



## Factors Affecting Quality of Tender Documents

Hosny H.E.<sup>1</sup>, Ibrahim A.H.<sup>2</sup>, Elmalt A. El Sayed.<sup>3</sup>

<sup>1</sup>Professor, Dept. of Construction Engineering & Utilities, Faculty of Engineering , Zagazig University, Zagazig, Egypt.

<sup>2</sup> Associate Professor, Dept. of Construction Engineering & Utilities, Faculty of Engineering , Zagazig University, Zagazig, Egypt.

<sup>3</sup>Demonstrator, Civil Engineering Dept., Higher Technological Institute 10th of Ramdan City, Egypt.

### الملخص

هذا البحث لدراسة العوامل المؤثرة على جودة مستندات العطاء و يعد العطاء وسيلة لإتمام المشروعات الهندسية. حيث يتم طرح العطاءات ؛ ويتقدم المقاولون بالمشاركة عن طريق سحب المظاريف ، ويقوم المقاولون بملى المظاريف وتقديم العطاءات؛ ومن ثم يتم إختيار العطاء المناسب لإتمام المشروع وبناء عليه تعتبر مستندات العطاء بمثابة المفتاح لنجاح المشروع؛ فيجب أن يكون جميع الأطراف على دراية تامة بحقوقهم وواجباتهم وهى كذلك حلقة الوصل بين التصميم والواقع ؛ لكن ضعف كتابة المواصفات و سوء التصميم من المعوقات التى تواجه المقاولين وتؤدى الى حدوث نزاعات تكون ناتجة من (على سبيل المثال : المعلومات المفقودة والمتأخره والخاطئه والتفاصيل الغير كافيه والتصاميم الغير قابله للتطبيق والمواصفات الغير واضحة والمعلومات المتضاربه ) وهى مشاكل ناتجة عن عدم جودة مستندات العطاء. ويهدف هذا البحث لتحديد العناصر التى تؤثر على جودة مستندات العطاء؛ من خلال البحث وجد ان هناك(9) عوامل رئيسيه و (34) عوامل فرعيه تؤثر على جودة مستندات العطاء. بناءً عليه تم تحديد نسبه تواجد وتأثير كل عنصر وكذلك معرفه مؤشر الاهميه لكل عنصر من هذه العناصر.

### ABSTRACT

Tender is the way used by many construction clients to get a great offer (on price and program) to construct a project. Tender documents are prepared by client and assigned by contractors as a part of the procurement process. However, tender documents are not always clear in practice. The aim of this study is to ascertain the factors that effect on quality of tender document. Factors that affects on the quality of tender documents were identified through second stages. The first stage 9 factors included 34 sub-factors inside them that effect quality of tender documents were collected from international literature. The second stage a questionnaire was used to get frequency and importance index to the factors, before this second step a statistical analysis were applied to verify the validity of the data came from questionnaire.

**Keywords:** Quality; Tender; Tender documents.

### Introduction

Tendering is the process used by many construction clients to obtain the program and price for building a project (Brook, 2004). It typically consists of three parts: first deciding on the type of contract and the terms and conditions that would form the basis of the contractual relationship and under which the work will be done; second selecting the most suitable contractor given the budget and time available; and third establishing the contract price (Hackett et al., 2007). The key to a successful project often lies in the understanding and cooperation that is essential from all participants; each must be clearly aware of his duties and rights. The documentation is the vital link between design and construction. Adequate and accurate drawings and specifications are indispensable if the team is going to achieve success in terms of quality, time and cost. Drawings in particular have served the construction industry well for hundreds of years

as the primary means of communication. Unfortunately, poor specification writing continues to be a weak link in the information chain and leads to disputes, particularly in a competitive market where estimators will use a strict interpretation of the documents to arrive at the lowest tender. Another cause of friction is when bills of quantities differ from the drawings and specification. This often happens when the quantity surveyor is short of information from the designers. (Brook, 2004).

