

# Capturing the Latent Structure of the Financial Criteria of the Big-Sized Contracting Enterprises Failure

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**Abstract** This study sets out to recognize the latent structure of the dimensions behind the financial criteria causing the failure of the big-sized contracting enterprises (B-SCEs). This scope is associated with the developing countries because their unfavorable economic circumstances exacerbate the repercussions of the financial criteria on the stability of their construction companies. Through a questionnaire of 18 financial criteria, linguistic responses from 56 experts of the B-SCEs in Egypt have been collected. Then, Fuzzy Trapezoidal Membership Function and the Failure Criterion Relevance Index have been used for converting the gathered replies into crisp numbers and ranking the criteria, respectively. The findings demonstrate that “cash flow mismanagement”, “poor estimating practice”, “national economy recession”, “delayed progress payments from the client”, and “hike in the building materials prices” are the top-five financial criteria of the B-SCEs failure. The further Exploratory Factor Analysis unravel six latent dimensions of the studied financial criteria, comprising “difficulty in collecting the financial dues”, “unsupportive laws and policies of the construction market”, “poor planning and control of capital and cash flow”, “government taxes”, “overhead burden”, and “excessive expansion”. The research also determines the percentage of effect of each of these dimensions on the B-SCEs failure. Additionally, it specifies the causative factor(s) and the responsible stakeholder for causing each financial dimension. Ultimately, significant practical recommendations have been presented to define the efforts needed to limit the incidence of the causal factor(s) of each financial dimension. The outcomes introduce implications for stemming the B-SCEs failure for keeping the role of the construction industry in the developing nations towards their economies.

**Keywords** Failure, Construction, Big-sized contracting enterprises, Fuzzy theory, Exploratory factor analysis

## 1. Introduction

The construction sector is a project-based sector, which depends significantly on the contributions of its contracting enterprises for executing its projects [1]. Meanwhile, the roles of the construction companies are perceived in any community as important bedrocks for achieving its economic, commercial, and social development plans. Economically, the construction industry through its contracting firms drives the economic activities of the communities by implementing their industrial and mining projects [2]. Commercially, on the other hand, because of the construction enterprises work with various parties such as manufacturers and suppliers [1], it revives the trading in the domestic sectors of the countries. Socially, on the other side, the contracting firms afford the role of executing the community service projects in the housing, educational, and health sectors [2]. More usefully, since the construction industry is a labor-intensive sector [3], it assists in solving

the unemployment problem by providing hundreds of thousands of jobs annually. Notably, these priceless contributions have been noticed to be at risk of not being realized due to the increase in the failure rate of the contracting enterprises around the globe. For instance, in Egypt, the records of the Egyptian Federation for Construction and Building Contractors showed that 24,600 construction companies have declared their bankruptcy or changed their careers from 2010 to 2014 [4]. In the same vein, in 2021, the construction news in the UK declared that there are 40,000 national contracting enterprises at risk of insolvency, putting their construction sector in a critical situation [5].

Unfortunately, the aforesaid numbers of the failed construction companies have been exacerbated in conjunction with an increase in the failure-based literature of the contracting enterprises. So why have several researches on the contracting firms' failure, but they did not assist in limiting this issue? The answer to this question includes the next reasons.

- First, the failure analysts in the construction industry (e.g., [6,7]) reported that although there are many classifications of the failure criteria of the construction enterprises, the factors of the financial nature are the

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Received: Dec. 17, 2022; Accepted: Dec. 29, 2022; Published: Jan. 31, 2023

Published online at <http://journal.sapub.org/ijcem>

prime culprit of exposing the firms to failure. Disappointingly, this critical result has not received a broad response from the academics to present a comprehensive list of the pertinent financial criteria of the construction firms' failure, except Halim et al. [8] and El-Kholy and Akal [9]. However, neither Halim et al. [8] nor El-Kholy and Akal [9] have touched on uncovering the latent factors behind arising the financial criteria they identified. Certainly, this lack of interest constitutes huge knowledge gaps for recognizing: (1) the structure of the underlying financial dimensions of the contracting firms' failure, (2) the parties associated with their incidence, and (3) the corrective actions that should be taken by the responsible parties toward the dimensions they cause.

- Second, in general, there is a dearth in the failure studies of the big-sized contracting enterprises (B-SCEs). Correspondingly, the small-sized contracting enterprises (S-SCEs) have the greatest attention. This tendency of the failure analysts may stem from the information that the B-SCEs have more managerial and financial resources than the S-SCEs; accordingly, their probability of failure is too small. Hence, the S-SCEs should receive more concern. This standpoint runs counter to two facts: (1) the failure hits even the well-established B-SCEs [10,11] and (2) the B-SCEs are severely influenced by the criteria of the financial nature than the S-SCEs [12]. Regrettably, ignoring these facts informs that the research directions of the failure literature do not consider, reflect, and analyze the actual cases of the failure of all the construction companies. Therefore, the current scholarly-based knowledge of the failure can not sufficiently limit the increase in the failure rate of the contracting firms.

The aforementioned gaps confirm that it is difficult to stem the failure in the construction community without doing more researches on the financial criteria in general focusing on the B-SCEs in specific. With this in mind, the author of this paper seeks to capture the latent structure of the dimensions behind the financial criteria leading to the B-SCEs failure. By profoundly analyzing and discussing this objective, this research contributes to enrich the knowledge of the construction industry stakeholders with: (1) the ranking of the financial criteria in terms of their relevance for dragging the B-SCEs to failure, (2) the underlying conception of the financial dimensions of the B-SCEs failure, (3) the percentage of effect of each financial dimension on the B-SCEs failure, (4) the potential causative factor of each financial dimension, (5) the responsibility and contribution percentage of each stakeholder toward each financial dimension, and (6) the role of each stakeholder in addressing the consequences of the dimension it caused. Achieving these findings constitutes a pioneering work to recognize the latent mechanism of the B-SCEs failure owing to the criteria of

the financial nature and the efforts needed to limit their incidence. To this end, this paper surveys 56 experienced practitioners from 14 B-SCEs in Egypt to collect linguistic data on the relevance of 18 financial criteria. Subsequently, it uses Fuzzy Trapezoidal Membership Function to convert the gathered linguistic data into crisp numbers. Then, it utilizes the Failure Criterion Relevance Index and the Exploratory Factor Analysis for ranking the relevance and structuring the latent dimensions of the studied criteria, respectively.

Exploring the case of Egypt as a developing economy setting for this study stems from the information that, unlike the developed construction markets, the developing ones experience severe persistent managerial, financial, and economic challenges such as: (1) poor project planning and management skills, (2) difficulty in getting loans, (3) fluctuations in material price, (4) changes in the interest and taxes rates, and (5) inflation [2,13-15]. These challenges, in turn, limit the ability of any construction company to encounter the failure, regardless of its managerial and financial capabilities. Consequently, studying the case of Egypt reveals the real challenges of the failure of the construction enterprises, making the study findings more objective, either for Egypt or the developing countries which have the same attributes and challenges.

The remainder of this research surveys, in section 2, the relevant literature of the contracting enterprises' failure. Then, section 3 outlines the methodology and presents the findings. Section 4 analyzes and discusses the outputs and shows their implications. Finally, section 5 sums up the paper and considers future work based on clarifying the limitations of this study.

