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Abstract- ***The quality specifications are the first initiative for building a notable partnership between the owner and the contractor of the project to manage a successful project. Specifications' writing is one of the greatest challenges, where specifications play an important role in obtaining quality deliverables of the project. Specifications of the Projects of Consulting Services (PCSs) are different from specifications of engineering projects due to the difference in the characteristics between the consulting projects and engineering projects. This paper represents a model developed for evaluating the quality of the specifications of the PCSs from the consultant point of view. Owing to the great influence of the specifications on preparing good technical and financial proposals for the projects, the relation between the evaluation degree of specifications and the risk values added to estimate the price of the contracts is also discussed. The model is tested using data of 20 consulting projects.***

Keywords: Project management, Consulting services, Quality specifications, Evaluation model, Risk

1. Introduction

Specifications have been defined by many literatures: American Society for Testing and Materials [1] defines specifications as an explicit set of requirements to be satisfied by a material, product, or service. The National Specifications System of Australia: NATSPEC [8] defines specifications as a written description of the required quality of the build product and its component products. Most of definitions of specifications come from engineering projects: they describe the quality of tangible products using some quantitative measurements such as length, weight, and strength of the product. The Projects of Consulting Services (PCSs) are different from the engineering projects: the deliverables of the PCSs – in most of the cases – are intangible; therefore it is not easy to describe those deliverables in quantitative measurements; furthermore the work of the PCSs is not obviously defined at the beginning of the projects in many cases. Writing specifications for the PCSs should take into consideration their characteristics; consequently specifications of the PCSs describe the quality of the project's deliverables in qualitative formats.

In 2005, Kululanga and Price [4] have developed a model for measuring the quality of writing of construction specifications. They declared that "a written exposition of a quantitative instrument that measures the quality of writing of construction specifications is not available in the literature". After making deep research in this area, we agree with Kululanga and Price, that the literature is poor in this area.

The client and the consultant are the main parties of the PCS contracts. The quality specifications play important role in developing good proposals by the consultants for executing the project. This paper introduces a model – developed at King Abdullah Institute for Research and Consulting Studies (KAI-RCS), King Saud University – for evaluating the quality of the PCSs' specifications from the consultant point of view. The results of the model are used in assessing the value of risk that is added to estimate the contract price.

2. Projects of Consulting Services (PCSs)

Stroh and Johnson [13] define consultant as someone who either advises a client – another person or an organisation – on the desirability of taking some action, or who assists the client in making a decision, then assists the client in planning or implementing action as determined by the client. The authors of this research define the PCS as the project of supplying services to solve the client's problem exploiting the knowledge and experiences of the consultant, and can be extended beyond the advice by implementing new systems or procedures. The ultimate goal of the PCSs is to increase an organisation's level of effectiveness. Consultants assist their clients in a variety of ways, from solving staffing and management problems to introducing new technology and helping organisations weather all manner of external and internal changes [13].

Because the main objective of the PCSs is solving client's problems, determining the steps (problem solving steps) wherein the consultant maybe needed is important for writing the specifications for the PCS. The main steps for problem solving are: defining the problem; gathering data relative to the problem; listing possible solutions to the problem; testing possible solutions; selecting the best solution to the problem; and finally implementing the solution. Defining the problem, at the first step of problem solving, could be not easy where deviations of the actual

work from the planned can be the problem itself, or it can be just symptoms of a problem.

The PCS may start at three different stages of the problem solving: according to the degree of the knowledge of the client about the problem and its solution. The client may need a consultant to define the problem; then find a solution for the problem; and finally implement the solution. Or, the client can define the problem and the need for the consultant will be for finding solution for the problem and implementing of the solution. Finally, the client may need a consultant only to implement a solution for a problem; the solution of the problem is determined by the client. In the first case, the client and the consultant work together and there is no precise specifications for selecting the consultant; selecting the consultant will be basically depends on the reputation and previous experience of the consultant. In the second and third cases, it will be possible for the client to prepare specifications to be the base for selecting of the consultant. Types of specifications and writing specifications for the PCSs are discussed in the following section.

