

Statistical Analysis for OPM3 Assessments

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"The example of the believers in their mutual cordiality, mercy, and empathy for each other is the example of the one body, when an organ is suffering the whole body mobilizes in sleeplessness and fever."

Mohammad (PBUH)

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Statistical Analysis for OPM3 Assessments

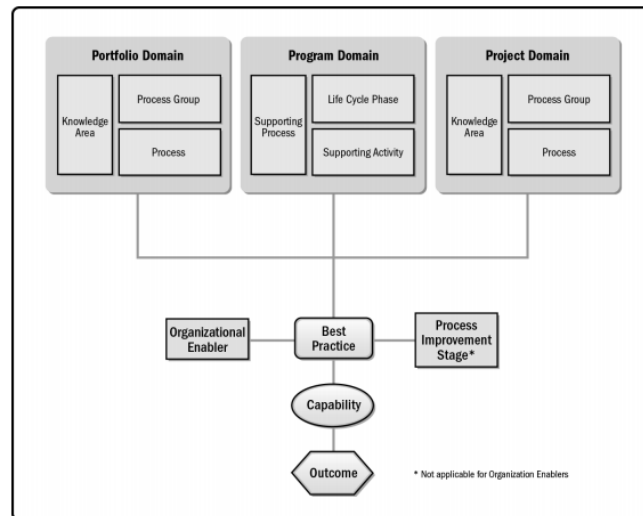
Abstract

This paper addresses statistical analysis of OPM3 model assessments. As for all questionnaires used in various purposes of research and study of a certain phenomenon, statistical analysis ensures validity and reliability of the instrument used. The variables included in the questionnaire, the questions addressing each variable, and data values collected in response to this questionnaire, all contribute to this analysis. Statistical significance of the findings of the study is also considered. This kind of analysis is of interest to all users of the OPM3 assessment, as it determines how much the assessment process, tool, and results and meaningful. Some issues and challenges related to statistical analysis of OPM3 assessments are highlighted, with suggestions for addressing these issues. The discussion in this paper assumes basic background on statistics concepts, although brief description is provided. Example results are shown using the SPSS statistical analysis software.

Keywords: *OPM3, SPSS, Statistical Analysis, Questionnaire Reliability, Statistical Significance, Cronach's Alpha, Questionnaire Development*

Statistical Overview of OPM3 Assessments

OPM3 assessments are based on interviews using questionnaires as an instrument. The process involves giving a score to each question according to response of the interviewee. The score can be 0 or 3 only for some questions, and any of 0, 1, 2, 3 for other questions. Answers of interviewees are aggregated for each role of the nine roles included in the assessment, in each domain within scope (project, program, and portfolio, in addition to organizational enablers), for each level of the SMCI cycle (standardize, measure, control, improve), and finally at the overall level of organizational project management (OPM) in the organization.



The OPM3 Construct

The nine roles interviewed in OPM3 assessments are:

1. Leadership
2. Process Owner
3. Line Managers
4. Portfolio Managers
5. Program Managers
6. Project Managers
7. Team Members
8. HR Representative
9. Training Process Owner

The sample of interviewees is determined based on the organizational structure, size of departments included in the assessment, and recommended ratio of sampling for each role. Typically, number of interviewees in each role ranges from 1 to 10, while for team members can be up to few tens.

Depending on the scope of the assessment, the number of questionnaires will vary. There will be standalone questionnaire for each intersection of: domain, SMCI level, and role. In a full scope assessment, there will be 33 different questionnaires.

For statistical analysis, each of these 33 questionnaires is analyzed separately, with the respondents (interviewees) to each questionnaire being considered independent sample cases, and each best practice in each questionnaire is an independent variable, measured through a number of questions, which refer to the capabilities associated with this best practice (variable).

In analyzing OPM3 assessments, there is not dependent variable, and the sort of research here is considered exploratory qualitative study, to understand the maturity of organizational project management practices in a certain organization. There are no specific hypotheses being assumed and tested for validation to accept or reject.

What we are analyzing in OPM3 assessments is validity and reliability of the questionnaire content and structure, characteristics of data values, which are in reality the scores given as answers to the questions, and statistical significance of the findings based on these questionnaires.

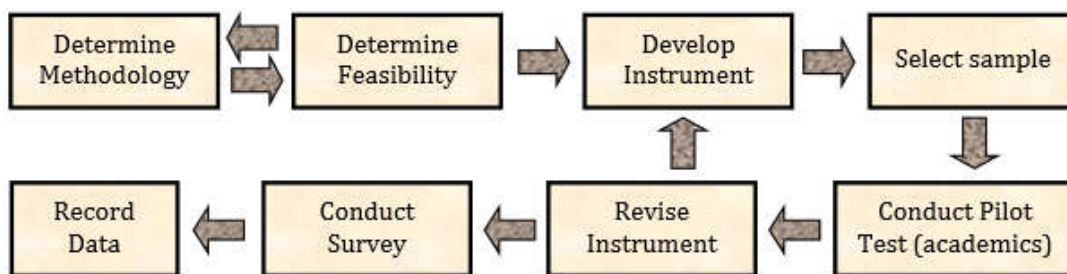
Within the following discussion, we show example results of analyzing OPM3 assessment answers for a real life case study. The analysis is conducted using SPSS software tool. The SPSS Statistics is a software package used for interactive, or batched, statistical analysis. The tool used for this analysis is IBM SPSS Statistics version 25.

