 21.

Table 17: The KMO and Bartlett's test score

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy.		0.968
Bartlett's test of sphericity	Approx. Chi-square	1654.447
	df	66
	Sig.	0.000

Table 18: The components and their respective items

Component matrix	
	Component 1
VQ1	0.889
VQ2	0.848
VQ3	0.866
VQ4	0.919
VQ5	0.918
VQ6	0.904
VQ7	0.923
VQ8	0.913
VQ9	0.909
VQ10	0.920
VQ11	0.923
VQ12	0.923

Extraction method: Principal component analysis
a. 1 components extracted

EFA using Principal Component Analysis as an extraction method performed for these 14 items to measure the Marketing Research construct. The results in Table 22 shows Bartlett's Test of Sphericity which is Significant since it's <0.05. Kaiser-Meyer-

Figure 5: The Scree Plot for the fifth construct

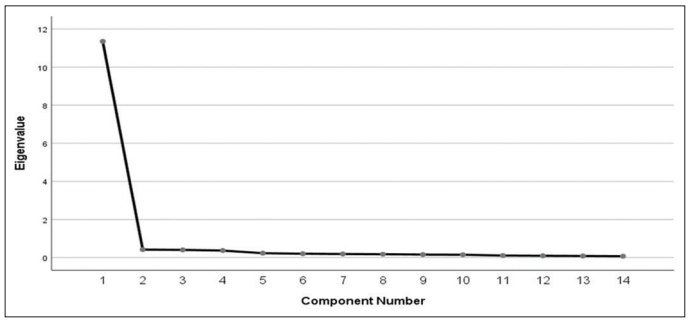


Table 19: Total variance explained

Total variance explained			
Component	Extraction sums of squared loadings		
	Total	% of variance	Cumulative %
1	9.827	81.888	81.888

Extraction method: Principal component analysis

Table 20: The internal reliability for marketing intelligence construct

Reliability statistics	
Cronbach's alpha	No. of items
0.980	12

Olkin Measure of Sampling Adequacy higher than 0.6 which is for the 5th construct 0.963, and this means that the sample size is adequate (Awang, 2010; 2012; Hoque et al., 2017; 2018; Awang et., 2018, and Noor et al., 2015). Accordingly, the current data are acceptable.

The scree plot in Figure 5 shows that only one component is emerged from the EFA, accordingly all items in this construct will belong to one component.

The results in Table 23 the components or dimension for each item is shown in this table, as it's clear all items are belonging to one component, The factor loading for every item should be >0.6 in order to be retained (Awang, 2012; and Yahaya et al., 2018). Thus all items will be retained.

The results in Table 24 show there are one dimension or component emerged from the EFA procedure based on the computed Eigenvalue >1.0. The total variance explained for measuring this construct is 81.087%. The total variance explained is acceptable since it exceeds the minimum 60% (Awang, 2010; 2012; Noor et al., 2015; Hoque et al., 2017; 2018; and Yahaya et al., 2018).

3.5.1. The internal reliability for the instrument measuring: Marketing research

The last test that should be done is the internal reliability of each construct. As Table 25 shows that Cronbach's alpha test

