

Development and Validation of a Questionnaire for Digital Government Competency Framework of Omani Public Sector Managers

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Abstract

Nowadays, most governments around the world are working towards improving the efficiency, transparency of their system and providing cheaper, faster, and more democratic public services. Therefore, the governments invest in transformation projects called Digital Government or previously known as e-Government. Not only that Digital Government transforms from paper based to computer-based system, it also requires technology, people, and process along with a set of strategies. To ensure this success of the Digital Government, the government employees must be equipped with relevant digital skills that are currently not rigorously been studied. This study aimed to evaluate the face and content validity of the new instrument for digital government competency framework for Omani public sector managers. There are 7 non-expert in the IT and non-IT field participated in face validity. They rated the instrument for the relevance of each item based on a dichotomous rating of favourable or unfavourable. The feedback and comments are taking into consideration. An expert panel of eight academicians is involved in evaluating the judgmental evidence of the instrument for content validity. Items with Content Validity Index (CVI) greater than 0.80 were included in the final instrument. The final instrument contained 66 items of 5-point Likert scale multiple-choice options. The finding supports the face and content validity of this 66-item questionnaire, hence could be further researched on construct validity.

Keywords: Digital Government, public sector, content validity, face validity, construct validity

1. Introduction

The validity of a research instrument is an essential process of analysis to consider as a good instrument [1]. Validity means "measure what is intended to be measured" [2]. Taherdoost [3] lists four main types of validity, namely face validity, content validity, construct validity, and criterion validity. However, the study only discusses the two most commonly used validities in the study, namely face validity and content validity.

As a tool to be used to identify digital government competencies in Omani public sector, the extent of the reliability and validity of the instrument has important implications to the various stakeholders in the public sectors. Therefore, this study is aimed to examine the validity and reliability of the digital government competencies in Omani public sector. Also, this study aims to explore a further statistical analysis invalidating the instruments.

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Before distribution of the questionnaire, it is advisable to check the questionnaire for its face validity and content validity - face validity ensures the participants do not feel uncomfortable with the questionnaire in terms of their familiarity with the terms used, their clarity, well-formed questions, and the ratification of the measurement of concepts in the questionnaire. Face validity identifies problems with the instruments that need improvement before distribution[4].

2. Background of Face and Content Validity

The instrument employed by this study was adapted from several previous studies that focused on the study of the digital government skills, digital skills, digital competencies in the digital transformation skills in the public sector. The questionnaire items to identify digital government competencies in Omani public sector. The validity of the instrument is a strength of a research study design. Where it is strongly dependent on how precisely the identified variables are measured [1].

The purpose of validity is to ensure that the questions being asked allow valid inferences to be made. As previously stated, there are four main types of validity, but this study applied two of the most common and frequently used validities, which are face and content validity. The main focus of this paper is to develop digital government competency framework for Omani public sector managers. In particular, the research objectives are as follows:

(A) to design and develop instrument; and (B) to validate an instrument to items to identify digital government competencies in Omani public sector.

3. Methodology

For the development and content validity of the new instrument, this study used the approach described by [5]. First stage is instrument design and construction (development). Items were generated from past research analysis, related reports, and preliminary studies. The selection of variables in the past analysis will be based on the theory of selected studies such as Human Capital

Theory (HCT) and Technology Organization Environment Theory (TOE).

The second stage is translation. Translation into local languages is one of the ways to help research participants provide accurate answers. The third step is the validity of the instrument and validation of the translation. The two main processes involved in this process are face validity and content validity. Face validity evaluates the appearance of the questionnaire in terms of feasibility, readability, consistency of style and formatting, and the clarity of the language used [3]. While content validity includes the evaluation of a new survey instrument in order to ensure that it includes all the items that are essential and eliminates undesirable items to a particular construct domain [6].

3.1 Development of the questionnaire

The questionnaire has Two main sections; A-Profile of Respondent, B-Information on digital government competencies. Based on preliminary studies in the design and construction of this study model, a total of 14 constructs were consolidated

into one proposed model[7] . Table 1 shows the items used to measure each construct used in this study.