## 2. Literature Review

Generally, considerable efforts have been exerted to define the pertinent sources and causes of the contracting enterprises' failure. These contributions have explored the cases of the US [16-19]; Saudi Arabia [20-22]; Palestine [6,23,24]; Turkey [13,25,26]; South Africa [27-30]; Malaysia [15]; Ghana [2]; India [31-33]; Egypt [14]; Australia [7]; Nigeria [34]; the UK [35,36]; and Rwanda [37,38]. The scopes of these studies have been concentrated on three contexts: (1) the socio-economic environment of the construction community with a major focus on the developing countries (e.g., [14]) and minor attention regarding the developed ones (e.g., [17]); (2) the size/grade of the contracting enterprise, mainly the small- and medium-sized construction companies (e.g., [2]) and very little concerning the big-sized enterprises (e.g., [24]); and (3) the specialization field of the contracting firm, encompassing the industrial [22], residential [32], building and housing [7,13], and road and bridge [38] contractors. In accordance with these contexts, the failure factors of the construction companies have been identified relying upon: (1) examining archived documentation of bankrupt

companies (e.g., [35]); (2) surveying the contracting enterprises' failure-related literature (e.g., [6]); and (3) interviewing owners/employees of insolvent construction firms [36]. Based on the data derived from these methods, the scholars have been enabled to determine the key sources of the failure of the construction companies along with their relevant causes. Importantly, this information, in turn, has geared the researchers to address two significant research directions, including specifying the degrees of impacts of the identified sources and factors on the contracting firms' failure for knowing the topmost affecting sources and causes.

Notably, the aforesaid research directions have been realized by: (1) studying statistics and reports on the bankruptcies of the construction companies (e.g., [16]) and (2) interviewing and surveying the construction industry practitioners (e.g., [22]). Further, the information collected from these statistics, interviews, and surveys have been analyzed, using: (1) the traditional analysis methods of the Severity Index (e.g., [20]), Mean Score (MS) (e.g., [23]), and Relative Importance Index (RII) (e.g., [21]) and (2) the advanced techniques of the Analytical Network Process [26] and the Exploratory Factor Analysis [36]. Table 1 illustrates the findings of the first research direction, indicating that the financial nature-related groups such as economic [16] and budgetary [19] and the financial set (e.g., [2]) are usually the chief sources of the contracting enterprises' failure in most of the explored studies. Similarly, the results of the second research direction (see Table 2) imply that in the majority of the investigated cases at least one of the top-three causes of the contracting firms' failure is a financial factor. Building on these severe outcomes, another research group has directed their endeavors to deeply scrutinize the failure of the construction companies owing

to the factors of the financial nature.

Ab. Halim et al. [10] addressed the financial causes of the contracting enterprises' failure by presenting a quantitative methodology of 17 financial ratios to appraise the financial performance of Malaysia's construction companies. Depending on the annual financial reports of 6 Malaysian contracting firms, the financial ratios have been determined and interpreted. The findings reported that the surveyed companies experience 2 financial problems, comprising lack of capital to finance their projects and realizing low-profit margin from their works. Three years later, Varghese and Menacere [39] developed the quantitative framework of Ab. Halim et al. [10] by dividing their financial ratios into 4 groups, namely: profitability, liquidity, leverage, and efficiency. The developed approach has then been directed to analyze the annual financial reports of 8 Qatari contracting enterprises. The extracted results revealed that the financial statuses of the investigated firms are not strong because they have not adequate financial resources and appropriate systems for managing their cash flow. Along the same lines, Sang et al. [40] established a Vector Error Correction Model of 6 macroeconomic variables for studying the implications of their fluctuations on the construction firms' financial performance in Korea. The model has been tested, utilizing quarterly financial data of 25 Korean contracting enterprises. The major outcome showed that the fluctuation in the macroeconomic variable of the currency exchange rate (CER) is a serious risk having negative repercussions on the financial situations of the construction companies. This output has been explained in light of the relation that increasing the CER raises the construction costs than previously estimated; thereby, decreasing the profits.

**Table 1.** Sources of the contracting enterprises' failure in the surveyed countries

Country	Study	Ranking of the Sources
US	Kangari [16]	Economic (1st); experience (2nd); sales (3rd); expenses (4th); fraud and neglect (5th); customer (6th); assets and capital (7th); disasters (8th)
	Arditi et al. [19]	Budgetary (1st); macroeconomic (2nd); human/organizational capital (3rd); business (4th); natural (5th); market conditions (6th)
Saudi Arabia	Al-Barrak [20]	Managerial (1st); financial (2nd); environmental (3rd); expansion (4th)
Palestine	Al-Hallaq [23]	Political (1st); financial (2nd); managerial (3rd); expansion (4th); environment (4th)
	Enshassi et al. [24]	Political (1st); financial (2nd); managerial (3rd); business growth (4th); business environment (4th)
	Mahamid [6]	Financial (1st); managerial (2nd); external (3rd)
Turkey	Kivrak and Arslan [13]	Lack of experience in business (1st); country's economic conditions (2nd); lack of managerial experience (3rd); personal attributes (4th); low profit margin (5th); difficulty in winning projects (6th); over-trading (7th)
South Africa	Ntuli [29]	Operational management (1st); strategic (2nd); personal (3rd)
Ghana	Donkor [2]	Political (1st); financial (2nd); managerial (3rd); business environment (4th); growth/expansion (5th)
Egypt	Hegazy et al. [14]	Administrative (1st); technical (2nd); general (3rd); financial (4th)
Nigeria	Mohammed [34]	Political (1st); financial (2nd); managerial (3rd); business growth (4th); business environment (4th)
UK	Young and Hall [35]	Operational management (1st); strategic (2nd); personal (3rd); environmental (4th); marketing (5th); rises in costs (6th)
Number in the brackets refers to the rank of the source of the contracting enterprises' failure.		

**Table 2.** Top-three factors of the contracting enterprises' failure in the surveyed countries

Country	Study	Ranking of the Top-Three Factors
US	Foust [17]	High interest rates (1st); escalating costs (2nd); technical complexity and warranty (3rd)
	Russell [18]	Increase in project size (1st); change in geographical area (2nd); accounting systems (3rd)
Saudi Arabia	Assaf et al. [21]	Management incompetence (1st); poor cash flow (2nd); poor financing (3rd)
	Assaf et al. [22]	Lack of contractor experience in business (1st); war (2nd); poor project management (3rd)
Turkey	Yagmuroglu [25]	Receivable difficulties; insufficient capital (2nd); lack of managerial experience (3rd)
	Dikmen et al. [26]	Management incompetence (1st); lack of organizational knowledge (2nd); poor technical and technological capacity (3rd)
Malaysia	Abdul Rahman and Rahmat [15]	Insufficient cash flow/capital (1st); difficulty in securing bank loans (1st); inability for anticipating the difficulty of getting material and labors (1st)
India	Gadekar and Pimplikar [31]	Insufficient capital (1st); cash flow management (2nd); inadequate sales (3rd)
	Sasikumar et al. [33]	Lack of experience in line of work (1st); low profit margin owing to competition (2nd); lack of inspection (3rd)
Australia	Coggins et al. [7]	Poor payment practices (1st); underbidding (2nd); poor financial management skills (3rd)
UK	Alaka et al. [36]	Economic recession (1st); immigration (2nd); too many firms springing up (3rd)
Number in the brackets refers to the rank of the factor of the contracting enterprises' failure.		