Table 21: The mean and standard deviation for items measuring marketing research

Descriptive statistics				
	Item	Item statement	Mean	Std. deviation
1	VIQ1	The budget allowance to marketing research department in the hotel adequate to carry the work effectively.	8.53	1.787
2	VIQ2	The hotel periodically and frequently works in the area of marketing research.	8.48	1.733
3	VIQ3	The hotel administration conducts persistent changes and improvements in the research design.	8.38	1.831
4	VIQ4	The hotel depends on primary information (interviews, research, monitoring) to gather data	8.50	1.760
5	VIQ5	The secondary information (internal records, research organizations, government research) is the base in data collection.	8.52	1.766
6	VIQ6	Marketing research is relevant to marketing situations facing the hotel.	8.49	1.803
7	VIQ7	Marketing researches in the hotel help in the discovery, collection, allocating problems and offer satisfactory solutions to them.	8.63	1.694
8	VIQ8	Marketing research in the hotel help in evaluating the current market precisely.	8.49	1.798
9	VIQ9	9- Marketing research in the hotel help in the perception of consumer behavior.	8.54	1.715
10	VIQ10	Marketing research efficiency is reflected positively on the execution of the Hotel's marketing staff.	8.63	1.836
11	VIQ11	Marketing research in the hotel decreases the risk of uncertainty.	8.46	1.891
12	VIQ12	Marketing research in the hotel takes part in standing on new opportunities.	8.53	1.765
13	VIQ13	Marketing research in the hotel provides the required data for decision making in a convenient and timely way.	8.68	1.707
14	VIQ14	The marketing research feedback, findings, suggestions, and recommendations contribute to the decision-making process.	8.69	1.836

is 0.982, higher than 0.7, which means that these items are reliable.

3.6. The EFA for the Sixth Construct: Marketing DSS

This construct was measured using 12 items listed in Table 26 as VIIQ1 to VIIQ12, and each item was measured using Likert-scale of 10, where 1 stands for strongly disagree and 10 stands for strongly agree, the mean response, standard deviation and item statement, for each item, are listed in Table 26.

EFA using Principal Component Analysis as an extraction method performed for these 12 items to measure the Marketing DSS construct. The results in Table 27 shows Bartlett's Test of Sphericity which is Significant since it's <0.05. Kaiser-Meyer-Olkin Measure of Sampling Adequacy higher than 0.6 which is for the 6th construct 0.960, and this means that the sample size is adequate (Awang, 2010; 2012; 2014; 2015; Hoque et al., 2017; 218 and Noor et al., 2015). Accordingly, the current data are acceptable.

Table 22: The KMO and Bartlett's test score

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		0.963
Bartlett's test of sphericity	Approx. Chi-square	1999.086
	df	91
	Sig.	0.000

Table 23: The components and their respective items

Component matrix[a]	
	Component 1
VIQ1	0.864
VIQ2	0.854
VIQ3	0.898
VIQ4	0.888
VIQ5	0.909
VIQ6	0.909
VIQ7	0.887
VIQ8	0.915
VIQ9	0.889
VIQ10	0.881
VIQ11	0.922
VIQ12	0.926
VIQ13	0.920
VIQ14	0.939

Extraction method: Principal component analysis.
a. 1 components extracted.

Table 24: Total variance explained

Total variance explained			
Component	Extraction sums of squared loadings		
	Total	% of variance	Cumulative %
1	11.352	81.087	81.087

Extraction method: Principal component analysis

Table 25: The internal reliability for the abundance of marketing research construct

Reliability statistics	
Cronbach's alpha	No. of items
0.982	14

The scree plot in Figure 6 shows that only one component is emerged from the EFA, accordingly all items in this construct will belong to one component.

The results in Table 28 the components or dimension for each item is shown in this table, as it's clear all items are belonging to one component, The factor loading for every item should be >0.6 in order to be retained (Awang, 2010; 2012; and Yahaya et al., 2018). Thus all items will be retained.

The results in Table 29 show that there are one dimension or component emerged from the EFA procedure based on the computed Eigenvalue >1.0. The total variance explained for measuring this construct is 80.619%. The total variance explained is acceptable since it exceeds the minimum 60% (Awang, 2010; 2012; Noor et al., 2015; Hoque et al., 2016; Hoque et al., 2017; 2018; and Yahaya et al., 2018).

3.6.1. The internal reliability for the instrument measuring: Marketing DSS

The last test that should be done is the internal reliability of each construct. As Table 30 shows that Cronbach's Alpha test is 0.978, higher than 0.7, which means that these items are reliable.

