

Prioritising Subcontractor Prequalification Criteria in Construction Projects: Evidence from G7 Contractors in Sarawak, Malaysia

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ABSTRACT

Subcontractor prequalification is an important part of construction procurement because the performance of specialist subcontractors can influence cost, programme, quality and project coordination. This study examines the criteria used to assess subcontractors from the perspective of G7 construction practitioners in Sarawak, Malaysia. A quantitative cross-sectional survey was conducted using a literature review framework of 29 criteria grouped into seven categories, namely company-related, past experience, cost or financial, quality, time, safety and general obligations. Questionnaires were distributed to 258 targeted respondents, and 198 responses were returned. After screening for the required subcontractor selection experience, 182 valid responses were retained for analysis. The relative importance of the criteria was assessed using mean scores, standard deviations and the Relative Importance Index (RII). The results show a strong level of agreement on the importance of prequalification, with all 29 criteria classified as extremely important. Tender price recorded the highest RII (0.940), followed by performance in previous similar projects (0.935), completion of the project on time (0.930), speciality in a specific type of work (0.922), and quality performance with standard and commitment (0.921). The findings indicate that, although price remains the leading consideration, practitioners do not view subcontractor selection as a price-only decision. Previous performance, schedule reliability, specialist capability and quality are almost as highly regarded. The study provides regional evidence that can support more structured prequalification practices among G7 contractors and offers a basis for future research on validated and performance-based multi-criteria decision-support models.

Keywords: subcontractor prequalification; subcontractor selection; construction procurement; G7 contractors; construction management; Sarawak; Malaysia

INTRODUCTION

Construction projects rarely depend on the main contractor alone. Specialist subcontractors carry out many of the work packages and bring trade knowledge, labour, equipment and practical experience that the main contractor may not have in-house. For this reason, choosing the right subcontractor is an important procurement decision. The main contractor needs confidence that the selected firm can complete its work to the required standard, within the agreed time and at a commercially acceptable price. A poor choice can affect more than one work package because delays, defects or resource problems can quickly spread to other activities on the project.

Subcontractor prequalification provides an opportunity to manage this risk before appointment. Prequalification can be used to assess whether prospective subcontractors have sufficient financial strength, relevant experience, technical competence, organisational resources, quality systems, safety practices and delivery capability rather than just looking at the price submitted for a work package. For instance, Olanrewaju, Bong and Preece (2022) developed a Malaysian subcontractor prequalification framework and found that expected completion date, financial capacity or stability, health and safety records, previous performance and tender price were among the major considerations. They demonstrate that the choice of subcontractors can be viewed as a formal decision problem, not just an informal procurement judgement.

Similarly, Olanrewaju et al. (2022) showed that a structured Malaysian prequalification framework can incorporate financial capacity, expected completion, safety records, previous performance and tender price into the assessment.

International evidence supports this multidimensional perspective. Hartmann, Ling and Tan (2009) found the price, technical knowledge, quality and cooperation to be important considerations in the sub-contractor selection. Price was found to be especially important in the actual choice situation. Gajjar and Anderson (2021) similarly identified past performance, experience, financial history, manpower, knowledge of project scope and workload as important factors considered by main contractors. Karaman and Sandal (2022) examined the relationship between subcontractor selection and construction project success, further demonstrating the significance of the selection decision. This broader view is consistent with Gajjar and Anderson (2021), who reported the importance of past performance, experience, financial history, manpower, scope knowledge and workload, and with Vo et al. (2021), who identified reputation, price, construction techniques, commitment and competence as important selection factors.

More recent research indicates an evolution from static criterion lists toward performance-based and decision-support approaches. Bingol, Arditi and Polat (2024) developed a performance-based subcontractor selection model using key performance indicators, while Bingol, Arditi and Polat (2025) subsequently examined multi objective optimisation involving cost, duration, quality, safety and environmental impact. These developments suggest that robust decision-support models require a contextually appropriate set of criteria and empirically grounded priorities before weighting or optimisation mechanisms can be meaningfully applied. Bingol et al. (2024) developed a performance-based subcontractor selection model using key performance indicators, while Bingol et al. (2025) extended the discussion through multi objective optimisation involving cost, duration, quality, safety and environmental considerations.

Malaysian evidence notwithstanding, construction practices are not necessarily homogeneous throughout the country. Sarawak has a unique geographical, economic and project delivery context with construction activities spread across major cities like Kuching, Miri, Bintulu and Sibul. Main contractors may evaluate prospective subcontractors based on the availability of skilled resources, specialist subcontractor capability, equipment, logistics, and relevant project experience. The underlying research thus specifically targeted G7 construction companies in Sarawak and identified a literature-informed set of subcontractor prequalification criteria. Olanrewaju et al. (2022) provides a national Malaysian benchmark, while the wider international literature suggests that criterion priorities differ across project and institutional contexts (Gajjar & Anderson, 2021; Vo et al., 2021; Sean & Techapeeraparnich, 2021).

Hence, the present study is to examine an empirical priority structure of subcontractor prequalification among G7 construction companies in Sarawak, Malaysia. The study identifies the criteria that main contractors consider important and ranks their relative importance using descriptive statistics and the Relative Importance Index. The pattern that emerges from this is interpreted against Malaysian and international evidence, and the findings are translated into practical implications for strengthening subcontractor prequalification.