## **Literature review**

The following is a summary of the milestones researches and studies in the field of tender documents. Tender documents consist of cover letter, invitation to tender, form of tender, terms and conditions of contract, Bill of quantities, design drawings, specification, tender evaluation criteria and pre-construction information. Cover letter: A formal letter inviting tenderers to submit a tender for the supply of contracting services. It will advise when and where the completed tender should be returned. Invitation to Tender: The procuring entity shall prepare an invitation to tender that sets out the following: The name and address of the procuring entity, The tender number assigned to the procurement proceedings by the procuring entity, A brief description of the goods works or services being procured including the time limit for delivery or completion, An explanation of how to obtain the tender documents, including the amount of any fee, An explanation of where and when tenders must be submitted and where and when the tenders will be opened, A statement that those submitting tenders or their representatives may attend the opening of tenders (Brook, 2004). Form of tender: The form of tender is a covering document prepared by the client and signed by tendered to indicate that they understand the tender and accept the various terms and conditions of the contract and other requirements of participating in the tender exercise. Terms and conditions of contract: This document sets out the legal framework and the obligations of both parties signed up to the Contract. They must be read in conjunction with the other tender documents. Most local authorities have their own standard contracts, some of which can be very lengthy and complex, but are required for large scale projects where risk can be significant for the Parties involved. Bill of quantities: ISO 6707-2 defines a bill of quantities as a document for tendering, usually prepared in standard form, comprising both a descriptive list of quantities of works and a description of the materials, workmanship and other matters required for construction works. The Civil Engineering Standard Method of Measurement (CESMM3) in its third edition divides Bills of quantities into the following sections: Preliminaries, Preambles, Measured work, Prime cost and provisional sums (Brook, 2004). Design Drawings: Construction working drawings should be used to show the quantity and relationship of physical elements on a project, to ensure that the project manager, estimator, superintendent, and subcontractors can properly execute their duties (Boemer, 1991). Although the current drawing style has a long history in the industry, construction industry practitioners (especially field engineers) often comment about the poor quality of current design details or design technology in drawings (Kagan, 1985) Specification: The researchers defined the quality of writing of construction specifications as a process where a competent practitioner communicates the construction management science and principles that facilitate the creation of a contract. Such a contract will permit bidding so that an offer can be made and the project built according to the agreed contract (Kululanga, 2005). The Project Specification Code recommends improvements, so specifications will be: Complete: covering every significant aspect of the work, Project specific: produced for the project, without irrelevant material, Appropriate: for available

materials and skills; and can be checked and Standards enforced, Constructive: helping all the parties to understand what is expected of them, Up-to-date: using current good building practice and most recent standards, Clear: economically worded (Brook, 2004). Tender Evaluation Criteria: The principal purpose of tender evaluation is to determine the tender which best meets the requirements of the Executive and delivers best value. It should be a rigorous examination and comparison of all submissions received on an equal and consistent basis without bias. Pre-Construction Information: The pre-construction information, which the Client must provide for all path construction projects, that is a legal requirement for notifiable projects only, should contain all the relevant information in the Clients possession or which they can easily obtain about the path construction project, that might influence the health and safety of path design and construction work, including any related feature works e.g. bridge construction and installation. Any information about environmental issues, e.g. contaminated land should also be included (Brook, 2004).

### Factors affecting quality of tender documents

This paper identifies factors which affect quality of tender documents. Identifying these factors can help to reduce the claims that should be happened from badly written tender documents.

Table (1) shows thirty-four factors are selected based on literature review. These factors were categorized under nine factors including: cover letter, invitation to tender, form of tender, terms and conditions of contract, bill of quantities, design drawings, specification, tender evaluation criteria, and pre-construction information. A questionnaire was prepared in this research aim to identify the importance index and the frequency of those 34 factors

**Table1. Factors affecting quality of tender documents**

<b>1-Cover letter</b>
1-1 The cover letter short, clear, direct, and professional
1-2 Contact information complete and easy to locate
<b>2- Invitation to Tender</b>
2-1 The name and address of the procuring entity founded
2-2 Tender number existed
2-3 The explanation of how to obtain the tender documents, including the amount of any fee existed and clear
2-4 The explanation of where and when tenders must be submitted and where and when the tenders will be opened founded
<b>3- Form of Tender</b>
3-1 Tenderer information ( brief description of the work and it's cost)