3. Types of Specifications

Whatever is the type of specifications, there are two important points should kept in mind during writing specifications; the bidders cannot read your mind; and the bidders are not going to provide any more than is asked for in the written bid specifications. Many literature has discussed the types of specifications, references number [2] to [11] of this paper are some of the thankful efforts that have discussed this issue.

Five types of specifications are most common: descriptive/ design specifications; performance specifications; reference specifications; direct/proprietary specifications; and mixed specifications.

Descriptive/design specifications are detailed written description of the required properties of a product, materials, or piece of equipment, and the workmanship required for its proper installation. Descriptive specifications can be considered as a cookbook, the quality of the final product is the responsibility of the specifications' writer, provided that steps written in the specifications are followed strictly during execution. This type of specifications can be used with the PCSs when the solution of the problem is known exactly to the client and the consultant will apply what is written in the specifications to solve the problem.

Performance specifications describe the performance requirements that a product has to meet, the criteria for verifying compliance should be determined in performance specifications. There is no limitation on the methods for achieving the results. Performance specifications encourage innovation and ingenuity. The final results of the project are the responsibility of the consultant. The client of the PCS can use performance specifications when the problem is not clearly defined but the results are clear.

Reference specifications are mostly used in engineering projects where reference clauses are written in the specifications to refer to a published document, with which processes and products must comply. It is incorporated by a reference to the title or other identification of the document which may be a standard or often a manufacturer's manual. This type of specifications is seldom to be used for the PCSs.

Direct/proprietary specifications cite a brand name, a model number, and other descriptions that identify a specific product of a manufacturer. Brand names should be used as an example of the desired quality level but not used to restrict the bid only to those brands. It is understood that items equalling or surpassing the quality level are also acceptable. This type of specifications is used in the PCSs when the client stipulates usage of special tools such as specific software.

The mixed specifications contain all the other types of specifications. They are used in the PCSs; an example of usage of the mixed specifications when the specifications writer uses descriptive specifications to describe a solution of the problem at the same time, performance specifications are used to give the consultant flexibility in selecting the procedures of application of the solution.

Fig. 1 illustrates the possible tasks of the PCS and the relative suitable specifications' type. When defining the problem is one of the tasks of the PCS, it is hard to write specifications in this case. The consultant will be selected based on the experience. As long as the problem is defined and the consultant will work on finding the solution, performance specifications can be used where the specifications writer can describe the problem and mention the expected results after solving the problem; nevertheless the way for reaching those results is the consultant responsibility. When the consultant is selected for implementing a solution, it means that the problem and its solution is clearly determined, therefore descriptive specifications, performance specifications, or mixed specifications can be used.

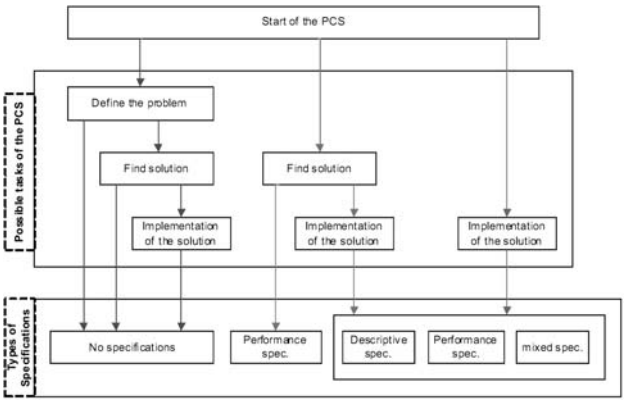


Figure 1. Possible tasks of the PCS and the relative specifications' type

4. The Model for Evaluating the Quality of Specifications

The proposed model of this research paper is a tool that can be used by consultants to evaluate the quality of specifications of the PCSs. The model assists in taking the decision of bid or no-bid, in addition to it helps in the determination of the risk value that is added to the project mark-up during the stage of project price estimation.