PROBLEM STATEMENT

The main problem addressed in this study is the subcontractor selection is a high stakes decision with a lot of criteria that may conflict with each other. The tender price is commercially visible and has a direct impact on the main contractor's budget and potential margin. However, price alone does not give a full picture of the subcontractor's capability to deliver the required scope. A subcontractor may offer an attractive tender but may not have sufficient technical capability, financial capacity, manpower, safety performance or history in schedule and quality performance. (Hartmann et al., 2009; Olanrewaju et al., 2022; Gajjar & Anderson, 2021).

The consequences of inappropriate selection may go beyond the individual work package of the subcontractor. Construction activities have interdependence such that delay, rework or resource failure of a subcontractor may disrupt the successor activities, increase the project overheads, create claims and affect the main contractor's relationship with the client. Poor workmanship can lead to defects and remedial work and

accidents, disruption and compliance consequences from poor safety performance are risks the project may face. Thus, uncertainty must be reduced by prequalification before commercial appointment. (Gajjar & Anderson, 2021; Hartmann et al., 2009; Olanrewaju et al., 2022).

At the same time, a prequalification system that is too broad can be administratively burdensome. If all criteria are considered equally important, procurement personnel may have difficulty distinguishing important indicators from supporting information. The practical problem is thus not only to identify possible prequalification criteria but to determine which criteria experienced practitioners consider relatively more important and how these criteria can be incorporated in a transparent evaluation process. (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

This problem is especially pertinent in Sarawak as there is limited empirical evidence on G7 construction practitioners in the state. Without regional evidence, main contractors may refer to generic national or international frameworks that may not fully reflect the local project conditions and procurement priorities. The present study addresses this problem by empirically ranking the identified criteria by practitioners with relevant subcontractor-selection experience. (Hartmann et al., 2009; Olanrewaju et al., 2022; Gajjar & Anderson, 2021).

Research Gap

The first gap is that of geographical location. While there is evidence from a number of countries in the existing literature and important Malaysian research, the findings from each country should not be implicitly generalized to all regional construction industry. The relative importance of selection criteria can be affected by differences in contractor profiles, project types, resource availability and procurement environments. The present study attempts to fill this gap by focusing specifically on G7 construction companies in Sarawak. (Gajjar & Anderson, 2021; Vo et al., 2021; Bingol et al., 2024).

The second gap is the lack of empirical evidence on the priority structure perceived by G7 practitioners in Sarawak. The criteria were developed based on the previous literature and then tested by a survey in the underlying study. In this way, it provides regional evidence of how main contractors determine the suitability of subcontractors, not just copying the criteria of other studies elsewhere. (Gajjar & Anderson, 2021; Vo et al., 2021; Bingol et al., 2024)

The third gap concerns the development of performance-based decision-support systems. Recent studies have shifted to performance indicators and multi objective decision models but these approaches require an empirically based set of criteria before suitable weights and performance measures can be determined. Thus, a regional ranking study is a critical first step toward the development of a more advanced decision support framework. (Gajjar & Anderson, 2021; Vo et al., 2021; Bingol, et al., 2024).

The fourth gap is in practical translation. The way ranked criteria are converted into a usable procurement procedure is not always stated in criterion identification studies. To address this research question, we interpret the ranking as a structured prequalification workflow and explicitly avoid the unsupported assumption that RII values should be converted into universal decision weights. (Gajjar and Anderson, 2021; Vo et al., 2021; Bingol et al., 2024).

The study, therefore, contributes to the body of knowledge specific to Sarawak, explains the multidimensional nature of the subcontractor prequalification, and provides an evidence base for future validation and multi-criteria decision modelling (Gajjar & Anderson, 2021; Vo et al., 2021; Bingol et al., 2024).

Research Aim, Objectives And Questions

This study aims to identify a ranking for prequalification of subcontractors in G7 construction companies in Sarawak, Malaysia. The objectives are to: (i) identify the subcontractor prequalification criteria deemed relevant by G7 construction practitioners in Sarawak; (ii) determine the relative importance and ranking of the

identified criteria using descriptive statistics and the Relative Importance Index; (iii) interpret the resulting ranking in relation to Malaysian and international subcontractor-selection research; and (iv) propose practical implications for strengthening subcontractor prequalification and future multi-criteria decision-support research.

The research questions are: (1) Which subcontractor prequalification criteria are considered important by G7 construction practitioners in Sarawak? (2) Which criteria receive the highest relative priority? (3) How do the Sarawak priorities compare conceptually with previous Malaysian and international evidence? and (4) How can the findings be translated into a more structured prequalification process? (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021)

LITERATURE REVIEW

Nature and Purpose of Subcontractor Prequalification

Subcontractor prequalification can be understood as a screening stage through which the main contractor assesses whether a prospective subcontractor has the capability and credentials necessary to perform a defined work package. Its purpose is not simply to eliminate weak bidders; it also establishes a more reliable information base for subsequent tender evaluation and appointment. By requiring evidence of previous projects, resources, financial capacity, quality performance and safety performance, prequalification can reduce information asymmetry between the main contractor and prospective subcontractors (Abdul Razak et al., 2021; Olanrewaju et al., 2022).