**Table1. Factors affecting quality of tender documents (Continue)**

3-2 Bank guarantee for tender security
<b>4- Terms and conditions of contract</b>
4-1 Written with care and precision so as to be clear and unambiguous
4-2 The terms and conditions must related to laws to reduce disagreement between parties later
4-3 The selection of most appropriate of the standard form of contract available for use with any particular contract calls for a detailed knowledge of their contents
<b>5- Bill of quantities</b>
5-1 Description of the work, location of the site, site boundaries, names of parties and lists of drawings
5-2 The form of contract used
5-3 Specific requirements which should be priced by the contractor
<b>6- Design Drawings</b>

6-1 Accuracy: have the quality or state of being correct and there is no missing data
6-2 Clarity: clear and not have complicated items
6-3 Consistency: drawing and it's details in the context of work or there is a different on the land site
<b>7- Specification</b>
7-1 General specification: contain mobilization and preparation of site security &Health and safety &Disposal and pollution& Surveys and setting out.
7-2 particular specification :contain Standard specifications for each item individually
7-3 Specification should be Complete: To covering every significant aspect of the work
7-4 Specification should be Constructive: To helping all the parties to understand what is expected of them
7-5 Specification should be Clear
<b>8- Tender Evaluation Criteria</b>
8-1 It required that all companies are given an equal opportunity to succeed
8-2 The criteria for evaluation must be established prior to Invitation to Tender
8-3 The reasons for rejection must be documented
<b>9- Pre-construction Information</b>
9-1 Description of the project and its program
9-2 Information about the construction work.
9-3 Information about the site as a workplace.
9-4 Client's management and welfare arrangements.
9-5 The CDM (construction design and management) planning period (time allowed for each stage of the project)
9-6 Any relevant information in any existing Health and Safety File
9-7 Schedule of existing information
9-8 Environmental restrictions and risks: Design and construction hazards.
9-9 Design and construction hazards (Design for construction safety)

### Questionnaire survey

A well-designed questionnaire was developed. The questionnaire investigates the most effective factors affecting the quality of tender documents. The design of the questionnaire was based on the fact that they had to be simple, clear and understandable for the respondents and at the same time they should be able to be interpreted well by the researcher. In all questionnaires, questions possible answers are identified and the respondent is asked to choose one of the answers. The questions depend on two scale measures the first measure was considered the frequency if it found or not and the second measure the importance index of the factor by ranking the items form (1 to 10).

### Data collection

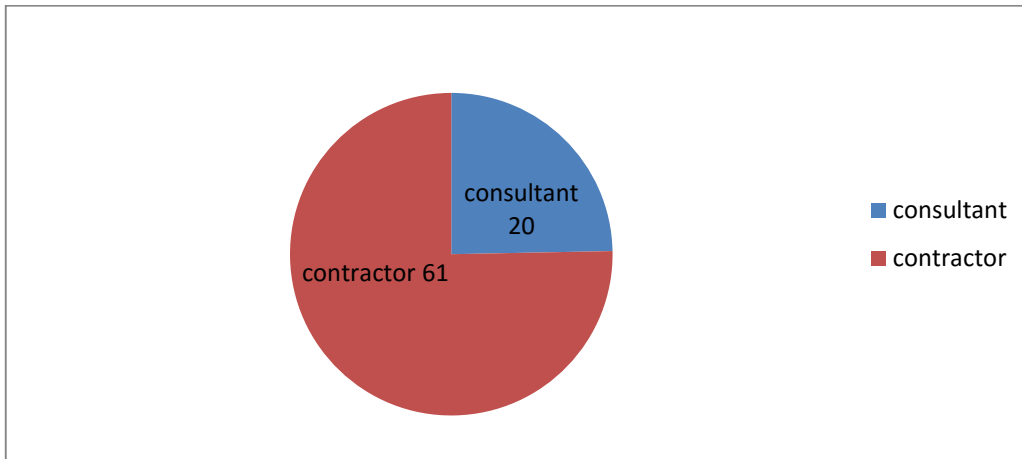
The sample size was computed by using Bartlett et al. (2001) equation (1) to compute the required sample size for infinite population:

$$n = \frac{k^2 * p(1-p)}{E^2} \text{ ----- (1)}$$

### Where

- n= is the required sample size for infinite population,
- K= value equals to 1.645 when confidence level equals to 90%,
- P= is the proportion of population i.e. P degree of variance between the elements of population (the critical value of P is 0.5).
- E= is acceptable margin of error= 10% for confidence level 90%.