Process for Effective Questionnaire Development

Questionnaires are collections of items (questions) to collect data. There can be more than one item targeted at understanding each variable included in the study, which can be one or more independent and dependent variables, and potentially intermediate variables.

In order for questionnaires to be reliable and achieve the intended purpose, they should be developed properly following a systematic process. Items' relations and coding is carefully determined, and the questionnaire is tested and revised until it is finalized.

The following figure summarizes the steps in the questionnaire development process: [1]



Questionnaire Development Process

Questionnaires in the OPM3 model are developed based on the standards for project, program, and portfolio management, so that compliance with the practices defined in these standards is assessed and scored. It's not known how the model questions were determined or whether the reliability and validity of the questionnaires content and structure is tested. Aside from the Organizational Enablers questions, there is a uniform pattern of questions related to each process in each domain and each process improvement (SMCI) level. The assignment of questions to specific roles and eliminating some questions from the questionnaire related to each role will result in a new questionnaire that needs to be validated as well.

The OPM3 model is developed from a professional perspective, and for a specific purpose, which probably didn't account for statistical aspects of the model. Reliability of the questionnaires could be challenged in some cases.

Moreover, the structure of the questionnaires themselves can vary in case some of the questions were determined by the assessor to be irrelevant and excluded from the assessment. This could impact the validity and reliability of the final structure of the questionnaires used in the actual assessment.

However, since the number of cases (sample interviewees) will be so small in most cases (less than 30 cases), the application of statistical analysis techniques may not be relevant or representing the actual characteristics of the model and data. Also taking in consideration that OPM3 assessments are conducted mainly by qualified assessors, the stability and consistency of question and answer interpretation can contribute to the assessment reliability.

Statistical Reliability of OPM3 Assessments

"Reliability is the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials. In short, it is the stability or consistency of scores over time or across raters. The degree to which an individual's responses (i.e., their scores) on a survey would stay the same over time is also a sign of reliability. It is worthy to note that lack of reliability may arise from divergences between observers or instruments of measurement or instability of the attribute being measured. Reliability of the questionnaire is usually carried out using a pilot test." [2]

Cronbach's Alpha Analysis

Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items (questions) are as a group. It is considered to be a measure of questionnaire reliability. The higher the value of Cronbach's Alpha (greater than 0.6) the higher the reliability of the questionnaire.

For example, the following section of the SPSS analysis shows the Cronbach's Alpha value for the Organizational Enablers best practice BP:7025 variable targeted for Team Member role, and consisting of 5 questions:

Reliability Statistics	
Cronbach's Alpha	N of Items
.837	5

The analysis value shows a highly reliable questionnaire, with Cronbach's Alpha value of .837. The sample for this analysis consisted of 8 cases (team members), which is actually too few to express the real measure of reliability of the questionnaire.

In reliability analysis using the SPSS tool, you will be given a table for "Item-Total Statistics", where the column titled "Cronbach's Alpha if Item Deleted" provides the expected value of Cronbach's Alpha if the item is deleted from the questionnaires, for each of the questions (variables) included in the analysis. This is intended to guide you during questionnaire development to enhance reliability by eliminating some items (questions), which is not always an option for all OPM3 questionnaires.

In addition to Cronbach's Alpha for reliability analysis, other techniques can be used. "Reliability could be assessed in three major forms; test-retest reliability, alternate-form reliability, and internal consistency reliability (e.g. Cronbach's Alpha)." [2]. These alternative forms are not practical for OPM3 assessments, where the questionnaire is pre-determined, and due to the commercial nature of time spent in the process.

The only practically sound way for ensuring reliability of OPM3 assessment questionnaires is during development of the model itself, and constraining the possibility of elimination of some questions with defined rules.

Statistical Significance of OPM3 Assessments

"When a finding is significant, it simply means you can feel confident that's it real, not that you just got lucky (or unlucky) in choosing the sample." [3]

"The level of statistical significance is often expressed as a p-value (or probability value) between 0 and 1. The smaller the p-value, the stronger the evidence that you should reject the null hypothesis. A p-value less than 0.05 (typically ≤ 0.05) is statistically significant." [4]

For example, the following table from SPSS analysis results for Organizational Enablers best practice BP:7025 variable targeted for Team Member role, shows a high significance value (p-value) of .000:

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig
Between People		12.775	7	1.825		
Within People	Between Items	15.250	4	3.813	12.784	.000
	Residual	8.350	28	.298		
	Total	23.600	32	.737		
Total		36.375	39	.933		

Grand Mean = 1.8750

The type of test used in this case is F-Test, which is determined to be the most suitable statistical test for the case of small sample sizes.

Conclusion

Despite the professional stance of the OPM3 model and its development and progression over years, there are concerns related to statistical aspects of the model, starting from the various structures that the final questionnaire can take in actual assessments performed depending of scoping, exclusions, samples, etc., to the relevance of statistical analysis techniques for OPM3 assessments due to the typical small size of samples. These issues need to be addressed when the model is in the development stage, so that it's tested and validated, with rules controlling the exclusion and customization of questionnaires' items during actual use.

References

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