The importance of prequalification is amplified by the interdependence between work packages. A subcontractor's failure to complete its scope can disrupt following trades, create rework, affect commissioning and delay the overall project. Consequently, prequalification should consider not only whether a subcontractor can undertake the work but also whether it can deliver that work within the project's technical, temporal and commercial constraints (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

Price and Financial Considerations

Tender price is a direct commercial consideration and can influence the main contractor's competitiveness and project margin. Nevertheless, a low tender price may not represent the lowest overall project cost if it is accompanied by weak resources, poor productivity, claims, rework or delay. The Malaysian evidence reported by Olanrewaju et al. (2022) and the Singapore evidence reported by Hartmann et al. (2009) demonstrate the continuing importance of price while supporting a broader selection perspective. Financial stability, ability to undertake the required work size and payment-related behaviour therefore provide important complementary information.

Previous Experience and Performance

Previous performance provides an evidence-based indicator of a subcontractor's ability to deliver similar work. Experience in comparable project types can reduce uncertainty concerning technical competence, coordination and work-package management. Gajjar and Anderson (2021) identified past performance and experience among key considerations of general contractors, while Olanrewaju et al. (2022) similarly identified previous performance as a leading Malaysian criterion. The second-ranked position of previous similar-project performance in the Sarawak data provides strong regional support for this perspective.

Time and Schedule Reliability

Schedule performance is important because subcontracted work is embedded within a sequence of interdependent construction activities. Delay in one package can affect successor activities and create cumulative schedule pressure. The Sarawak respondents ranked completion of the project on time third, while flexibility and cooperation when resolving delays also received a high ranking. This suggests that practitioners

value both historical schedule reliability and the behavioural capacity to manage emerging delay (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

Technical Specialisation and Organisational Capability

Specialist capability is a core rationale for subcontracting. Main contractors may engage subcontractors precisely because they possess trade-specific knowledge, equipment or skills. The fourth-ranked criterion namely specialty in a specific type of work therefore has direct practical significance. Technical expertise, number of experienced construction staff, machinery and equipment, workload and duration in business provide complementary indicators of whether the organisation can mobilise and sustain the required capability (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

Quality and Safety

Quality and safety are not secondary considerations simply because they may not appear directly in the tender price. Poor workmanship can result in defects, rework, disputes and additional cost, while inadequate safety performance can expose workers, project participants and organisations to serious consequences. The Sarawak findings reinforce this perspective because quality performance ranked fifth and safety consciousness ranked eighth, with the reported criteria falling within the extremely important category (Abdul Razak et al., 2021; Olanrewaju et al., 2022).

Governance, Compliance and Collaboration

Subcontractor performance also depends on compliance, risk planning, coordination and relationships. Compliance with regulations or instructions ranked ninth, while risk planning ranked thirteenth. Relationship with the main contractor and other subcontractors also received a high RII. These findings suggest that prequalification evaluates not only technical and financial capability but also whether a subcontractor can operate effectively within the governance and collaborative environment of a construction project (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

Evolution Toward Performance-Based Selection

Recent research indicates an evolution from static prequalification checklists toward performance-based and multi-criteria decision systems. Bingol et al. (2024) developed a performance-based model using key performance indicators, while Bingol et al. (2025) examined multi objective optimisation involving cost, duration, quality, safety and environmental impact. These developments are relevant because the present RII ranking should not be treated as a final decision model. Instead, it provides empirical evidence that can be used to define candidate criteria and priority areas for a subsequent weighted or optimisation-based framework.

Study	Context	Approach	Key themes	Relevance
Hartmann et al. (2009)	Singapore	Survey	Price; technical know-how; quality; cooperation	Shows persistent importance of price alongside non-price factors.
Olanrewaju et al. (2022)	Malaysia	Survey; factor analysis	Expected completion; financial stability; safety; previous performance; tender price	Closest national benchmark.
Gajjar & Anderson (2021)	Southeastern USA	Survey	Past performance; experience; financial history; manpower; workload	Supports evidence-based capability assessment.
Karaman & Sandal (2022)	Turkey	Survey and structural modelling	Subcontractor selection and project success	Shows potential link between selection and project outcomes.

Bingol et al. (2024)	International	Performance-based model	KPIs for subcontractor performance	Shows shift toward performance-based decision support.
Bingol et al. (2025)	International	Multi objective optimisation	Cost; duration; quality; safety; environment	Shows need to balance multiple objectives.
Present study	Sarawak, Malaysia	Survey; RII	29-criterion framework across seven categories	Provides regional priority evidence for G7 contractors.

Conceptual Framework

The conceptual framework considers subcontractor prequalification as a multidimensional assessment problem. The source research organises the criteria into seven dimensions namely company-related, past experience, cost or financial, quality, time, safety and general obligations. The framework is deliberately descriptive rather than causal. What is presented are the dimensions that the respondents evaluated and the resulting priority structure and it does not claim that the dimensions are independent causes of project success. The seven dimensions cover the themes that are common in the subcontractor selection literature such as organisational capability, past performance, price and financial capacity, quality, time and safety (Hartmann et al., 2009; Olanrewaju et al., 2022; Gajjar & Anderson, 2021; Vo et al., 2021).

Dimension	Purpose	Examples
Company-related	Assess organisational capacity, reputation, technical capability and resources.	Specialty; reputation; workload; technical expertise; staff; equipment; labour retention; business duration; relationships.
Past experience	Assess evidence of comparable work and historical performance.	Previous similar projects; project scale; number completed; defect-liability performance; cooperation.
Cost/financial	Assess commercial competitiveness and financial capacity.	Tender price; work-size capacity; financial stability; payment flexibility; labour payment.
Quality	Assess ability to achieve required workmanship and manage defects.	Quality performance; remedial-work monitoring.
Time	Assess schedule reliability and response to delay.	Completion on time; flexibility/cooperation in resolving delays.
Safety	Assess safety culture, compliance and risk exposure.	Safety consciousness; site safety records; insurance.
General obligations	Assess governance, compliance, risk and innovation.	Regulatory compliance; creativity/innovation; risk planning.