By substituting of these parameters in the equation (1), then the required sample size of this study for infinite population is 68 samples as minimum value. Data was collected from some professionals and experts in construction projects in Egypt, where most of practicing contractors (cost estimators, civil engineers and project managers) and consultant. The sample sizes for the selected professionals are shown in Figure (1). A total of 110 questionnaires were administered to professionals and experts in construction projects in Egypt (80 contractor experts and 30 consultant experts). A total of 81 questionnaires representing 73.63% of the total questionnaires administered were returned.



**Figure1. Classify of sample size**

The respondents to the questionnaire were classified according to their experience Table (2). clearly shows that about 14.81% of the respondents have experience Less than 10 years, around 34.56% have experience greater than or equals to 10 years and less than 20, around 29.62% have experience Greater than or equal 20 years and less than 30 and finally, 20.98% of respondents have experience Greater than or equals to 30 years.

**Table2. Classification of the surveyed experts based on their experience**

Years of practising	Contractor	Consultant	Total	percent%
Less than10 Years	8	4	12	14.81
Greater than or equal (10 and less than 20)years	21	7	28	34.56
Greater than or equal (20 and less than 30) years	17	7	24	29.62
Greater than or equal 30 Years	15	2	17	20.98
<b>Total</b>	<b>61</b>	<b>20</b>	<b>81</b>	<b>100</b>

## Data analysis

The questionnaire respondents have provided numerical scoring expressing their opinions based on their experience in the construction field in Egypt. Eighty-one questionnaires were collected which achieve a valid number of the sample size. The questionnaire respondents were asked to provide numerical scoring expressing their opinions based on their experience in the construction field in Egypt. The respondents have inserted two scores in front of each factor. First is the frequency of occurrence of each factor. Second the degree of impact and importance of each factor on achieving the quality of tender documents. The importance index determined by using two indices. First is the frequency index. Second is the impact index which their formulas are shown as follows:

$$\text{Frequency Index (F}_I\text{)} = \frac{\sum_{i=1}^n F_i}{a \times N} \text{----- (2)}$$

$$\text{Impact Index (I}_I\text{)} = \frac{\sum_{i=1}^n M_i}{a \times N} \text{----- (3)}$$

$$\text{Importance Index} = F_I * I_I * 100 \text{----- (4)}$$

Where,  $\sum_{i=1}^n F_i$  and  $\sum_{i=1}^n M_i$  = the sum of frequency and importance scores of each factor from the total respondents.

- a = the upper scale for each measure which equals to 10.
- N= the number of Respondents which is constant and equals to 81.

Finally, Table (3) shows the factors affecting quality of tender documents and their frequency and importance index.

**Table3. Factors and their importance index**

Item	Frequency percent%	Impact percent%	Importance index%
<b>1-Cover letter</b>			
1-1 The cover letter short, clear, direct, and professional	100	85.56	85.56
1-2 Contact information complete and easy to locate	100	83.70	83.70
<b>2- Invitation to Tender</b>			
2-1 The name and address of the procuring entity founded	100	88.27	88.27
2-2 Tender number existed	81.5	38.89	31.69
2-3 The explanation of how to obtain the tender documents, including the amount of any fee existed and clear	86.4	60.86	52.59
2-4 The explanation of where and when tenders must be submitted and where and when the tenders will be opened founded	96.3	81.48	78.47
<b>3- Form of Tender</b>			
3-1 Tenderer information ( brief description of the work and it's cost)	97.5	83.83	81.73

3-2 Bank guarantee for tender security	97.5	79.14	77.16
<b>4- Terms and conditions of contract</b>			
4-1 Written with care and precision so as to be clear and unambiguous	98.8	76.30	75.38
4-2 The terms and conditions must related to laws to reduce disagreement between parties later	97.5	69.63	67.89
4-3 The selection of most appropriate of the standard form of contract available for use with any particular contract calls for a detailed knowledge of their contents	91.4	65.56	59.92
<b>5- Bill of quantities</b>			
5-1 Description of the work, location of the site, site boundaries, names of parties and lists of drawings	98.8	82.35	81.36
5-2 The form of contract used	93.8	66.42	62.30
5-3 Specific requirements which should be priced by the contractor	96.3	76.91	74.07
<b>6- Design Drawings</b>			
6-1 Accuracy: have the quality or state of being correct and there is no missing data	97.5	71.85	70.06
6-2 Clarity: clear and not have complicated items	98.8	67.16	66.35
6-3 Consistency: drawing and it's details in the context of work or there is a different on the land site	95.1	68.27	64.93
<b>7- Specification</b>			
7-1 General specification: contain mobilization and preparation of site security &Health and safety &Disposal and pollution& Surveys and setting out.	95.1	73.83	70.21