The initial questionnaire contained 72 items of measurement. This research applied the Likert Scale format to measure the items in the survey instrument. A five-point Likert scale "1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree" was used for all measurement items, which is same as to the originally adapted measurements. The items of measurement are adapted from the various previous study, as shown in Table 1.

Table 1. Measurement items for each construct

Construct	CODE	ITEMS	Source
Data science competency	DSC-1	I have the ability to gather and analyse any data in big data context.	[10-8]
	DSC-2	I know how to organize information using tools such as databases, data analytics application and similar programs	[10 ,9]
	DSC-3	I know how to search for data sets developed by others.	[10 ,9]
	DSC-4	I am able to check the data available on different sources to provide justifying arguments or reasoning	[10 ,9]
	DSC-5	I am interested to use new data science tools to improve my data analytics skills in supporting my task	[12-10]
	DSC-6	My organization is actively seeking to use new data analytics tools in supporting the organization vision and mission	[10 ,9]
Information Security Competency	ISC-1	I have knowledge in ICT Security	[9 ,8]
	ISC-2	I consider myself ICT security competent, in most cases, to detect email with viruses, trash or spam	[9 ,8]
	ISC-3	I comply with organizational policies to protect hardware, software, information, and systems	[9 ,8]
	ISC-4	I have the ability to analyze digital risks and identify cybersecurity threats	[9 ,8]
	ISC-5	There is a lack of security rules, policies and privacy laws	[9 ,8]
Management Competency	MC-1	I implement international standards the project management in digital government project	[13 ,11 ,8]
	MC-2	I involve coordinating and planning the employee digital competency assessment	[13 ,11 ,8]
	MC-3	I use digital tools and resources to manage task and communicate in my organisation.	[13 ,11 ,8]

	MC-4	I guide staffs in implementing the latest implementing latest project management international standards that accommodates changes to be made in the digital government project development requirement	[13 ,11 ,8]
Soft Skills	SOS-1	I can communicate well according to the needs and various situations of digital government environment.	,13 ,11 ,9 ,8] [14
	SOS-2	I effectively search, find, retrieve, process and communicate information from a variety of digital sources and in a variety of formats	,13 ,11 ,9 ,8] [14
	SOS-3	I have the ability to find solution to any problems at my work by using the digital technology	,13 ,11 ,9 ,8] [14
	SOS-4	I use the internet to find the best way to solve the problem	,12 ,10 ,8 ,7] 13
	SOS-5	I do Troubleshoot/solve problems that arise when using digital technologies	,12 ,10 ,8 ,7] 13
	SOS-6	I am able to recognize workplace problems and needs in the digital environment and propose innovative solutions	,13 ,11 ,9 ,8] [14
Digital leadership competency	DLC-1	The organization's top management have strong leadership and engages in the digital government process	[15]
	DLC-2	I have ability to develop a clear vision for the future and to link strategic objectives to the priorities of action	[15 ,14 ,11]
	DLC-3	I have ability to respond promptly to critical events, analyze them, identify areas for change, and engage and commit individuals and task forces changing.	[15 ,14 ,11]
	DLC-4	I have ability to motivate, encourage, develop and empower employees and provide them with a suitable working environment that meets their career needs and meet their future aspirations	[15 ,14 ,11]
	DLC-5	My organization is effectively developing the types of leaders who have the capabilities necessary to lead organization in digital environment	[15 ,14 ,11]
	DLC-6	My organization is increasingly pushing decision making authority down into lower levels of the organization in order to better execute in digital environment	[15 ,14 ,11]
	DLC-7	My organization needs to find new leaders in order for the organization to succeed in the digital age	[15 ,14 ,11]
Digital Creativity and Innovation	DCI-1	I use the digital technology to generate innovative ideas for my working field	[8]
	DCI-2	I use the digital technology to execute my tasks creatively	[8]
	DCI-3	I use the digital technology to evaluate the usability of my ideas	[8]

