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

Amged Saleh Shkeer*, Zainudin Awang

Faculty of Economics and Management Science, Universiti Sultan Zainal Abidin, Malaysia. *Email: abu_shqeer@yahoo.com

Received: 24 August 2019           Accepted: 11 October 2019         DOI: https://doi.org/10.32479/irmm.8622

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 six 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 six 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.

| Item | Item statement | Descriptive statistics | 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 |

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
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).

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.
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.

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

| Item | Item statement                                                                                     | Mean | Std. deviation |
|------|----------------------------------------------------------------------------------------------------|------|----------------|
| 1    | VQ1                                                                                               | 8.50 | 1.871          |
| 2    | VQ2                                                                                               | 8.56 | 1.802          |
| 3    | VQ3                                                                                               | 8.32 | 1.988          |
| 4    | VQ4                                                                                               | 8.52 | 1.819          |
| 5    | VQ5                                                                                               | 8.34 | 1.759          |
| 6    | VQ6                                                                                               | 8.46 | 1.855          |
| 7    | VQ7                                                                                               | 8.56 | 2.019          |
| 8    | VQ8                                                                                               | 8.49 | 1.912          |
| 9    | VQ9                                                                                               | 8.61 | 1.757          |
| 10   | VQ10                                                                                              | 8.43 | 1.818          |
| 11   | VQ11                                                                                              | 8.39 | 1.873          |
| 12   | VQ12                                                                                              | 8.67 | 1.822          |

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                                                                            | 1654.447 |
| Approx. Chi-square df                                                                                    | 66    |
| Sig.                                                                                                     | 0.000 |

Table 18: The components and their respective items

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

Figure 4: The Scree Plot for the fourth construct
Figure 5: The Scree Plot for the fifth construct

Table 19: Total variance explained

| Component | Total variance explained |
|-----------|--------------------------|
|           | 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 | No. of items |
|------------------------|--------------|
| Cronbach’s alpha       | 12           |
| 0.980                  | 12           |

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

| Item | Item statement                                                                 | Descriptive statistics | 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          |

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
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* | Component |
|---------------------|-----------|
|  | 1 |
| VIIQ1 | 0.864 |
| VIIQ2 | 0.854 |
| VIIQ3 | 0.898 |
| VIIQ4 | 0.888 |
| VIIQ5 | 0.909 |
| VIIQ6 | 0.909 |
| VIIQ7 | 0.887 |
| VIIQ8 | 0.915 |
| VIIQ9 | 0.889 |
| VIIQ10 | 0.881 |
| VIIQ11 | 0.922 |
| VIIQ12 | 0.926 |
| VIIQ13 | 0.920 |
| VIIQ14 | 0.939 |

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.

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).

The results in Table 28 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. 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* | Component |
|---------------------|-----------|
|  | 1 |
| VIIQ1 | 0.864 |
| VIIQ2 | 0.854 |
| VIIQ3 | 0.898 |
| VIIQ4 | 0.888 |
| VIIQ5 | 0.909 |
| VIIQ6 | 0.909 |
| VIIQ7 | 0.887 |
| VIIQ8 | 0.915 |
| VIIQ9 | 0.889 |
| VIIQ10 | 0.881 |
| VIIQ11 | 0.922 |
| VIIQ12 | 0.926 |
| VIIQ13 | 0.920 |
| VIIQ14 | 0.939 |

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.
The results in Table 32 show 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.

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

| Item   | Item statement                                                                 | Mean  | Std. deviation |
|--------|---------------------------------------------------------------------------------|-------|----------------|
| VIIIQ1 | Hotel’s staff understand the goals and objectives of the computerized marketing information system in the hotel. | 8.53  | 1.721          |
| VIIIQ2 | Tangible benefit from computerized information system in the hotel is found in the decisions you make in your field. | 8.55  | 1.693          |
| VIIIQ3 | You trust the decisions taken based on computerized information systems of the hotel. | 8.49  | 1.793          |
| VIIIQ4 | Computerized marketing information systems in the hotel contribute to determining the real problem | 8.65  | 1.759          |
| VIIIQ5 | Computerized marketing information systems in the hotel provide adequate alternatives for solutions to the problems at hand. | 8.52  | 1.851          |
| VIIIQ6 | Computerized marketing information systems in the hotel provide adequate information on all alternatives to the decision maker. | 8.48  | 1.835          |
| 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       | 0.941|     |
| Bartlett’s test of sphericity | 933.242 | df 21 |
| Approx. Chi-square       | 0.000|     |

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.

REFERENCES

Al-Adamat, A. (2015), The Impact of Information and Communication Technology on the Marketing Performance of Jordanian Hotels (Doctoral Dissertation, Queen Margaret University, Edinburgh).
Awang, Z. (2010), Research Methodology for Business and Social Sciences. Malaysia: Universiti Teknologi MARA.
Awang, Z. (2012), Research Methodology and Data Analysis. Malaysia: Penerbit Universiti Teknologi MARA Press.
Awang, Z. (2014), A Handbook on SEM for Academicians and Practitioners: The Step by Step Practical Guides for the Beginners. Bandar Baru Bangi: MPWS Rich Resource.
Awang, Z. (2015), SEM Made Simple: A Gentle Approach to Learning Structural Equation Modelling. Bandar Baru Bangi: MPWS Rich Resources.
Awang, Z., Afthanorhan, A., Mamat, M. (2016), The Likert scale analysis using parametric based structural equation modeling (SEM). Computational Methods in Social Sciences, 4(1), 13.
Awang, Z., Afthanorhan, W.M.A., Asri, M.A.M. (2015), Parametric and non-parametric approach in structural equation modeling (SEM): The application of bootstrapping. Modern Applied Science, 9(9), 58.
Awang, Z., Lim, S.H., Zainudin, N.F.S. (2018), Pendekatan Mudah SEM-Structural Equation Modelling. Bandar Baru Bangi: MPWS Rich Resources.
Bahloul, M. (2011), The Role of Marketing Information System...
Technology in the Decision Making Process Case Study: The Banking Sector in Gaza Strip. Gaza: Islamic University.
Brest, P., Levinson, S., Balkin, J.M., Amar, A.R., Siegel, R.B. (2018), Processes of Constitutional Decision Making: Cases and Materials. New York: Wolters Kluwer Law and Business.
Harker, M., Brennan, R., Kotler, P., Armstrong, G. (2015), Marketing: An Introduction. London: Pearson Prentice-Hall.
Hoque, A.S.M., Awang, Z., Jusoff, K., Salleh, F., Muda, H. (2017), Social business efficiency: Instrument development and validation procedure using structural equation modelling. International Business Management, 11(1), 222-231.
Hoque, A.S.M., Siddiqui, B.A., Awang, Z.B., Baharu, S.M.A. (2018), Exploratory factor analysis of entrepreneurial orientation in the context of Bangladesh small and medium enterprises (SMES). European Journal of Management and Marketing Studies, 3, 81-94.
Keller, K.L., Kotler, P. (2016), Marketing Management. Upper Saddle River, New Jersey: Pearson.
Noor, N.M., Aziz, A.A., Mostapa, M.R., Awang, Z. (2015), Validation of the Malay version of the inventory of functional status after childbirth questionnaire. BioMed Research International, 2015, 1-10.
Yahaya, T., Idris, K., Suandi, T., Ismail, I. (2018), Adapting instruments and modifying statements: The confirmation method for the inventory and model for information sharing behavior using social media. Management Science Letters, 8(5), 271-282.