4.1 Model Development Procedures

Quality Measurement Factors (QMFs) of the specifications were initially determined based on the literature that describe the good specifications and give guidance for writing the specifications [2] to [11]. The QMFs were sent to 35 experts of the KAI-RCS experts to consult their opinion about the QMFs. Comments of the experts were taken into account for establishing the final set of the QMFs. In 3 brainstorming sessions – the total number of experts participated in the sessions were 20 experts – the relationship between the final set of the QMFs and their use in measuring the quality of the specifications of the PCSs were discussed, the scale of the QMFs that used for the measurement is also discussed. The following section illustrates how the model works.

4.2 How to Use the Model

The QMFs consist of three main factors that contain some sub-factors. The three main factors, which are explained in the following sections, are:

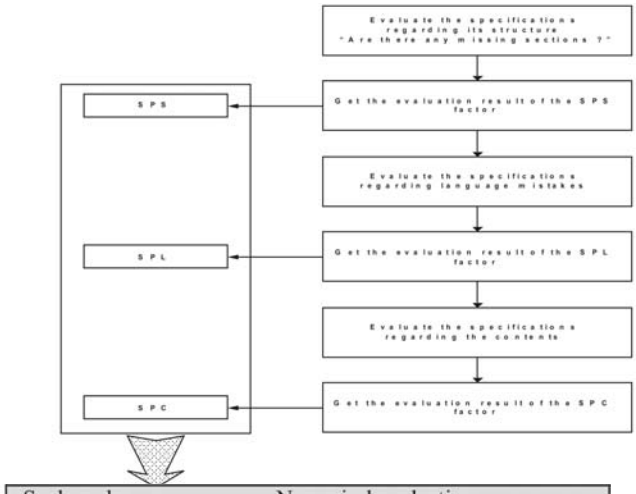
- specifications structure (SPS)
- specifications language (SPL)
- specifications contents (SPC)

Fig. 2 shows the model calculations steps. An example of the evaluation of the specifications resulted from the model is shown in the following form:

SPS	SPC	SPL
S1	90	B

4.2.1 Specifications structure (SPS)

At the beginning of the evaluation process of the specifications, the structure of the specifications is evaluated. The structure of the specifications is compared to the standard structure of the specifications to find whether there are missing sections or not. The standard specifications structure contains 10 main sections and 1 supplementary section. The titles of the main sections and the value of each section in degrees are shown in table (1). The supplementary section is the appendixes for additional information.



Scale code	Numerical evaluation
S1	90 – 100
S2	70 – 89
S3	50 – 69
S4	< 50 "Information is needed before proceeding in preparation of the proposal"

S2; in degrees is shown in table (2). Equation (1) is used to calculate the degree of the SPS factor.

Section titles of standard specifications	Value of each section (degrees)
specifications contents list	3
definition of the problem	55
objectives of the project	55
scope of work	30
project deliverables	45
project duration	20
identification of the client	10
tender requirements	15
tender information (tender period and procedures)	55
contact details	30

Table 1: SPS main sections and their values in degrees

Table 2: Scale numerical values

$$\text{SPS degrees} = 100 - \sum_{i=1}^{n} \text{degrees of missing sections (from table 1)} \quad (1)$$

where: "n" is the number of missing sections of the specifications. The result of equation (1) is compared to the numerical values in table (2) to determine the evaluation code of the SPS factors for the specifications. When the result of equation (1) is less than 50, the evaluation of the SPS factor is "S4" according to table (2), this means that the client should be contacted to collect more information before proceeding in the preparation of the proposals for the project.

4.2.2 Specifications language (SPL)
This factor measures the written specifications language. It has the sub-factors which are shown in table (3). The SPL factor is evaluated using the scale shown in table (4).