Digital literacy	DL-1	I know how to use various digital tools and applications to support my work	[12 ,8]
	DL-2	I am able to use all the desktop productivity software at ease to support my work	[12 ,8]
	DL-3	I'm able to use all the specific software designated by my organisation at ease to support my work	[12 ,8]
	DL-4	I Know how to use collaborative software at ease to support my work	[12 ,8]
	DL-5	I use the internet to find the best way to solve any problem arises in delivering My office work tasks	[12 ,8]
	DL-6	In your organization IT staff have good knowledge about the underlying structures and requirements of digital government	[11 ,7]
	DL-7	In your organization IT staff have good knowledge about various of digital government systems	[11 ,7]
Vocational training and education	VTE-1	For the last five years I got at least one training course related to digital government	[12]
	VTE-2	Most of my team members attended at least one course related to digital government during last five years	[12]
	VTE-3	My organization support technical and vocational education and training related to digital government	[12]
	VTE-4	My organization provide training opportunities to support digital transformation	[12]
Social and ethical responsibility	SER-1	I have the knowledge and comply about intellectual property rights	[12 ,8]
	SER-2	I understand the positive and negative environmental impacts of digital technologies	[8]
	SER-3	I understand the importance of privacy in handling data and information	[8]
	SER-4	My organization has rule and policies about Privacy of digital data	[8]
	SER-5	I follow rule and policies of organization about Privacy of digital data	[8]
Relationships and engagement	RE-1	I Have the ability to engage with stakeholder and business owners on digital government project	[12 ,8]
	RE-2	I share important information with my team via the internet and digital technology	[17 ,16 ,8]
	RE-3	Use the internet and digital technology to share resources that help the team perform	[12 ,8]
	RE-4	I share work-related knowledge with each other via the internet and digital technology	[12 ,8]

	RE-5	I have ability to build and consolidate working relationships with the relevant parties with the institution, negotiate with them and develop relationships with a positive impact on the performance of the institution on digital government project.	[15]
Digital talents development	DTD-1	My organization provide training to develop new skills for digital environment	[10 ,8]
	DTD-2	I do update my digital competency by continuing education and vocational training	[10 ,8]
	DTD-3	I am satisfied with how my organization is help in me prepare for the changes necessary for working in digital environment	[10 ,8]
Change management and Digital transformation	CMDT-1	I have the ability to manage the change and transformation to Digital Government	[10 ,8]
	CMDT-2	Do nature of a work on digital environment drive collaboration in your organization	[10 ,8]
	CMDT-3	Those who is in management level in my organization understands the benefits of digital government	[10 ,8]
	CMDT-4	Organization top management encourages using new emerging technology to provide digital services	[10 ,8]
	CMDT-5	At my organization the top management supports the implementation of Digital services.	[10 ,8]
	CMDT-6	My organization top management support the initiatives to drive digital transformation across the organization	[10 ,8]
	CMDT-7	Digital transformation is one of the top management prioritisation in my organization	[10 ,8]
Digital Platform Usability	DPU-1	I have the ability to use digital platforms at my organization	[10 ,8]
	DPU -2	At my organization the digital government services portal is easy to use	[10 ,8]
	DPU -3	using the digital government platform enable me to accomplish the required task more quickly	[10 ,8]
	DPU -4	The digital government Platform increase my productivity and efficiency	[10 ,8]
	DPU -5	At my organization the digital government platform meets my' expectations	[10 ,8]
	DPU -6	I can access digital platforms at my organization from any location have internet connection	[10 ,8]
Attitudes	AT-1	I have Entrepreneurial and commercialization mindset in the digital environment	[14 ,8]

AT-2	I have Creativity and experimental mind-set in the digital workplace	[14 ,8]
AT-3	I have A mind-set to function with an increasingly digitized workplace	[14 ,8]
AT-4	I believe the nature of working on digital environment drive the collaboration in my organization	[14 ,8]

3.2 Translate of the questionnaire

The survey was translated from English to Arabic to enable respondents' understanding of the questionnaire. This study uses the method proposed by [18] , which is a one-way or expert translation. Therefore, this study has been using professional translator services in Oman and then validate the translation of questioners' items by academic expert from ICT field.