Similar to the research stream of Ab. Halim et al. [10], Varghese and Menacere [39], and Sang et al. [40], many frameworks/models have been proposed, utilizing other modelling tools such as: Gray Relations Analysis [41] and Long Short-Term Memory-Recurrent Neural Network [42]. In this research direction, the scholars have based their frameworks/models on the financial ratios/macroeconomic variables of the prior colleagues. This, unfortunately, implies that they were not interested in providing the scholarly-based knowledge of the construction companies' failure with other financial ratios/macroeconomic variables to extract other relevant impacting financial factors. They, however, were focused on using more advanced modelling techniques for ameliorating the accuracy of the frameworks/models of the prior works [1]. To address this limitation, other scholars; nevertheless, they are very few, including Halim et al. [8] and El-Kholy and Akal [9] have worked to present comprehensive lists of the pertaining financial factors. Halim et al. [8] and El-Kholy and Akal [9] through an extensive literature review, enriched the knowledge body with 21 and 18 financial criteria of the construction firms' failure in the contexts of Malaysia and Egypt, respectively. Additionally, they utilized the questionnaire as the main survey tool to collect their data. The data gathered by Halim et al. [8] have been analyzed, using the MS method to determine the most impacting causes. Yet, El-Kholy and Akal [9] subjected their data to the RII and Ginini's Mean Difference Measure of Dispersion to specify the top financial factors and the stationary financial one, respectively. To the best of the authors' efforts, none have been attracted to complement the research direction of Halim et al. [8] and El-Kholy and Akal [9], leaving behind several un-approached gaps and insufficient knowledge of the contracting enterprises' failure owing to the criteria of the financial nature.

Having surveyed the knowledge body of the construction

companies' failure, it can be observed that neither the failure causes of the B-SCEs nor the factors of the financial nature have received sufficient attention from the scholars, despite the clarity of the following two facts. First, the findings derived from the conducted literature review implied that the financial criteria are the top impacting factors on the contracting enterprises' failure. Second, the implications of the financial nature-related criteria are more severe on the B-SCEs than the S-SCEs [12]. These facts provide the impetus for the researcher to essentially concentrate on studying the failure of the B-SCEs due to the criteria of the financial nature by modelling their latent structure. This helps in enhancing the knowledge of the construction stakeholders to absorb the underlying mechanism of these severe impacting factors to make better decisions in further reducing the failure of the B-SCEs.

### 3. Research Methodology

To prudently realize the research scope, a multistep research methodology of seven steps has been developed. It includes defining the financial criteria, developing and distributing an online survey to assemble linguistic data from the Egyptian experts on the relevance of the financial criteria, and checking the adequacy and consistency of the survey responses. Additionally, it illustrates how the experts' replies have been analyzed on the basis of: (1) Fuzzy Trapezoidal Membership Function (FTMF) to convert the collected linguistic data into concrete numbers, (2) the Failure Criterion Relevance Index (FCRI) to rank the criteria in terms of their relevance, and (3) the Exploratory Factor Analysis (EFA) to uncover the underlying dimensions of the studied financial criteria. The next subsections will clearly demonstrate these steps along with their outcomes.

### 3.1. Defining the Financial Criteria of Contracting Enterprises Failure

Recently, El-Kholy and Akal [9] have identified 18 financial criteria pertaining to the failure of the B-SCEs in Egypt. Fifteen of these criteria have been determined depending on an extensive examination of papers published in peer-reviewed academic journals and dissertations. Yet, three criteria have been added during interviewing 8 Egyptian experts to recognize their standpoints regarding the suitability of the criteria identified from the conducted review with respect to Egypt's construction sector. These 18 criteria appear in Table 3. Further, they will be deemed in this research because, first, they have been defined according to a comprehensive study of the pertinent literature. Second, they have been refined by experts experienced in the Egyptian construction community, which is the context of the current work.

**Table 3.** Financial criteria of contracting enterprises failure (source: El-Kholy and Akal [9])

Criterion Label	Financial Criteria
FC <sub>1</sub>	Starting business with a small paid-up capital
FC <sub>2</sub>	Cash flow mismanagement
FC <sub>3</sub>	Poor estimating practice
FC <sub>4</sub>	Weakness on construction cost control
FC <sub>5</sub>	Increasing number of projects
FC <sub>6</sub>	High indirect costs incurred by the contractor, such as site and company management costs
FC <sub>7</sub>	Insufficient advanced payment
FC <sub>8</sub>	Delay in checking and certifying the interim payment by the owner/consultant
FC <sub>9</sub>	Delayed progress payments from the client
FC <sub>10</sub>	Delay in the preliminary and final handover of the project by the owner, causing delay in releasing the contractor's business guarantees, such as performance bonds and final deposits
FC <sub>11</sub>	Non-payment of interest on delayed certificate
FC <sub>12</sub>	Taxes practices
FC <sub>13</sub>	Difficulty in securing bank loans due to the lack of fixed assets (land and buildings) used as collateral
FC <sub>14</sub>	High interest rates
FC <sub>15</sub>	Hike in the building materials prices during construction
FC <sub>16</sub>	Monopoly
FC <sub>17</sub>	Low profit margin owing to competition
FC <sub>18</sub>	National economy recession

### 3.2. Survey Development and Distribution

In this study, the target population is the Egyptian B-SCEs, mainly the first-grade contracting enterprises. Relying upon the Egyptian Federation for Construction and Building Contractors (EFCBC), which has the authority to classify the contractors in Egypt, a firm can be graded as a first-grade construction company if its capital and expertise are not less than L.E 20 million and 15 years, respectively.

These firms have been selected to represent the population of the present work because their experts are sufficiently familiar with nature of the Egyptian construction community and the challenges faced by their companies [9]. To survey the experts of these enterprises, the validated questionnaire of El-Kholy and Akal [9] has been utilized. The questionnaire has three sections. Section one comprises an introduction to describe the purpose of the survey. Section two encompasses questions related to the background information of the participant and his/her construction company. Finally, section three provides the expert with a linguistic scale of five terms, comprising 1 = not-relevant, 2 = somewhat-relevant, 3 = relevant, 4 = very-relevant, and 5 = extremely-relevant to define the relevance of each financial criterion regarding the failure of the B-SCEs. Subsequently, an online survey has been developed, using Google Form to engage the experts in the survey.

To distribute the questionnaire, the non probability-based purposive and snowball sampling techniques have been used. Considering the non probability-based purposive strategy is owing to the author's inability to get from the EFCBC the current number of the first-grade contracting firms and their contacting addresses to randomly involve them in the survey. Yet, utilizing the non probability-based snowball technique is to gather a large number of the responses in a fast pace and economic manner [43]. On the basis of these sampling strategies, the author has sent the questionnaire link to his engineer colleagues and friends who: (a) owning a bachelor's degree in engineering, (b) experienced in the Egyptian contracting sector, and (c) his/her company has considerable contributions as a first-grade contracting firm in Egypt's construction market throughout the last three years. Moreover, the author has asked his colleagues and friends to further send the questionnaire link to their colleagues and friends. Depending on these approaches, 77 questionnaires have been collected from 11 May to 3 June 2022. Of the received questionnaires, 21 have been neglected because the background information of the participants and their companies do not meet the aforementioned criteria. Yet, the other 56 usable questionnaires have been included in the analysis of the current study.

By checking the usable questionnaires, it has been turned out that the experts represent 14 first-grade contracting firms. Their firms have considerable contributions for more than 25 years in Egypt's construction market as prime contractors responsible for executing countless mega national projects, such as highways, bridges, water and sewage plants, power plants, and gas and oil treatment plants. Further, the business size of each company over the last three years is more than L.E 200 million. Indeed, these characteristics denote that the engineers of these firms have the knowledge required to answer the questions of the survey. This clearly appears in the experts' profiles. While 42 experts have experience up to 10 years in Egypt's construction sector, the other 14 ones are with expertise

ranging from 11 to 25 years. As for their job titles, 49 of the experts have engineering positions, comprising: 22 executive engineers, 15 technical office engineers, 10 quality control engineers, 1 planning engineer, and 1 design engineer. Yet, the other 7 ones have management positions, encompassing: 4 project managers, 1 technical office manager, 1 general safety manager, and 1 sector manager. Essentially, such broad experiences and job titles signify that the assembled data exemplify perspectives of engineers and managers having hands-on working expertise in the Egyptian contracting sector and its first-grade construction companies which can be relied upon for fulfilling further analysis.