SPL	Selection of suitable language	
	Phraseology	Correct language
		Brevity
		Clarity
		Abbreviations and expressions

Table 3: The SPL factor and its sub-factors

Specifications' writer should select the suitable language depending on the targeted consultants. When the local consultants are targeted, specifications will be written in the local language, whereas to target international consultants, specifications should be written in widely understood international language.

SPL evaluation scale	Reference of the scale
A	Excellent (language have no mistakes)
B	Very good
C	Good
D	Poor

Table 4: SPL factor evaluation scale

"Phraseology" sub-factor measures the language as to the style of writing and the grammar. Specifications' language should be free of mistakes grammatically and use clear words, i.e. *"correct language"*.

Brevity: imperative forms are preferred to be used for writing specifications specially the descriptive specifications, and the lengthy verbal descriptions are avoided. Specifications' sentences should be simple and correct.

Clarity: sentences of the specifications should be clear, precise, and consistent. Stilted formal terms and sentences should not be used in the specifications.

Abbreviations and expressions: description of abbreviations used in the specifications should be clear and there is no missing abbreviation description. As long as expressions in different language are used, they must be explained undoubtedly.

4.2.3 Specifications contents (SPC)
The SPC factor measures the quality of the written sections of the specifications. It is different from the SPL factor, where the SPL measures the quality of the language regarding sentences ordering, structure, and grammar, whereas the SPC measures the written specifications regarding the clearance of information and description of all project aspects. The SPC is also different from the SPS, where the SPS measures the existence or not of the specifications sections compared to the standard specifications structure, on the other hand, the SPC measures the quality of writing those sections. It is important to notice the relationship between the SPS factor and the SPC factor: if there are some missing sections in the specifications, the evaluation of the SPS will be low; the SPC will be also low because the evaluation of the contents of the missing parts will be zero. The sub-factors of the SPC and their relative importance are presented in table (5).

The relative importances shown in table (5) are calculated using the values that were determined by the KAI-RCS experts for the relative importance of the sub-factors. The pair-wise comparison method is applied and the eigenvector were calculated (Saaty, 1980). The values of the second column in table (5) are the values of the calculated eigenvector. The user of the model will evaluate the degrees of each sub-factor for the specifications under evaluation, the maximum degree is 100. The user degrees will be written in the third column of table (5). The degrees of the third column will be multiplied by the relative importance of each sub-factor that are presented in the second column of table (5), the resulted weighted evaluation of each sub-factor will be written in the fourth column of table (5). Summation of the weighted evaluations of all the sub-factors will be the evaluation degree of the SPC.

5. Application of the Model

The model was tested using 20 consulting projects. The model is an effective tool for evaluating the quality of the PCSs' specifications. A relation between the result of the model and the risk value that is added to estimate the project price was developed, where a scale was designed for the results of the model to determine the highly risk, the moderate risk, and the low risk projects, based on the concept that low quality specifications represent highly risk projects and vice versa.

SPC sub-factors	Relative importance	Evaluation degree (max. degree = 100)	Weighted evaluation
Clear written problem definition	0.14		
Clear written objectives	0.14		
Deliverables compliance measures	0.14		
Complete information	0.12		
Logical deliverables	0.11		
There is no contradictions	0.09		
Allow competitive bidding	0.07		
Cover the whole project requirements	0.07		
There is no redundancy	0.05		
Clear project duration	0.05		
There is no repetitions	0.02		
Total	1		

Table 5: The SPC sub-factors and their relative importance

6. The conclusions

Measuring specifications quality is very important, where specifications are the reference for determining the quality of the project. The quality specifications are the first step for assuring quality deliverables from the PCSs. The proposed model of this research is an effective tool for evaluating the quality of specifications of the PCSs. The model evaluates the quality of the specifications from the consultant's point of view, and it is based on three measuring factors which are specifications structure, specifications language, and specifications contents. The model is developed at King Abdullah Institute for Research and Consulting Studies at King Saud University and was tested using 20 consulting projects. A relation between the result of the model and the determination of the risk value that is added to estimate the project price is also developed.

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