3.3 Face validity of the questionnaire

Face validity is the degree to which a measure appears to be related to a specific construct, in the judgment of non-experts such as test-takers and representatives of the legal system [3] . In order to examine the face validity, the dichotomous scale can be used with the categorical option of “Yes” and “No”, which indicate advantageous and disadvantageous item, respectively. According to Masuwai [1]. the procedural suggest evaluated by two (or more) independent judges. Therefore, in the study of 7 respondents were invited and performed face validity procedures. The participants include government employees, academicians, and university students.

3.4 Expert content validity of the questionnaire

Expert judgment intentions to ensure the measurement items correctly represent the construct, and each item measures what it is intended to measure. In this study, the content validity test will be performed by the expert and academic to validate the instrument to be used suggested by McKenzie [19]. A Study by Kennedy [20] proposed a panel of five to ten experts is considered sufficient to evaluate the items of measurement. Therefore, in this study 8 experts and academics were chosen for the content validity test based on their knowledge and education background, interest area, experience, and skill related to digital government competencies, survey instrument development, and statistical analysis.

The experts were asked to evaluate the relevancy and clarity of each item by providing their rating for each item based on three scales: 1=Not relevance/not clear, 2=Relevant/clear but need some revision, 3=Very relevant/clear [21],[22]. Besides, the experts are also asked to provide any comments or feedback on any construct measurement.

Quantitative analysis includes Content Validity Ratio (CVR) and Content Validity Index (CVI) calculation to measure the validity of the survey items [3] . CVR is an item's statistic indicating the usefulness of item measurement to be accepted or rejected. CVR and CVI offer practicality in terms of time and cost, and also, it is quick and easy to perform [23]. Besides, CVI flexible as requires on a minimum of three

experts. Using Lawshe[22] , CVR was calculated for each measurement item by the CVR calculation, which is defined as follow:

$$CVR = \frac{(Ne - \frac{N}{2})}{\frac{N}{2}}$$

The value Ne is the number of experts indicating “relevant” (score of 2 and 3), and the value N is the total number of experts. Based on the total number of experts, which is eight, minimum CVR of 0.75 is required to accept the measurement item to be retained in the survey[22] .

4. Results and Discussions

Through two validity sessions conducted, face validity and content validity, several improvements to the questionnaire were made based on the results and recommendations.

4.1 Face validity

In general, participants feel that they do not have a big problem in understanding the requirements of the questions, and it is answerable. However, some points are raised for attention, and corrective action is as shown in Table 2.

Table 2. Summary of participants' feedback and decisions made in response

No	Comments	Decisions made on the comments
1	Kindly provide the definition for each competency.	Definitions have been provided at the beginning of each section .
2	Consistency to use either British English or American English.	Revised according to the expert evaluation.
3	Need to do correction in sentence structure	Revised accordingly.
4	Not focused on individual's competency.	Revised according to the expert evaluation.
5	Remove part three	Part Three has been removed
6	Need to do correction in sentence structure	Revised according to the expert evaluation.

4.2 Expert content validity

Expert evaluations show that all constructs are accepted as part of this research model. However, some items were dropped as a result of the calculation performed using the CVR method. Table 3 illustrates the CVR values for each item, the CVI value for each construct and overall survey validity, indicating that the validity of the survey instrument was achieved at 96% of CVI. While Table 4 highlights the summary of the comments and feedback by the experts and several decisions made accordingly.