### 3.3. Survey Responses Adequacy

Prior to analyzing the replies of the experts, their sample size has been empirically and statistically tested to verify its adequacy to represent the first-grade contracting enterprises in Egypt and its number is appropriate to carry out the EFA. Empirically, several works have been achieved, either nationally in Egypt or internationally in leading construction markets such as the US, using small sample sizes, including 37 experts [44] and 48 experts [45], respectively. In the same vein, the EFA has been utilized by many academics in the construction management researches based on small sample sizes of 43 experts [46] and 45 experts [47]. This information, in turn, proves that the assembled sample size (i.e., 56 questionnaires) is empirically adequate to be considered and the EFA can be performed on its basis. Statistically, on the other hand, Abdul Nabi and El-adaway [45] calculated the minimum needed sample size to assure the representation of a survey-based data, utilizing the frequently used sampling formula of Cochran [48]. The finding showed that the minimum norm of a sample size should be equal to or greater than 43. Additionally, as stated by Mundfrom et al. [49], to fulfill the EFA on a statistical basis, the satisfactory sample size must be three times the number associated with the variables of the study. Ultimately, such standard statistical norms demonstrate that the realized sample is statistically valid to represent the first-grade Egyptian contracting enterprises and apply the EFA. This is owing to its size (i.e., 56 questionnaires) exceeds the minimum required proportion of Cochran [48] along with a sample-to-variables ratio of 3.11 (56 questionnaires ÷ 18 financial criteria), satisfying the acceptance ratio of Mundfrom et al. [49].

### 3.4. Survey Responses Consistency

To further examine the reliability of the survey, the author has utilized the test of Cronbach's alpha. This test has a numerical scale and it ranges from 0 to +1. On this scale, values above 0.7 are deemed acceptable; however, scores above 0.80 are preferable [50]. By using the SPSS version 16.0, Cronbach's alpha has been determined and the result designates that its value is 0.851, depicting high

reliability and internal consistency of the compiled data.

### 3.5. Fuzzy Trapezoidal Membership Function

After checking the adequacy and consistency of the survey, the linguistic evaluations of the entrants have been defuzzified into concrete numbers relying upon Fuzzy Trapezoidal Membership Function (FTMF). Generally speaking, Fuzzy Set Theory (FST) plays an important role in enhancing the accuracy of the expected findings by allowing the researchers to investigate the standpoints of the respondents on a linguistic basis as they prefer. Then, through its membership functions, it converts the experts' linguistic assessments into crisp numbers for being numerically analyzed. Hence, it provides a reliable tool for measuring the vagueness existed in the natural language for being represented meaningfully [51]. Owing to these valuable advantages, FST has been widely used in the construction management branches, such as public-private partnership (e.g., [52]) and safety (e.g., [51]). In the same vein, its popular and simple TMF has been adopted in this study to convert the participants' linguistic evaluations into crisp data outputs for being employed as inputs for developing the FCRI and the EFA in the coming sections. The processes followed to achieve this purpose according to Gunduz et al. [51] and literature therein are:

- 1) Determining the Trapezoidal Fuzzy Number (TFN) of each linguistic variable (LV). In this research, five linguistic terms, including not-relevant, somewhat-relevant, relevant, very-relevant, and extremely-relevant have been adopted to evaluate the relevance of each financial criterion. Figure 1 explains the TFN of each LV, implying that each LV is parameterized by four numbers (a, b, c, d). In addition, Table 4 demonstrates the TFN of each LV.
- 2) Defuzzifying the TFN of each LV to define its concrete number. Equation (1) exemplifies how the Crisp Number (CN) of the TFN can be computed. Moreover, the last column of Table 4 includes the CNs of the TFNs of the utilized LVs. These CNs are the main inputs of the analysis of the FCRI and the EFA.

$$CN = \left[ \frac{a + b + c + d}{4} \right] \quad (1)$$

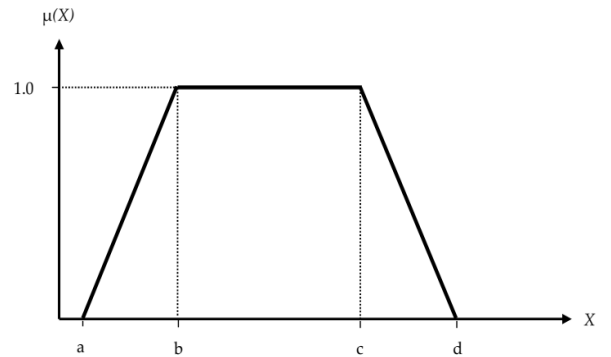


Figure 1. Fuzzy trapezoidal membership function

**Table 4.** Linguistic variables, corresponding trapezoidal fuzzy numbers, and crisp numbers

Linguistic Variable	Trapezoidal Fuzzy Number				Crisp Number
	a	b	c	d	
Not-relevant	0.0	0.0	0.0	0.3	0.075
Somewhat-relevant	0.0	0.3	0.3	0.5	0.275
Relevant	0.2	0.5	0.5	0.8	0.500
Very-relevant	0.5	0.7	0.7	1.0	0.725
Extremely-relevant	0.7	1.0	1.0	1.0	0.925

### 3.6. Failure Criterion Relevance Index and Rating

To reflect the experts' perspectives concerning the relevance of the financial criteria, the Failure Criterion Relevance Index (FCRI) of Equation (2) has been relied upon. This index computes the relevance of each financial criterion with respect to the failure of the B-SCEs, where the higher the FCRI of a financial criterion is, the higher the relevance it has towards to failure of the B-SCEs and vice versa. Previously, Alaka et al. [36] adopted such index to rank the insolvency factors of the S-SCEs. However, the inputs of their index have been associated with a five-grade Likert scale, not a linguistic appraisal scale. To address this remark, the index of Alaka et al. [36] has been modified, utilizing the CNs of Table 4 instead of their five-point Likert scale. Equation (2) presents this modification and the independent data of the FCRI.

$$FCRI_j = \left[ \frac{\sum_{i=1}^N CN_i}{N \times G} \right] \times 100\% \quad (2)$$

**Table 5.** Failure criterion relevance index scores and rankings

Criterion Label	FCRI (%)	Ranking
FC <sub>1</sub>	85.714	6
FC <sub>2</sub>	89.334	1
FC <sub>3</sub>	88.031	2
FC <sub>4</sub>	85.376	7
FC <sub>5</sub>	62.548	18
FC <sub>6</sub>	71.284	16
FC <sub>7</sub>	72.008	15
FC <sub>8</sub>	79.488	11
FC <sub>9</sub>	86.052	4
FC <sub>10</sub>	76.207	12
FC <sub>11</sub>	85.280	8
FC <sub>12</sub>	83.977	9
FC <sub>13</sub>	65.589	17
FC <sub>14</sub>	75.483	14
FC <sub>15</sub>	85.956	5
FC <sub>16</sub>	79.778	10
FC <sub>17</sub>	75.579	13
FC <sub>18</sub>	86.100	3

Where  $FCRI_j$  is the failure criterion relevance index of a financial criterion  $j$ ;  $CN_i$  is the equivalent crisp number of a linguistic variable given by  $i$ th expert, varying from 0.075 to 0.925 (see Table 4);  $N$  is the experts' whole number; and  $G$  is the highest CN, i.e., 0.925.