3.7. The EFA for the Seventh Construct: The Decision-Making Process

This construct was measured using 7 items listed in Table 31 as VIIIQ1 to VIIIQ7, and each item was measured using Likert-scale of 10, where 1 stands for strongly disagree and 10 stands for strongly agree, the mean response, standard deviation and item statement, for each item, are listed in Table 31.

EFA using Principal Component Analysis as an extraction method performed for these 7 items to measure: The decision-making process construct.

Figure 6: The Scree Plot for the sixth construct

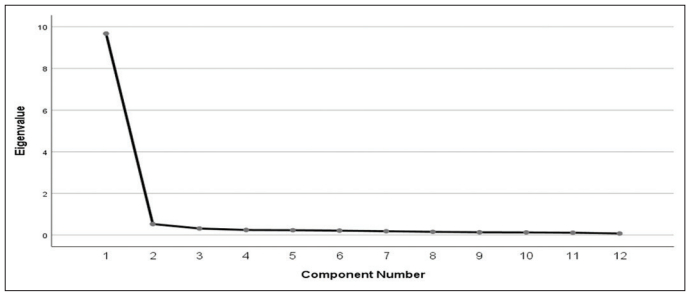


Figure 7: The Scree Plot for the seventh construct

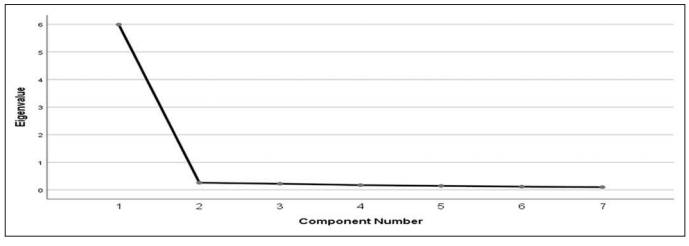


Table 26: The mean and standard deviation for items measuring marketing decision support system

Descriptive statistics				
	Item	Item statement	Mean	Std. deviation
1	VIIQ1	Computer programs give helpful data used to attain marketing targets effectively.	8.60	1.662
2	VIIQ2	Computer programs can predict the changes may happen to the marketing strategy constructs in the hotel.	8.35	1.866
3	VIIQ3	Computer programs can characterize the outcomes of a change in marketing constructs.	8.52	1.727
4	VIIQ4	Computer programs can analyze and detect marketing problems.	8.44	1.802
5	VIIQ5	computer programs decrease exertion, cost, and time.	8.49	1.861
6	VIIQ6	Computer programs measure the performance of marketing activities.	8.36	1.922
7	VIIQ7	Computer programs determine the customer influencing size that affecting the association sales.	8.37	1.908
8	VIIQ8	Computer programs indicate the software limitations and bottlenecks influencing the course of day by day work.	8.51	1.676
9	VIIQ9	Computer programs assist the foundation with seizing opportunities and maintain a strategic distance away from dangers.	8.54	1.664
10	VIIQ10	Computer programs can identify the marketing strengths and weaknesses in the organization.	8.34	2.014
11	VIIQ11	Training program for the use of computer programs improves the efficiency of marketing performance.	8.64	1.771
12	VIIQ12	The hotel relies on the analysis of information arising from the computerized decision- support programs in the decision-making process.	8.76	1.707

Table 27: The KMO and Bartlett's test score

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		0.960
Bartlett's test of sphericity	Approx. Chi-square	1618.515
	df	66
	Sig.	0.000

Table 28: The components and their respective items

Component matrix[a]	
	Component
	1
VIIQ1	0.892
VIIQ2	0.905
VIIQ3	0.892
VIIQ4	0.907
VIIQ5	0.855
VIIQ6	0.852
VIIQ7	0.914
VIIQ8	0.921
VIIQ9	0.875
VIIQ10	0.939
VIIQ11	0.896
VIIQ12	0.923

Extraction method: Principal component analysis
a. 1 components extracted

The results in Table 32 shows Bartlett's Test of Sphericity which is Significant since it's <0.05. Kaiser-Meyer-Olkin Measure of Sampling Adequacy higher than 0.6 which is for the 7th construct 0.941, and this means that the sample size is adequate (Awang, 2010; 2012; Hoque et al., 2017; 2018; and Noor et al., 2015). Accordingly, the current data are acceptable.