The framework bridges the gap between literature-derived criteria and empirical ranking in a logical manner. Its main value is to show that subcontractor suitability cannot be adequately represented by price. The primary criteria are commercial, past-performance, temporal, technical and quality, with safety, governance and organisational-resource criteria remaining as important supporting dimensions (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

METHODOLOGY

Research Design

A quantitative cross-sectional survey design was adopted because the study sought to obtain standardised perceptions from a defined practitioner population and compare the relative importance of a fixed set of

prequalification criteria. A close-ended questionnaire was appropriate because each respondent could evaluate the same criteria using a common five-point importance scale, enabling the responses to be converted into numerical scores and ranked. This approach is consistent with the source research, which used a structured questionnaire to obtain comparable practitioner ratings and rank the 29 criteria (Olanrewaju et al., 2022; Hartmann et al., 2009).

Population and Sampling

The target population consisted of practitioners who were employed by or affiliated with G7 construction companies that were registered with the Construction Industry Development Board (CIDB) and conducting business in Sarawak. The sampling frame identified 720 G7-registered construction companies in four locations namely Kuching (529), Miri (79), Bintulu (66) and Sibu (46). G7 contractors were selected, as G7 is the highest contractor grade in the CIDB classification and thus provides a suitable context to explore subcontractor prequalification in organisations that undertake relatively large construction activities. The unit of response was the individual practitioner, not the company. The survey targeted a total of 258 practitioners. To ensure that the ratings were based on informed professional judgement, respondents had to have previous experience selecting or awarding work to subcontractors. The selection of G7 organisations is consistent with the source study's focus on contractors registered at the highest CIDB contractor grade and practitioners involved in subcontractor selection (Olanrewaju et al., 2022; Hartmann et al., 2009).

Data Collection and Screening

A total of 198 questionnaires that were filled out were received from the 258 individuals who were targeted for participation, which results in a response rate of 76.74%. Respondents were screened on the basis of their previous experience in subcontractor selection using Section B of the questionnaire. Sixteen respondents had no previous experience in the selection of subcontractors and were excluded from the main analysis. The final analytical sample consisted of 182 valid respondents representing 70.54% of the targeted sample. The respondents of the 198 returned questionnaires were from Kuching (107; 54.0%), Miri (43; 21.7%), Bintulu (30; 15.2%) and Sibu (18; 9.1%). The maps indicate the geographic distribution of returned questionnaires. The final ranking analysis was based on just the 182 respondents fulfilling the experience criterion (Olanrewaju et al., 2022; Hartmann et al., 2009).

Questionnaire Structure

The questionnaire was divided into three sections. Section A describes respondent and company characteristics. The section B was used as the eligibility screening section to determine the respondents if they have previous experience in selecting or awarding work to subcontractors. Section C included the literature-based subcontractor prequalification criteria, and asked the respondents to rate the importance of each criterion on a 5-point scale where 1 means Not Important and 5 means Extremely Important. The criteria were grouped in seven dimensions namely company-related, past experience, cost/financial, quality, time, safety and general obligations. The use of the same response scale for all respondents provided a consistent basis for making comparisons of the relative importance of the criteria (Abdul Razak et al., 2021; Olanrewaju et al., 2022).

Data Analysis

Mean and standard deviation were used to describe the central tendency and dispersion of importance ratings. The Relative Importance Index was used to normalise the responses and establish the ranking. The formula was: RII is widely used in construction-management survey research to compare the perceived importance of criteria measured on ordinal importance scales; in this study, it is used as a ranking measure rather than a test of causal relationships (Olanrewaju et al., 2022; Hartmann et al., 2009).

$$RII = \Sigma W / (A \times N)$$

where W is the weighting assigned by respondents, A is the highest possible weighting on the five-point scale, and N is the number of valid respondents (182). The source study classified RII values of 0.80 – 0.99 as

extremely important, 0.60 – 0.79 as important, 0.40 – 0.59 as neutral, 0.20 – 0.39 as slightly important and 0.00 – 0.19 as not important. In this paper, RII is interpreted as perceived relative importance and not as evidence of causal influence on project outcomes (Olanrewaju et al., 2022; Hartmann et al., 2009).

Reliability, Validity and Methodological Boundaries

The quality of the measurement was considered in relation to the purpose of the study, which was to rank distinct subcontractor prequalification criteria rather than to construct a single reflective psychological scale. The 29 criteria were derived from the subcontractor-selection literature and organised into seven dimensions. Respondents were also screened to ensure that the principal analysis was based on practitioners with previous subcontractor-selection experience. The original study did not report a numerical Cronbach's alpha coefficient, item-level reliability statistics, or formal factor-analytic validation. These statistics are therefore not claimed in the present paper. Given that the criteria represent different aspects of procurement decision-making, internal consistency should be assessed at the dimension level only where the items can reasonably be regarded as measuring a common construct. Future research should validate the dimensional structure using a larger sample and appropriate construct-validation techniques before the framework is used as a formal measurement scale (Olanrewaju et al., 2022; Hartmann et al., 2009).