Table 3. CVR and CVI of the Survey Instrument

Construct	Item	CVR	Decision	CVI	Construct	Item	CVR	Decision	CVI	
Data science competency	DSC-1	1	Accept	0.96	Vocational training and education	VTE-1	1	Accept	1	
	DSC-2	1	Accept			VTE-2	1	Accept		
	DSC-3	1	Accept			VTE-3	1	Accept		
	DSC-4	1	Accept			VTE-4	1	Accept		
	DSC-5	0.75	Accept		Social and ethical responsibility	SER-1	1	Accept	1	
	DSC-6	0.75	Accept			SER-2	1	Accept		
Information Security Competency	ISC-1	0.75	Accept	0.85	Relationship and engagement	SER-3	1	Accept	1	
	ISC-2	0.75	Accept			SER-4	1	Accept		
	ISC-3	1	Accept			SER-5	1	Accept		
	ISC-4	0.75	Accept			RE-1	1	Accept		
	ISC-5	0.25	Drop		RE-2	1	Accept			
Management Competency	MC-1	1	Accept	1	RE-3	1	Accept	1		
	MC-2	1	Accept		RE-4	1	Accept			
	MC-3	1	Accept		RE-5	1	Accept			
	MC-4	1	Accept							
Soft Skills	SOS-1	0.75	Accept	0.83	Digital talent development	DTD-1	1	Accept	1	
	SOS-2	1	Accept			DTD-2	1	Accept		
	SOS-3	1	Accept			DTD-3	1	Accept		
	SOS-4	0	Drop		Change management and Digital transformation	CMDT-1	1	Accept	0.89	
	SOS-5	0.25	Drop			CMDT-2	0.25	Drop		
	SOS-6	1	Accept			CMDT-3	1	Accept		
Digital leadership competency	DLC-1	1	Accept	1	CMDT-4	0.75	Accept	1		
	DLC-2	1	Accept		CMDT-5	0.75	Accept			
	DLC-3	1	Accept		CMDT-6	0.75	Accept			
	DLC-4	1	Accept		CMDT-7	1	Accept			
	DLC-5	1	Accept		Digital Platform Usability	DPU-1	1		Accept	1
	DLC-6	1	Accept			DPU-2	1		Accept	
	DLC-7	1	Accept			DPU-3	1		Accept	
Digital Creativity and Innovation	DCI-1	1	Accept	1	DPU-4	1	Accept	1		
	DCI-2	1	Accept		DPU-5	1	Accept			
	DCI-3	1	Accept		DPU-6	1	Accept			
Digital literacy	DL-1	0.75	Accept	0.88	Attitudes	AT-1	1	Accept	1	
	DL-2	1	Accept			AT-2	1	Accept		
	DL-3	1	Accept			AT-3	1	Accept		
	DL-4	1	Accept			AT-4	1	Accept		
	DL-5	1	Accept							
	DL-6	0.25	Drop							
	DL-7	0.25	Drop							
Overall CVI						0.96%				

Table 4. Summary of expert feedback and decisions made in response

No	Reviewer feedback	Decisions made on the comment
1	Improve language.	Revised accordingly.
2	Improve the sentence structure to be more consistent.	Revised accordingly.
3	Remove part three	Part Three has been removed
4	Choose the suitable items only.	Revised accordingly.

5. Discussion

This study established the face and content validity of questionnaires designed to items to identify digital government competencies in Omani public sector. The face validity shows some weaknesses that need to be addressed in the survey. Among the emphasis are the sentence structure and the language that the respondent can easily understand. The feedback received is considered appropriate.

The CVI used in this study indicates the validity of the survey instrument was achieved at 96% (66 out of 72 items were judged content valid by the content experts). The CVI value exceeded the expected minimum CVI of 0.80 [23] and thus showed an adequate content valid instrument. All the comments and corrections suggested by the experts been considered for revision. Finally, at the end of the face and content validity process, study instrument was prepared with 14 constructs and 66 items.

6. Conclusion

This new instrument has been found to demonstrate an adequate and acceptable measurement performance needed for a future quantitative study to identify digital government competencies in Omani public sector. This survey appeared to have adequate face and content validity and can be further arranged for the next steps and doing the rest of the actual data collection and analysis.

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