In accordance with Equation (2), the FCRI scores of the 18 financial criteria along with their rankings have been presented in Table 5. As this table explains, the FCRI values of the 18 financial criteria vary from 62.548% to 89.334%, where  $FC_2$ ,  $FC_3$ ,  $FC_{18}$ ,  $FC_9$ , and  $FC_{15}$  are the top-five relevant criteria of the failure of the B-SCEs. This finding will discuss further in the "analysis and discussion" section.

### 3.7. Exploratory Factor Analysis

Relying upon the outputs of the TMF, an Exploratory Factor Analysis (EFA) has been conducted, employing the SPSS version 16.0, to capture the latent structure of the dimensions behind the 18 financial criteria of the B-SCEs failure. Appreciating this end, the EFA has been performed following a sound scientific basis as has been found in Alaka et al. [36], Ye et al. [53], Ozorhon and Karahan [54], and Ma et al. [55]. As a result, the Kaiser-Meyer-Olkin (KMO) adequacy test together with the Barlett's test of sphericity has been applied to firstly check the fitness of the compiled data to apply the EFA. Thereafter, the Principal Component Analysis (PCA) and Varimax have been utilized as techniques of factor extraction and rotation, respectively [36]. As has been extracted from the SPSS, the KMO and the significance of Barlett's test are 0.679 and 0.000 with  $\chi(153) = 502.438$ , respectively. These outcomes imply that given the KMO is more than 0.60 and the significance of Barlett's test is less than 0.05, the data set is acceptable for the EFA [50]. On the basis of these positive results, the rotated component matrix has been generated (see Table 6), utilizing the PCA and Varimax for extracting and rotating the financial criteria, respectively.

According to Table 6, six financial components (dimensions) have been presented with Eigenvalues greater than 1.0, which is the standard cut-off point for retaining the components [50]. More importantly, their cumulative proportion of variance is 75.418%, satisfying the norm of 60% [56] for being considered to signify the latent financial dimensions of the B-SCEs failure. In interpreting the outputs of the rotated component matrix and naming the six underlying financial dimensions of the B-SCEs failure, three rules have been followed. First, to include a financial criterion under a financial dimension, its factor loading should be 0.50 or above. Second, if a financial criterion has two factor loadings of 0.50 or above in two different financial dimensions and their difference is less than 0.10, this financial criterion must be excluded owing to the cross-loading. Third, when labeling an underlying financial dimension, the meanings of its financial criteria of the highest loadings have to be combined to reflect its name. Such rules have been deemed by Ye et al. [53] and Ma et al. [55] for screening and labeling the outputs of the EFA, except the second rule which has been regarded to avoid the

cross-loading issue.

Looking at Table 6, it can be noticed that FC<sub>15</sub> and FC<sub>14</sub> have to be excluded from establishing the latent dimensions of the financial criteria because they do not satisfy the first and second above-mentioned rules, respectively. Yet, the other 16 criteria can be deemed apposite to represent the underlying financial dimensions of the B-SCEs failure. The first financial dimension has 6 criteria, comprising FC<sub>11</sub>, FC<sub>9</sub>, FC<sub>7</sub>, FC<sub>10</sub>, FC<sub>18</sub>, and FC<sub>8</sub>. Further, it has been termed as “difficulty in collecting the financial dues” since its related financial criteria of the highest loadings are associated with the payment/collection of the financial receivables of the contracting enterprise. The second financial dimension involves FC<sub>13</sub>, FC<sub>17</sub>, and FC<sub>16</sub>, indicating, by examining their descriptions, that the construction market’s unfavorable rules play a significant

role concerning the failure of the B-SCEs. Thence, this dimension has been named as “unsupportive laws and policies of the construction market”. The third financial dimension encompasses FC<sub>2</sub>, FC<sub>3</sub>, FC<sub>1</sub>, and FC<sub>4</sub>. The explanations of these 4 financial criteria, as Table 3 demonstrates, are associated with the improper planning and mismanagement of the financial resources, comprising capital and cash flow. Therefore, it has been labeled as “poor planning and control of capital and cash flow”. Finally, each of the fourth, fifth, and sixth financial dimensions has only one criterion, i.e., FC<sub>12</sub>, FC<sub>6</sub>, and FC<sub>5</sub>, respectively. Building on the meaning of FC<sub>12</sub>, the fourth financial dimension has been termed as “government taxes”. Yet, depending on the definitions of FC<sub>6</sub> and FC<sub>5</sub>, the fifth and sixth financial dimensions have been named as “overhead burden” and “excessive expansion”, respectively.

**Table 6.** Rotated component matrix of the financial criteria

Financial Dimensions Labels	Financial Criteria	Financial Components					
		1	2	3	4	5	6
Difficulty in collecting the financial dues	FC <sub>11</sub>	<b>0.786</b>	0.010	0.063	0.175	0.174	0.125
	FC <sub>9</sub>	<b>0.766</b>	0.095	0.046	0.223	−0.161	0.126
	FC <sub>7</sub>	<b>0.759</b>	0.072	0.182	−0.128	−0.173	0.321
	FC <sub>10</sub>	<b>0.733</b>	0.166	0.052	0.015	0.015	−0.189
	FC <sub>18</sub>	<b>0.709</b>	0.216	−0.026	0.087	0.037	−0.462
	FC <sub>8</sub>	<b>0.686</b>	0.207	−0.094	0.251	0.132	0.072
	FC <sub>15</sub> <sup>a</sup>	0.494	0.356	0.159	0.276	−0.635	0.030
Unsupportive laws and policies of the construction market	FC <sub>13</sub>	0.183	<b>0.829</b>	0.190	0.163	0.182	0.088
	FC <sub>17</sub>	0.168	<b>0.786</b>	0.007	−0.115	−0.070	−0.047
	FC <sub>16</sub>	0.231	<b>0.617</b>	0.061	0.436	−0.098	−0.316
	FC <sub>14</sub> <sup>b</sup>	0.136	0.584	0.228	0.509	0.065	0.187
Poor planning and control of capital and cash flow	FC <sub>2</sub>	−0.027	0.204	<b>0.880</b>	−0.125	−0.188	−0.007
	FC <sub>3</sub>	0.308	−0.081	<b>0.824</b>	0.102	0.107	−0.127
	FC <sub>1</sub>	−0.150	0.500	<b>0.681</b>	0.071	−0.063	−0.071
	FC <sub>4</sub>	0.049	−0.034	<b>0.673</b>	0.407	0.470	−0.183
Government taxes	FC <sub>12</sub>	0.253	0.075	0.024	<b>0.834</b>	−0.085	0.094
Overhead burden	FC <sub>6</sub>	0.275	0.437	0.056	−0.038	<b>0.688</b>	0.312
Excessive expansion	FC <sub>5</sub>	0.112	0.019	−0.209	0.125	0.096	<b>0.779</b>
Eigenvalues		5.572	2.647	1.732	1.444	1.127	1.053
Variance (%)		21.903	15.450	14.365	9.120	7.344	7.236
Cumulative variance (%)		21.903	37.354	51.718	60.838	68.182	75.418
a: this financial criterion has been excluded as its factor loading is less than 0.50.							
b: this financial criterion has been excluded owing to the cross-loading.							
Bold values signify the factor loadings of the financial criteria in their latent financial components.							