Ethical and Data-Governance Considerations

The final submission should state the actual ethical approval or exemption applicable to the original survey and the participant consent procedure used. Because the supplied research material does not provide an ethics reference number or complete consent statement, these details must be completed from the authors' research records rather than inferred. Data-availability wording should likewise reflect the actual consent conditions and institutional policy (Olanrewaju et al., 2022; Hartmann et al., 2009).

RESULTS

A key component of the results is the clustering of responses at the upper end of the importance scale. All 29 criteria were rated as extremely important using the adopted RII thresholds which indicates a strong overall consensus that the criteria are relevant to subcontractor prequalification. This concentration also gives rise to a ceiling effect and restricts the ability of the scale to discriminate between criteria. Thus, the ranking should be interpreted as indicating relative priority within a generally high importance set, not as evidence that the first ranked criterion is substantially more important than all lower ranked criteria. For example, the RII for tender price was 0.940, and the RII values for performance in previous similar projects, completion on time, speciality in a specific type of work, and quality performance were 0.935, 0.930, 0.922 and 0.921, respectively. The relatively small differences contribute to the need for a balanced interpretation. Hence, the lower ranked criteria should not be considered unimportant just because they are ranked lower.

Respondent Characteristics

Among the 182 valid respondents, project managers represented 37.4%, senior engineers 32.3%, senior quantity surveyors 22.7% and company chief executive officers 7.6%. Respondents were distributed across Kuching, Miri, Bintulu and Sibul. The occupational profile provides perspectives from managerial, engineering, quantity surveying and executive roles, which are all relevant to subcontractor selection.

Respondent role	Percentage
Project manager	37.4%
Senior engineer	32.3%
Senior quantity surveyor	22.7%
Company CEO	7.6%

Overall Importance

Of the 182 valid respondents, 91 (50.0%) rated subcontractor prequalification evaluation criteria as extremely important, 90 (49.5%) rated them important and one respondent (0.5%) rated them neutral. No respondent selected slightly important or not important. At the criterion level, the original report shows that all 29 criteria were classified as extremely important. This overall pattern indicates a strong level of agreement among the respondents that prequalification is an important part of subcontractor selection.

Rank	Code	Criterion	Dimension	Mean	SD	RII
1	CRF5	Tender price	Cost/financial	4.698	0.484	0.940
2	CRPE1	Performance in previous similar projects	Past experience	4.676	0.481	0.935
3	CRT1	Completed the project on time	Time	4.648	0.490	0.930
4	CRC1	Specialty in a specific type of work	Company-related	4.610	0.532	0.922
5	CRQ1	Quality performance with standard and commitment	Quality	4.604	0.490	0.921
6	CRF1	Ability to undertake the size of work	Cost/financial	4.571	0.518	0.914
7	CRC5	Reputation	Company-related	4.495	0.554	0.899
8	CRS1	Safety consciousness on the job site	Safety	4.489	0.544	0.898
9	CRGO1	Compliance with regulations/instruction	General obligations	4.462	0.603	0.892
10	CRPE3	Size/scale of previous completed similar projects	Past experience	4.440	0.568	0.888
11	CRC4	Current workload	Company-related	4.429	0.539	0.886
12	CRF3	Current financial stability	Cost/financial	4.407	0.586	0.881
13	CRGO3	Risk planning	General obligations	4.401	0.586	0.880
14	CRPE2	Number of similar projects completed	Past experience	4.357	0.545	0.871
15	CRT2	Flexibility and cooperation when resolving delays	Time	4.352	0.532	0.870
15	CRC8	Technical expertise	Company-related	4.352	0.592	0.870
16	CRPE4	Performance during defect liability period/warranty issues	Past experience	4.341	0.561	0.868
17	CRF4	Flexibility in payment terms and conditions	Cost/financial	4.313	0.542	0.863
18	CRQ2	Mechanism for monitoring remedial work	Quality	4.297	0.525	0.859
19	CRC3	Relationship with main contractor/subcontractors	Company-related	4.280	0.570	0.856
20	CRC6	Number of employees/experienced construction staff	Company-related	4.275	0.632	0.855
20	CRC2	Duration in business	Company-related	4.275	0.532	0.855

21	CRPE5	Able to cooperate with other subcontractors	Past experience	4.269	0.621	0.854
22	CRS2	Compliance with site safety requirements/records	Safety	4.264	0.613	0.853
23	CRF2	Prompt payment to labour	Cost/financial	4.242	0.619	0.848
24	CRS3	Insurance of major equipment and employees	Safety	4.220	0.591	0.844
25	CRC7	Machinery and equipment	Company-related	4.176	0.591	0.835
26	CRC9	Labour force retention	Company-related	4.121	0.703	0.824
27	CRGO2	Creativity and innovation	General obligations	4.099	0.614	0.820

Interpretation of the Top Five Criteria

Tender Price

Tender price achieved the highest reported RII of 0.940, with a mean of 4.698 and standard deviation of 0.484. This result demonstrates that commercial competitiveness remains a dominant consideration in subcontractor prequalification. The high mean and relatively small standard deviation indicate strong concentration of responses toward the upper end of the importance scale. Nevertheless, the ranking should not be interpreted as evidence that the lowest tender should automatically be selected. The immediate proximity of four non-price criteria demonstrates that respondents attach almost comparable importance to demonstrated capability, schedule reliability, specialist competence and quality.

Performance in Previous Similar Projects

Previous similar-project performance ranked second with RII of 0.935, mean of 4.676 and SD of 0.481. The criterion represents evidence-based confidence in a subcontractor's demonstrated capability rather than reliance on general claims. Previous comparable projects allow a main contractor to examine whether the subcontractor has previously managed similar scope, technical requirements, coordination conditions and delivery expectations. Its near-equivalence with tender price indicates that practitioners place substantial value on what a subcontractor has actually achieved.