**Table3. Factors and their importance index (Continue)**

7-2 particular specification :contain Standard specifications for each item individually	100	79.26	79.26
7-3 Specification should be Complete: To covering every significant aspect of the work	97.5	71.98	70.18
7-4 Specification should be Constructive: To helping all the parties to understand what is expected of them	96.3	67.41	64.91
7-5 Specification should be Clear	100	73.33	73.33
<b>8- Tender Evaluation Criteria</b>			
8-1 It required that all companies are given an equal opportunity to succeed	90.1	55.56	50.06
8-2 The criteria for evaluation must be established prior to Invitation to Tender	91.4	62.10	56.76
8-3 The reasons for rejection must be documented	77.8	54.44	42.36
<b>9- Pre-construction Information</b>			
9-1 Description of the project and its program	100	84.20	84.20
9-2 Information about the construction work.	98.8	79.75	78.80
9-3 Information about the site as a workplace.	100	75.68	75.68
9-4 Client's management and welfare arrangements.	84	46.54	39.10
9-5 The CDM (construction design and management) planning period (time allowed for each stage of the project)	91.4	66.54	60.82
9-6 Any relevant information in any existing Health and Safety File	85.2	36.91	31.45
9-7 Schedule of existing information	86.4	58.02	50.13
9-8 Environmental restrictions and risks: Design and construction hazards.	80.2	30.25	24.26
9-9 Design and construction hazards (Design for construction safety)	80.2	25.56	20.50

## Statistical analysis

Many statistical tests were applied for the data collected from the questionnaire where its results are shown in table (3) to verify the validity of the results, and to verify the validity of the results it is necessary to verify the validity of the data.

- 1- Normal analysis test: this test applied to ascertain that data has a normal distribution or not by using kolmogorov-smirnov test as shown in Table (4) and the result that data have a normal distribution.

**Table (4). One-Sample Kolmogorov-Smirnov Test**

		1-1	1-2	2-1	2-2	2-3	2-4	9-8	9-9
N		81	81	81	67	71	78	65	65
Normal Parameters <sup>a,b</sup>	Mean	8.56	8.37	8.83	4.70	6.94	8.46	3.77	3.18
	Std. Deviation	1.597	1.624	1.395	2.387	2.021	1.748	2.248	2.179
Most Extreme Differences	Absolute	.276	.256	.315	.198	.192	.224	.234	.199
	Positive	.183	.158	.200	.198	.117	.189	.234	.199
	Negative	-.276	-.256	-.315	-.086	-.192	-.224	-.154	-.158
Kolmogorov-Smirnov Z		2.487	2.303	2.833	1.618	1.621	1.974	1.886	1.604
Asymp. Sig. (2-tailed)		.000	.000	.000	.011	.010	.001	.002	.012

a. Test distribution is Normal.

b. Calculated from data.

- 2- Reliability test : to measure the reliability of the data as shown in table(5) and the result show that data have a very high confidence degree where  $\alpha > 0.5$

**Table (5). Reliability Statistics**

Cronbach's Alpha	N of Items
.912	34

- 3- Descriptive statistics: show the mean, std.deviation and std.error.

As shown in Table (6) the results show that the value of std.error  $< 0.5$  this mean that the data more accurate.

**Table (6). Descriptive Statistics**

	N	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
1-1	81	2	10	8.56	.177	1.597	2.550
1-2	81	2	10	8.37	.180	1.624	2.636
2-1	81	4	10	8.83	.155	1.395	1.945