Table 29: Total variance explained

Total variance explained			
Component	Extraction sums of squared loadings		
	Total	% of variance	Cumulative %
1	9.674	80.619	80.619

Extraction method: Principal component analysis.

Table 30: The internal reliability for the abundance of marketing decision support system construct

Reliability statistics	
Cronbach's alpha	No. of items
0.978	12

The scree plot in Figure 7 shows that only one component is emerged from the EFA, accordingly all items in this construct will belong to one component.

The results in Table 33 the components or dimension for each item is shown in this table, as it's clear all items are belonging to one component, The factor loading for every item should be >0.6 in order to be retained (Awang, 2010; 2012; and Yahaya et al., 2018). Thus all items will be retained.

The results in Table 34 show there are one dimension or component emerged from the EFA procedure based on the computed Eigenvalue >1.0. The total variance explained for measuring this construct is 85.593%. The total variance explained is acceptable since it exceeds the minimum 60% (Awang, 2010; 012; Noor et al., 2015; Hoque et al., 2017; 2018; and Yahaya et al., 2018).

Table 31: The mean and standard deviation for items measuring the decision-making process

Descriptive statistics				
	Item	Item statement	Mean	Std. deviation
1	VIIIQ1	Hotel's staff understand the goals and objectives of the computerized marketing information system in the hotel.	8.53	1.721
2	VIIIQ2	Tangible benefit from computerized information system in the hotel is found in the decisions you make in your field.	8.55	1.693
3	VIIIQ3	You trust the decisions taken based on computerized information systems of the hotel.	8.49	1.793
4	VIIIQ4	Computerized marketing information systems in the hotel contribute to determining the real problem	8.65	1.759
5	VIIIQ5	Computerized marketing information systems in the hotel provide adequate alternatives for solutions to the problems at hand.	8.52	1.851
6	VIIIQ6	Computerized marketing information systems in the hotel provide adequate information on all alternatives to the decision maker.	8.48	1.835
7	VIIIQ7	Computerized marketing information systems in the hotel provide adequate information in a timely manner.	8.88	1.874

Table 32: The KMO and Bartlett's test score

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		0.941
Bartlett's test of sphericity	Approx. Chi-square	933.242
	df	21
	Sig.	0.000

Table 32: The KMO and Bartlett's test score

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		0.941
Bartlett's test of sphericity	Approx. Chi-square	933.242
	df	21
	Sig.	0.000

Table 33: The components and their respective items

Component matrix[a]	
	Component
	1
VIIIQ1	0.919
VIIIQ2	0.918
VIIIQ3	0.916
VIIIQ4	0.933
VIIIQ5	0.919
VIIIQ6	0.925
VIIIQ7	0.945

Extraction method: Principal component analysis
a. 1 components extracted

Table 34: Total variance explained

Total variance explained			
Component	Extraction sums of squared loadings		
	Total	% of variance	Cumulative %
1	5.992	85.593	85.593

Extraction method: Principal component analysis

Table 35: The internal reliability for the abundance of the decision-making process construct

Reliability statistics	
Cronbach's alpha	No. of items
0.972	7

3.7.1 The internal reliability for the instrument measuring: The decision-making process

The last test that should be done is the internal reliability of each construct. As Table 35 shows that Cronbach's Alpha test is 0.972 higher than 0.7, which means that these items are reliable.

4. CONCLUSION

This study has proven the validity and reliability of the new instrument for measuring the effectiveness of MIS components in the decision-making process, accordingly, this instrument can be used to measure the effectiveness of MIS in the targeted organizations in this study. This study found a valid and reliable instrument for measuring the effectiveness of MIS components in the decision-making process.

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