Completion of the Project on Time

Completion of the project on time ranked third with RII of 0.930, mean of 4.648 and SD of 0.490. Schedule reliability is important because subcontractor work packages are embedded in a network of dependent activities. Delay by one subcontractor may prevent successor activities from commencing, create idle resources, increase preliminaries and contribute to extension-of-time or claims risk. The high ranking therefore indicates that time performance is treated as a prequalification issue rather than merely a post-award contract-management concern.

Specialty in a Specific Type of Work

Specialty in a specific type of work ranked fourth with RII of 0.922, mean of 4.610 and SD of 0.532. The result reinforces the fundamental rationale for subcontracting whereby specialist firms are expected to provide expertise that complements the main contractor's own capabilities. Prequalification should therefore examine the match between the subcontractor's actual specialist experience and the technical requirements of the proposed work package, rather than treating general construction experience as sufficient evidence.

Quality Performance with Standard and Commitment

Quality performance with standard and commitment ranked fifth with RII of 0.921, mean of 4.604 and SD of 0.490. This places quality within the core priority cluster rather than treating it as a secondary compliance issue. The result suggests that practitioners value evidence that a subcontractor can consistently achieve the required standard and demonstrate commitment to quality management.

DISCUSSION

The Findings Confirm a Multi-Criteria Decision Environment

The most important overall finding is not simply that tender price ranks first, but that the first five criteria span multiple decision dimensions. They encompass commercial cost, historical performance, schedule reliability, specialist capability and quality. This distribution demonstrates empirically that subcontractor prequalification is a multidimensional decision environment. The result is consistent with the Malaysian framework of Olanrewaju et al. (2022) and with recent performance-based approaches Bingol et al. (2024), Bingol et al., (2025).

Price Remains Important, but Is Not Sufficient

The first-ranked position of tender price is consistent with previous evidence that price remains a major determinant in subcontractor choice. Hartmann et al. (2009) found price to be the most influential criterion in actual choice situations among Singapore main contractors. The Sarawak result confirms the continuing commercial importance of price, but the very small RII gap between price and the next four criteria changes the interpretation. The data do not support a lowest-price-only model, instead, they suggest that price is considered within a broader capability and performance context.

This distinction has practical significance. A low tender price that is not supported by sufficient technical, financial or organisational capacity may create downstream costs through delay, rework, claims or poor performance. The Sarawak findings therefore support a balanced interpretation in which commercial attractiveness is assessed together with demonstrated ability to deliver (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

Previous Performance as a Form of Risk Reduction

The second-ranked position of previous similar-project performance is important from a risk-management perspective. Historical evidence allows contractors to reduce uncertainty concerning whether a subcontractor can execute a comparable scope. It also creates an opportunity to examine schedule adherence, quality outcomes, defect management and coordination performance. The finding aligns closely with Olanrewaju et al. (2022) and Gajjar and Anderson (2021).

Time Performance Is a Strategic Criterion

Completion on time ranked third, while flexibility and cooperation when resolving delays ranked fifteenth. Taken together, these results suggest two distinct aspects of schedule capability namely historical delivery reliability and behavioural responsiveness when problems arise. A robust prequalification process should therefore distinguish between evidence that a subcontractor historically completes work on time and evidence that it can respond constructively when delays occur (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

Specialist Capability Matters

The fourth-ranked position of specialist capability is consistent with the functional rationale of subcontracting. Main contractors use subcontractors partly because they possess specialised knowledge, labour, equipment or experience. The high ranking therefore indicates that capability matching is an important consideration.

Although the present dataset does not directly measure labour scarcity or geographic logistics, the prominence of specialist capability, technical expertise, staff and equipment indicates that organisational capacity is essential to practitioner evaluation (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

Quality and Safety Remain Core Concerns

Quality performance ranked fifth and safety consciousness ranked eighth. Both therefore occupy the upper tier of the ranking. This is important because a lower rank should not be interpreted as low importance. Every reported criterion falls within the extremely important category. Quality and safety can also operate differently from price in an actual procurement system. For example, critical safety or statutory requirements may appropriately function as mandatory thresholds rather than as variables that can simply be traded against a lower price (Abdul Razak et al., 2021; Olanrewaju et al., 2022).

Governance and Collaboration Should Not Be Omitted

Compliance with regulations or instructions ranked ninth, while relationship and cooperation criteria also received high RII values. These findings indicate that subcontractor capability is partly relational and organisational. A subcontractor may possess technical capability but still create project risk if it cannot coordinate with other trades, comply with instructions or participate in risk planning. Prequalification should therefore combine hard capability indicators with governance and collaboration indicators (Olanrewaju et al., 2022; Hartmann et al., 2009; Gajjar & Anderson, 2021).

Comparison with Malaysian Evidence

The Sarawak ranking demonstrates substantial conceptual convergence with Olanrewaju et al. (2022), whose Malaysian study identified expected completion date, financial capacity or stability, health and safety records, previous performance and tender price among its five leading criteria. In the Sarawak data, tender price ranks first, previous performance second and time third, while safety and financial stability remain highly rated but appear lower in the ordering. The convergence confirms the continuing relevance of these broad criteria across Malaysia, while the differences in ordering justify regional empirical investigation.