## 4. Analysis and Discussion

Failure of the contracting enterprises, particularly the B-SCEs has become a main article in the construction news. The construction industry researchers, additionally, have specified the criteria of the financial nature to be the major component of this issue. However, neither the key components of these criteria nor their encompassed factors have been captured yet. This study, therefore, has scrutinized

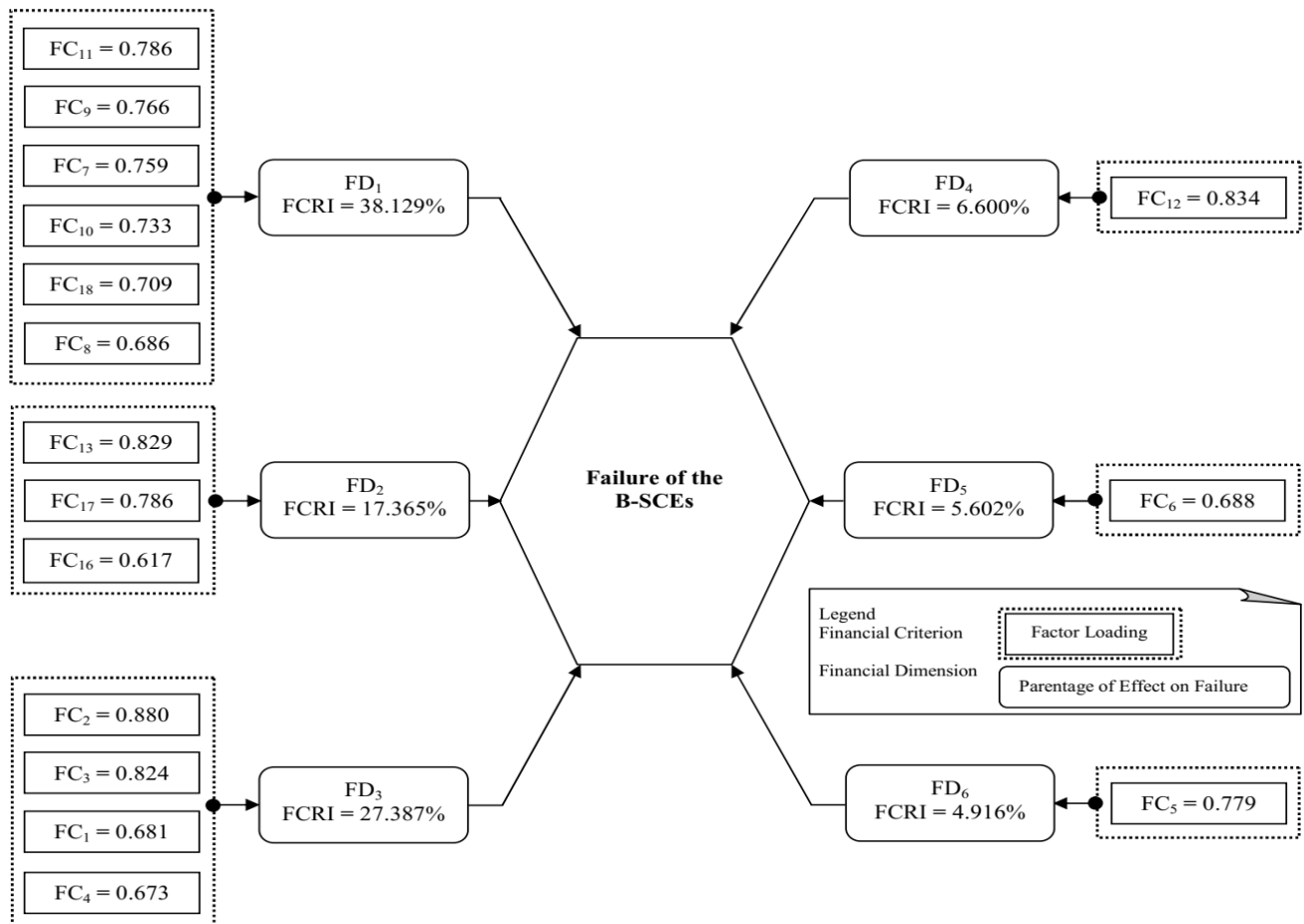
18 financial criteria in four steps: (1) questionnaire survey: to collect linguistic data on the relevance of 18 financial criteria; (2) FTMF: to convert the gathered data into crisp numbers; (3) FCRI: to determine the relevance of each financial criterion concerning the failure of the B-SCEs; and (4) EFA: to reveal the latent dimensions of the financial criteria and their related factors. These methodological steps constitute a strong foundation for discussing the failure of the B-SCEs in other contexts because they have been cited in several



researches worldwide. Tables 5 and 6 present the findings of these steps. According to Table 5, each financial criterion has its FCRI and ranking, indicating that “FC<sub>2</sub>: cash flow mismanagement” (FCRI = 89.334%), “FC<sub>3</sub>: poor estimating practice” (FCRI = 88.031%), “FC<sub>18</sub>: national economy recession” (FCRI = 86.100%), “FC<sub>9</sub>: delayed progress payments from the client” (FCRI = 86.052%), and “FC<sub>15</sub>: hike in the building materials prices” (FCRI = 85.956%) are the top-five financial criteria of the B-SCEs failure. This output adds a crucial implication to the knowledge body: the contractors, projects owners, and governments are together responsible for the failure of the B-SCEs. Importantly, it highlights the weaknesses in their systems for being addressed to control the most relevant financial criteria of the B-SCEs failure. These weaknesses are associated with: (1) the contractors when they poorly estimate and manage their cash flows; (2) the projects owners in terms of their delay in freeing the contractors’ receivables; and (3) the governments in terms of the slump of their economies and their ineffective policies for controlling the fluctuations in the building materials prices.

Away from the results of Table 5, Table 6 demonstrates the latent financial dimensions of the B-SCEs failure. To the best of the researchers’ knowledge, such finding has not been reached before, illustrating the valuable contribution of this

paper towards the scholarly-based account of the B-SCEs failure. As shown in Table 6, the failure of the B-SCEs results from six underlying financial dimensions along with sixteen influencing criteria. These dimensions are: “FD<sub>1</sub>: difficulty in collecting the financial dues”, “FD<sub>2</sub>: unsupportive laws and policies of the construction market”, “FD<sub>3</sub>: poor planning and control of capital and cash flow”, “FD<sub>4</sub>: government taxes”, “FD<sub>5</sub>: overhead burden”, and “FD<sub>6</sub>: excessive expansion”. To get more knowledge about these dimensions in terms of the proportion of effect of each dimension on the B-SCEs failure, Figure 2 has been developed. This figure, through its dotted rectangles, elucidates the criteria of each financial dimension in a descending order of their factor loadings as has been drawn from the EFA. Then, its rounded rectangles define for each financial dimension its percentage of consequence on the B-SCEs failure. This has been determined by aggregating the FCRI of the criteria of each financial dimension and divides their sum by the total of the FCRI of all the criteria of Figure 2. Following these calculations, the ranking of the financial dimensions (from the highest to the lowest relevant) is: FD<sub>1</sub> (FCRI = 38.129%), FD<sub>3</sub> (FCRI = 27.387%), FD<sub>2</sub> (FCRI = 17.365%), FD<sub>4</sub> (FCRI = 6.600%), FD<sub>5</sub> (FCRI = 5.602%), and FD<sub>6</sub> (FCRI = 4.916%).