**Table (6). Descriptive Statistics (Continue)**

2-2	67	1	10	4.70	.292	2.387	5.697
2-3	71	1	10	6.94	.240	2.021	4.082
2-4	78	1	10	8.46	.198	1.748	3.057
3-1	79	2	10	8.59	.178	1.581	2.500
3-2	79	2	10	8.11	.192	1.702	2.897
4-1	80	1	10	7.72	.233	2.087	4.354
4-2	79	2	10	7.14	.205	1.824	3.327
4-3	74	1	10	7.18	.217	1.868	3.489
5-1	80	2	10	8.34	.220	1.968	3.872
5-2	76	3	10	7.08	.173	1.512	2.287
5-3	78	3	10	7.99	.207	1.827	3.337
6-1	79	2	10	7.37	.167	1.486	2.210
6-2	80	3	10	6.80	.195	1.746	3.048
6-3	77	3	10	7.18	.174	1.528	2.335
7-1	77	1	10	7.77	.239	2.096	4.392
7-2	81	2	10	7.93	.182	1.634	2.669
7-3	79	3	10	7.38	.156	1.390	1.931
7-4	78	2	10	7.00	.192	1.698	2.883
7-5	81	2	10	7.33	.221	1.987	3.950
8-1	73	2	10	6.16	.222	1.900	3.611
8-2	74	3	10	6.80	.180	1.553	2.410
8-3	63	1	10	7.00	.237	1.884	3.548
9-1	81	3	10	8.42	.181	1.627	2.647
9-2	80	3	10	8.08	.158	1.412	1.994
9-3	81	3	10	7.57	.186	1.673	2.798
9-4	68	1	10	5.54	.253	2.084	4.341
9-5	74	2	10	7.28	.268	2.303	5.302
9-6	69	1	10	4.33	.235	1.953	3.814
9-7	70	2	10	6.71	.291	2.438	5.946
9-8	65	1	10	3.77	.279	2.248	5.055
9-9	65	1	10	3.18	.270	2.179	4.747

## Conclusion

The objectives of this paper to identify the factors that affecting the quality of tender documents and to obtain importance index to the factors affecting quality of tender document thirty-four factors came from nine main factors as follows: (1-1) The cover letter short and clear, (1-2) Contact information complete, (2-1) The name and address of the procuring entity, (2-2) Tender number, (2-3) The explanation of how to obtain the tender documents, (2-4) Where and when tenders must be submitted and will be open, (3-1) Tenderer information, (3-2) Bank guarantee, (4-1) Clear and unambiguous, (4-2) Related to laws, (4-3) The selection of most appropriate of the standard form of contract available for use with any particular contract calls for a detailed knowledge of their contents, (5-1) Description of the work, (5-2) The form of contract used, (5-3) Specific requirements, (6-1) Accuracy, (6-2) Clarity, (6-3) Consistency, (7-1) General specification, (7-2) particular specification, (7-3) Complete, (7-4) Constructive, (7-5) Clear, (8-1) Given an equal opportunity, (8-2) The criteria for evaluation established prior to Invitation to Tender, (8-3) The reasons for rejection documented, (9-1) Description of the project and its program, (9-2) Information about the construction work, (9-3) Information about the site as a workplace, (9-4) Client's management and welfare arrangements, (9-5) The CDMplanning period, (9-6) Any relevant information in any existing Health and Safety File, (9-7) Schedule of existing information, (9-8) Environmental restrictions and risks, (9-9) Design and construction hazards.

## Refrence

- [1] **Bartlett, j. E., Kotrlik, W. and Higgins, C. (2001):** "Organizational Research: Determining Appropriate Sample Size in Survey Research." Learning and Performance Journal, 19(1), 43-50
- [2] **Boemer, A. J. (1991):** "Improving working drawings", Architecture, 80(3), 153–154.
- [3] **Brook, M. (2004):** "Estimating and tendering for construction work", 3ed, Elsevier, Boston: Butterworth Heinemann.
- [4] **Hackett, M., Robinson, I. and Statam, G. (2007):** "Procurement, tendering, and contract administration", Oxford: Blackwell.
- [5] **International Organization for Standarization (ISO 6707-2:2017en):** Building and civil engineering works-vocabulary-part 2: contract and communication terms (3.2.5).
- [6] **Kagan, H. A. (1985):** "How designers can avoid construction claims," Journal of ASCE, 111(3), 100–107.
- [7] **Kululanga, G. K. and Price, A. D. F. (2005):** " Measuring Quality of Writing of Construction Specifications" journal of construction and management ASCE .
- [8] **Thomas, T. (1991):** "Civil Engineering Standard Method of Measurement CESMM3", 3ed, London.