Theme	Sarawak G7 study	Olanrewaju et al. (2022)	Interpretation
Price	Rank 1; RII 0.940	Among top five	Consistently important.
Previous performance	Rank 2; RII 0.935	Among top five	Strong convergence.
Time	Rank 3; RII 0.930	Expected completion highly ranked	Schedule reliability shared priority.
Safety	Rank 8; RII 0.898	Health and safety among top five	Highly important, different relative position.
Financial capability	Work-size capacity rank 6; current stability rank 12	Financial capacity/stability among top five	Important but not the highest Sarawak priority.

International Positioning

The findings also complement the international literature. Hartmann et al. (2009) identified price as the most influential criterion in actual subcontractor choice in Singapore, followed by quality, cooperation and technical knowledge. Gajjar and Anderson (2021) emphasised past performance, experience, financial history, manpower and workload. The Sarawak results therefore sit within a broader international pattern in which commercial considerations coexist with evidence of technical and organisational capability.

The results also align with the recent shift toward performance-based selection. Bingol et al. (2024)

incorporated price, duration, quality, safety and other performance dimensions into a structured model, while Bingol et al. (2025) extended the problem toward multiobjective optimisation. The present study does not claim to provide such a decision model. Its contribution is to provide regional empirical evidence that can inform the criterion-selection stage of future models.

The present findings describe the perceptions of practitioners about the importance of criteria, rather than their causal or statistical predictive power regarding project success. A high RII suggests that respondents considered the criterion important when evaluating subcontractors. It does not in itself establish that subcontractors who perform well on that criterion then go on to deliver better cost, time, quality or safety outcomes. Thus, the current study should be considered as a study of priorities, not as a model for performance prediction. The establishment of predictive value would depend on project-level evidence linking prequalification information with observed subcontractor performance.

Practical Implications

The findings of this study can be converted into an actionable six-phase prequalification process for contractors evaluating prospective subcontractors. The suggested workflow aims to offer an organised method for implementing the 29 criteria recognised in the study, rather than considering each criterion as a separate checklist element. This is especially pertinent as the results suggest that the choice of subcontractors is multifaceted. Despite the tender price being deemed the most significant factor, the participants also attributed considerable importance to prior project performance, timely completion, specialised expertise, and quality outcomes. Consequently, a comprehensive prequalification procedure must evaluate both the financial appeal and the proven capacity of a subcontractor to execute the necessary tasks. The procedure must not supplant the expertise of the primary contractor. Conversely, it offers a reliable and clear foundation for the application of professional judgement, bolstered by documented proof. This aligns with the evolution of performance-oriented and systematic subcontractor selection methodologies documented by Bingol et al. (2024) and Bingol et al. (2025).

The first stage should establish whether the subcontractor satisfies the minimum statutory, contractual and regulatory requirements before more detailed evaluation is undertaken. The initial phase must determine if the subcontractor meets the essential legal, contractual, and regulatory criteria prior to conducting a more comprehensive assessment. This evaluation may encompass the confirmation of pertinent registration, licensing, contractual qualifications, insurance provisions, and other essential papers necessary for involvement in the project. The objective of this phase is to disqualify entities who cannot fulfill the essential criteria of the procurement procedure. It also averts the distortion of the future evaluation by juxtaposing technically or financially appealing subcontractors who may nonetheless be unsuitable to perform the task. In application, this phase need to function as a fundamental pass-or-fail threshold, with documentation preserved for auditing and further consultation. This methodology aligns with the extensive prequalification literature, acknowledging statutory adherence, organisational suitability, safety, and other essential criteria as vital components in evaluating contractors and subcontractors (Abdul Razak et al., 2021; Olanrewaju et al., 2022).

Upon confirming mandatory eligibility, the subsequent phase must assess if the subcontractor possesses adequate organisational and technical capabilities to execute the proposed task scope. The evaluation must take into account the magnitude and intricacy of the project, the subcontractor's existing commitments, specialised skills, technical proficiency, the presence of qualified staff, and the sufficiency of machinery and tools. This phase is crucial since a subcontractor could meet all official eligibility criteria yet still be deficient in the necessary resources to execute efficiently. The existing burden must be taken into account, as overwhelming obligations across many projects could hinder the subcontractor's capacity to dedicate adequate manpower, managerial focus, equipment, and financial resources to the new project. Prior research has likewise recognised experience, labour force, technical proficiency, workload, and specialised expertise as pertinent criteria in the selection of subcontractors (Gajjar & Anderson, 2021; Olanrewaju et al., 2022; Vo et al., 2021).

The third phase ought to emphasise tangible performance evidence instead of depending exclusively on data provided by the subcontractor. The contractor ought to evaluate finished projects that are similar in scope,

scale, intricacy, and technical specifications. Special consideration must be afforded to the quantity of analogous projects executed, the subcontractor's capacity to fulfill tasks within the stipulated timeline, its efficacy during the defect-liability phase, and its standing with former clients and contractors. These assertions should be substantiated by authentic project documentation, completion certificates, references, performance assessments, or other forms of evidence whenever feasible. This phase is especially crucial as the performance in prior analogous initiatives was among the top-rated factors in the current analysis. Prior studies suggest that historical performance serves as a significant predictor of a subcontractor's potential to succeed in forthcoming projects (Gajjar & Anderson, 2021; Olanrewaju et al., 2022). Contemporary performance-oriented methodologies likewise prioritise quantifiable metrics above complete dependence on subjective evaluation (Bingol et al., 2024).