**Figure 2.** Percentage of effect of each financial dimension on the failure of the B-SCEs

Beneficially, Figure 2 plans in a smart structure, either the sequences of the latent dimensions or their criteria in terms of their implications on the B-SCEs failure. Hence, it enhances the visions of the stakeholders in the construction community to follow on a prioritized basis the paths of the sources impacting the failure of the B-SCEs. Consequently, it arranges their mindset when directing their efforts to stem the failure of the B-SCEs more effectively. Figure 2 has other implications; however, for the academia by posing two ideas for being scrutinized to move the failure studies of the B-SCEs a step further. First, the dimensions of Figure 2 along with their calculated percentages of effects can represent a sound ground for developing an index to reflect the financial health of the B-SCEs. Second, the framework of Figure 2 can be subjected to the analysis of the Interpretive Structural Model or the Decision-Making Trial and Evaluation Laboratory to portray its dimensions and criteria in terms of their interrelations and dependencies. Definitely, realizing these topics in the future increases the scanty knowledge account of the B-SCEs failure and affords the construction industry stakeholders with new information to help them in countering the failure issue. Based on Figure 2, additionally, the industry stakeholders can be provided with other unique implications and suggestions, including their contributions and management roles for causing and controlling the repercussions of each financial dimension, respectively. This will be explained by discussing each dimension as follows:

#### **FD<sub>1</sub> – Difficulty in Collecting the Financial Dues**

Building on Figure 2, the FCRI of this dimension causes 38.129% of the B-SCEs failure. As the name of this dimension implies, the Egyptian contractors face critical challenges to get their receivables. Unfortunately, this encounters the contractors in other developing contexts, such as Malaysia [8], Turkey [26], and South Africa [28]. The latent reasons behind this common problem are: (1) the fluctuations in the project owner's financial accounts to regularly pay the invoices of the contractor; (2) the attitudes of the projects owners in delaying the contractors' financial receivables, especially the final payment to enforce them to do additional works during the handover phase without any charges; and (3) the complex and long routine invoicing systems of the owners [9,20]. Emphatically, these causes afford the projects owners the responsibility of this dimension. Hence, they are advised to firstly change their bureaucracy/opportunistic practices when paying the contractors' dues. Second, they must automate their billing systems, using the industry 4.0 tools to reduce the invoices' checking and freeing cycle. Third, before tendering their projects, they should appoint experienced consultants to define their financial needs, especially on the long-run by considering the fluctuations in the macroeconomic variables. This informs them whether their financial accounts will be sufficient to satisfy their project needs or not. If the result is inadequate, they must find an appropriate funding source; otherwise, they should cancel their planned projects. Those

measures may be costly for the projects owners; nevertheless, their implications in remedying the B-SCEs failure are priceless.

#### **FD<sub>2</sub> – Unsupportive Laws and Policies of the Construction Market**

This dimension accounts for 17.365% of the B-SCEs failure. It includes three financial criteria, encompassing in the first place FC<sub>13</sub>, followed by FC<sub>17</sub> and FC<sub>16</sub> relying upon their factor loadings. This dimension reflects that the Egyptian construction market's laws and policies do not support their B-SCEs, leading to their failure. These unsupportive regulations comprise the inflexible laws of the banks concerning lending the contractors along with their high-interest rates. Second, they involve the tendering law of inviting as many contractors as possible to compete for offering the lowest price; then, accepting the lowest price [57], regardless of its reasonability to satisfy the financial and technical requirements of the tendered project. This fierce competition often compels the contractors to reduce their profits to win the tenders, especially in their stagnation periods to meet their financial obligations. Third, they are associated with the monopoly of the manufacturers and suppliers given the absence of deterrent laws to fight their greed. Assaad and El-adaway [1], Assaf et al. [22], Al-Hallaq [23], and John [38] support this analysis that the banks policies and their high prices, increased competition, awarding the projects to the lowest price, and monopoly contribute to the construction companies' failure. However, the current research is distinguished from these works by adding to the knowledge body that the governments bear the emergence of these issues, as they have the power in their countries to arrange the legislations of their sectors. Hence, this paper urges the lawmakers in Egypt to re-enact their banking policies and tendering laws to be more supportive for the B-SCEs to stem their failure. In the same vein, it advises them to enact strict laws to combat the manipulation of the manufacturers and suppliers of the prices of the building materials and equipment.

#### **FD<sub>3</sub> – Poor Planning and Control of Capital and Cash Flow**

The dimension of "poor planning and control of capital and cash flow" consists of FC<sub>2</sub>, FC<sub>3</sub>, FC<sub>1</sub>, and FC<sub>4</sub>. It represents 27.387% of the B-SCEs failure, positioning it in the second place among the other dimensions of the failure. It is surprising to find such result that the B-SCEs contribute by 27.387% of their failure owing to the improper planning of their capital and mismanagement and control of their cash flows. Sadly, this is the management culture of the contractors in many developing contexts that embarking on participating in the tenders without investigating their financial eligibility to execute the tendered projects. Moreover, they ignore structuring the cash flows curves of the tendered projects to know whether there are gaps between their cash outflows and cash inflows and how they can fill these gaps. More critically, they price the tenders relying upon their previous expertise in similar projects [9],

neglecting appraising the fluctuations in the macroeconomic variables on their bidding prices. These practices denote that the top management of the B-SCEs deems that their experiences are enough for making the bidding decisions and planning and managing the cash flows of their projects. So, there is no need to support their enterprises' organizational structures with adequate planning and management departments to reduce the expenses. This defective leadership may reduce the expenses; however, it puts their companies up to failure. Whatever the know-how of the senior managers, they are not skilled to prepare on a methodological basis the budget, follow-up, and control plans of their project as an experienced cost planner will do.

Assaad and El-adaway [1] agree with the aforementioned analysis that the deficiency in the leadership and the firm's inadequate organizational structure lead to its failure. Ab.Halim et al. [10], additionally, found that the Malaysian medium- and large-sized contracting enterprises are at risk of failure, because they do not have systems for monitoring their capital and cash flows. These facts together with the conclusions of this paper advise the firms' senior management in the developing economies to change their leadership approach and support their human capital with specialized engineers in estimating and controlling the projects costs. Those engineers will not burden their budgets. They, however, will have a vital role in maximizing the returns and reducing the losses of their companies by optimizing their resources usage, professionally managing their current projects, and planning for winning the future tenders at low risks.

#### **FD<sub>4</sub> – Government Taxes**

Again, the governments contribute to the B-SCEs failure by raising the taxes in their countries. This is clearly shown in Figure 2 that 6.600% of the B-SCEs failure is due to the “government taxes”. Enshassi et al. [24] in Palestine and Mohammed [34] in Nigeria support this result that the taxes are among the failure criteria of the contracting enterprises. Radically, the causative factor of this threat is the recession in the national economy of the developing countries. In fact, the economic conditions in the developing world are unfavorable and the sudden and unplanned increases in the taxes are the mean of the governments to realize the yearly incomes of their budgets. This, in turn, burdens all the sectors with additional costs; thus, they increase the prices of their products and services to cover these added expenditures. Conversely, the contractors in the contracting sector can not raise the prices of their services, particularly when they execute previously contracted projects. In this case, a large part of the contractors' profits is deducted when paying their taxes for the governments. Yet, the other portion is lost given the raises in the prices of the supplies and services which they receive from the other sectors to implement their contracted projects. Ultimately, the contractors are the victim of increasing the taxes and the failure of their enterprises becomes inevitable. This regrettable end has a stern warning to the governments in the developing world: taxes practices

are a time bomb, causing a chain of losses starting with destroying their vital sectors and definitely ending at threatening their economies stability. Thence, they have to avoid applying such policies and consider other innovative ones to drive their economies as the developed countries have followed.

#### **FD<sub>5</sub> – Overhead Burden**

This dimension has one financial criterion, i.e., FC<sub>6</sub> “high indirect costs incurred by the contractor”. Moreover, it causes 5.602% of the B-SCEs failure. The indirect costs are the operation expenses of the contractor, either at the company or project level. These costs encompass for instance, administrative offices rent, staff salaries, insurance, consultants fees, and surety bonds [1]. Undoubtedly, if the B-SCEs have not carefully estimate, manage, and monitor their indirect costs, they will drag their business to failure. Consequently, the B-SCEs endure the repercussions of this dimension. However, the governments can also afford the burden of this dimension in terms of their responsibilities for exacerbating the recession in their national economies. This has been explained in the previous subsection that the more the decline in the economies is, the sharper the sudden increases in the services prices in all the sectors become. This incurs the contractors extra unexpected charges when paying the costs of the services they receive from the other sectors. The outputs of this dimension reaffirm for the senior managers of the B-SCEs that there are severe drawbacks in planning and managing their costs. Therefore, they should hire the specialists in this field in their B-SCEs to handle these tasks in a professional manner. As for the governments, this dimension highlights that whatever the developments in the human capital of the B-SCEs, their support to their national B-SCEs by reforming their economies is further important to stem their failure.

#### **FD<sub>6</sub> – Excessive Expansion**

Over again, the findings of this paper delineate that the B-SCEs are putting their business up to failure. This appears in Figure 2 that the “excessive expansion” of the B-SCEs constitutes 4.916% of their failure. Assaad and El-adaway [1] have summarized the core cause of this problem that when the future steps of a contracting firm are unplanned, its failure is always expected. Further, these researchers have specified the flawed practices of the contractors leading to their failure when they set out to expand their business. These practices are: (1) expanding faster than what the funding allows, (2) investing in unfamiliar business segments, (3) running several projects simultaneously, (4) executing unconventional types of projects, and (5) working in unaccustomed geographic areas. Sadly, Dikmen et al. [26] found the contractors in the developing construction markets, particularly in Turkey exercise some of these practices when growing their business. Focusing on Egypt and its B-SCEs, the analysis of Assaad and El-adaway [1] and Dikmen et al. [26] and the conclusions of dimension FD<sub>3</sub> concerning the approach of the B-SCEs in tenders reveal a serious fact. This fact is that neither the short-term strategic decisions of the

B-SCEs when embarking on participating in the tenders nor their long-term strategic decisions when expanding their business have been effectively planned. This critical fact reaffirms that the principal problem that the B-SCEs suffer from, responsible for, and leading to their failure is the poor planning. This issue has been highlighted in three dimensions of Figure 2, including  $FD_3$ , part of  $FD_5$ , and  $FD_6$ .

To exactly quantify the contribution proportion of the improper planning of the B-SCEs toward their failure, Table 7 has been developed. This is another contribution of this paper as this table clarifies that the poor planning of the B-SCEs causes 35.104% of their whole failure. This huge percentage is the sum of: (1) 100% of  $FD_3$  (FCRI = 27.387%) due to the inadequate financial and strategic planning of their capital and bidding decisions, respectively; (2) 50% of  $FD_5$  (FCRI =  $0.50 \times 5.602 = 2.801\%$ ) given the improper financial planning of their indirect costs; and (3) 100% of  $FD_6$  (FCRI = 4.916%) owing to the inadequate strategic planning of their long-term expansion plans. Worth

mentioning is that 50% has been assumed and multiplied by the FCRI of dimension  $FD_5$  because this dimension has been previously discussed to be endured by the B-SCEs or the governments. With a comprehensive insight into Table 7, the extent of the effect of the poor planning on the B-SCEs failure can be more stressed. Depending on this table, the projects owners endure 38.129% of the B-SCEs failure given their full responsibility of  $FD_1$ . Yet, the governments afford 26.766% of the failure due to their total responsibility of  $FD_2$  and  $FD_4$  and 50% of  $FD_5$ . Briefly, Table 7 shows that the projects owners are the main culprits of dragging the B-SCEs to failure (FCRI = 38.129%), followed by the B-SCEs (FCRI = 35.104%) and the governments (FCRI = 26.766%). Although this output carries the projects owners the greatest blame for the failure of the B-SCEs, the B-SCEs are equally blamed. This stems from the small difference (i.e.,  $3.025\% = 38.129\% - 35.104\%$ ) between the contributions percentages of the projects owners and the B-SCEs toward the B-SCEs failure.

**Table 7.** Contribution percentages of the projects owners, governments, and contracting enterprises toward the failure of the B-SCEs

Financial Dimension	FCRI of the Dimension (%)	Contribution Percentage (%)		
		Projects Owners	Governments	Contracting Enterprises
$FD_1$	38.129	38.129		
$FD_2$	17.365		17.365	
$FD_3$	27.387			27.387
$FD_4$	6.600		6.600	
$FD_5$	5.602		$0.50^* \times 5.602 = 2.801$	$0.50^* \times 5.602 = 2.801$
$FD_6$	4.916			4.916
Total	100	38.129	26.766	35.104

\*: 0.50 has been utilized as the governments and the B-SCEs are responsible for  $FD_5$ .

The analysis of Table 7 directs a stern message to the B-SCEs and their top management, either in Egypt or any developing context elsewhere: they should not blame the projects owners or their governments for putting their B-SCEs up to failure. They, however, have to blame themselves for the poor planning of their business. Second, they must fully absorb that, as a management rule, no business can be expanded without doing sufficient researching, planning, and monitoring [38]. Third, they should take significant leaps to apply this rule in their B-SCEs by boosting their organizational structures with adequate planning and management departments and provide these departments with experienced planners, cost estimators, and cost control engineers. By doing so, 35.104% of their failure can be prevented. The projects owners and the governments, on the other hand, must support the B-SCEs to stem the other percentage of their failure by addressing the failure factors that they are accountable for. Emphatically, if each of these parties considers the recommendations defined in this study seriously, at a fast pace the failure issue of the B-SCEs can be curbed.

## 5. Conclusions

Focusing on the developing countries' socio-economic environment, this research provides the knowledge body with the latent structure of the financial criteria of the B-SCEs failure. Targeting these contexts stems from the fact that the B-SCEs are severely influenced by the criteria of the financial nature than the S-SCEs, particularly under the unfavorable circumstances of the developing markets. Using Egypt as a developing country, linguistic data on the relevance of 18 financial criteria have been collected from 56 experts of 14 B-SCEs. Subsequently, FTMF and the EFA have been utilized to convert the linguist data into crisp numbers and establish the underlying structure of the financial criteria of the B-SCEs failure, respectively. The EFA pinpoints six dimensions of these criteria, comprising "difficulty in collecting the financial dues", "unsupportive laws and policies of the construction market", "poor planning and control of capital and cash flow", "government taxes", "overhead burden", and "excessive expansion". The study further determines the percentage of effect of each of these six dimensions on the B-SCEs failure. Moreover, it

discusses the potential causative factor(s) and the responsible party for causing each financial dimension. Relatedly, the projects owners, B-SCEs, and governments have been defined to be the three culprits of dragging the B-SCEs to failure, where the projects owners afford 38.129% of the B-SCEs failure. Yet, the B-SCEs and governments are responsible for 35.104% and 26.766% of the B-SCEs failure, respectively. To move forward to limit the causal factor(s) of each financial dimension, several practical recommendations have been directed to each responsible stakeholder.

These findings of this paper frame a pioneering work to stem the failure in the construction community because they grasp the latent mechanism of the financial criteria of the B-SCEs failure and the efforts needed to curb their incidence. Despite the significance of this work, the following limitations have to be addressed. First, the dimensions of the financial criteria of the B-SCEs failure have been established, using a sample of not very large size by considering the context of Egypt only. Therefore, involving more practitioners and investigating other contexts than Egypt in future research streams can afford more inclusive and generic latent perception of the financial criteria of the B-SCEs failure. Second, relying upon the author's analysis only for the criteria of the financial dimensions, the responsible parties have been specified. This limitation underlines another future research direction, including surveying the financial dimensions and criteria of the B-SCEs failure among the construction practitioners to determine their involved liable parties to ensure the reliability of the obtained results.

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