The fourth phase must evaluate the subcontractor's capacity to uphold satisfactory quality and safety standards during project execution. Quality evaluation may encompass the subcontractor's quality-management systems, historical quality performance, methods for overseeing and rectifying substandard work, and its history of corrective actions. Safety evaluations must take into account safety awareness, historical safety performance, incident documentation, pertinent training, and insurance provisions. These elements must not be regarded solely as bureaucratic obligations, as inadequate quality and safety outcomes can lead to increased expenses, delays, rework, and damage to the primary contractor's reputation. The results of the current research corroborate this focus, with quality performance, standards, and commitment identified as essential criteria. The significance of safety-related factors is further corroborated by other studies on construction prequalification and contractor selection (Abdul Razak et al., 2021; Olanrewaju et al., 2022).

The fifth phase ought to assess the subcontractor's market appeal and financial viability. The evaluation must encompass bid pricing, fiscal soundness, payment behaviours, and adaptability concerning payment conditions. Crucially, the tender price need not to be seen as a definitive criterion for choosing the least expensive subcontractor. The current results indicate that tender price attained the greatest overall significance rating; yet, the proximity of prior performance, timetable reliability, expert capability, and quality rankings reveals that participants regarded many other factors as critically significant. A financially appealing proposal must be evaluated in conjunction with the subcontractor's capability and dependability. Monetary stability is of similar significance, since a subcontractor facing fiscal challenges may find it impossible to retain workforce, get supplies, manage machinery, or fulfill project obligations. Prior research has likewise recognised cost and financial capability as significant factors in the selection of subcontractors (Hartmann et al., 2009; Gajjar & Anderson, 2021; Olanrewaju et al., 2022).

The concluding phase must evaluate the subcontractor's capacity to collaborate efficiently with the broader project team. Construction endeavours necessitate ongoing engagement among the principal contractor, subcontractors, consultants, suppliers, and many specialised trades. Thus, mere technical proficiency may prove inadequate if a subcontractor is either incapable or disinclined to collaborate with other stakeholders in the project. The conclusive assessment must take into account prior collaborations, interactions and teamwork with other subcontractors, adherence to regulations, risk management proficiency, and openness to implementing suitable creative strategies. This phase allows the primary contractor to evaluate hazards that might not be entirely identified through financial or technical analysis. Investigations into subcontractor selection have likewise acknowledged collaboration, interpersonal dynamics, and overarching organisational traits as significant factors in selection processes (Hartmann et al., 2009; Gajjar & Anderson, 2021).

Collectively, the six phases offer a systematic assessment and screening procedure. The initial phase determines fundamental eligibility, whilst the subsequent stages assess the subcontractor's capability and demonstrated expertise to perform the task. The fourth phase examines quality and safety hazards, the fifth assesses commercial and financial viability, and the concluding step analyses collaboration and overarching project risks. This progression enables contractors to advance from fundamental compliance to more comprehensive assessments, hence minimising the likelihood of choosing a subcontractor based simply on a competitive bid. It additionally establishes a more transparent audit trail as the rationale for selecting or dismissing a subcontractor can be associated with established standards and proof.

Crucially, the six-stage workflow ought to be viewed as a decision-support framework instead than a strict mathematical selection model. The significance of specific criteria may fluctuate based on the type of project, size of the contract, technical intricacy, risk assessment, and the specialised characteristics of the subcontract package. Bingol et al. (2024) highlight the significance of performance-oriented methodologies, whereas Bingol et al. (2025) elucidate the treatment of subcontractor selection as a multi-faceted decision-making challenge including conflicting factors. The current workflow thus offers a pragmatic framework for the application of professional judgement, while allowing contractors the necessary freedom to modify the focus on certain criteria based on the unique conditions of each project.

The suggested workflow transforms the empirical results of the research into a functional prequalification system for G7 contractors in Sarawak. Its primary significance is in transitioning subcontractor selection from an informal or mostly cost-centric approach to a more methodical evaluation of qualifications, capacity, demonstrated performance, quality, safety, financial and commercial robustness, and collaborative potential. This is notably significant as the research indicated that all 29 factors were perceived as highly relevant by the participants, implying that successful subcontractor selection necessitates the evaluation of various aspects instead of depending on one predominant feature.

Phase	Purpose	Relevant criteria	Decision evidence
1. Eligibility screening	Confirm minimum statutory, contractual and regulatory eligibility before detailed assessment.	Compliance with regulations/instructions, relevant insurance and mandatory documentation.	Registration/licensing documents, insurance, statutory records, pass/fail compliance.
2. Capability and capacity	Determine whether the subcontractor has the technical and organisational resources for the proposed scope.	Specialty; ability to undertake work size, technical expertise, current workload, staff, machinery/equipment, labour-force retention, duration in business, reputation.	Organisation profile, staff/equipment records, workload statement, specialist credentials.
3. Previous performance	Assess demonstrated performance on comparable projects.	Previous similar projects, project scale, number completed, completion on time, defect-liability/warranty performance, cooperation.	Completion records, references, performance assessments, programme records, defect/warranty history.
4. Quality and safety	Evaluate the subcontractor's ability to manage workmanship and site safety risks.	Quality performance; remedial-work monitoring, safety consciousness, site safety records, insurance.	QA/QC records, corrective-action records, safety statistics, training/incident records.
5. Commercial and financial review	Assess commercial competitiveness and financial capacity without treating low price as an automatic selection rule.	Tender price, current financial stability, payment flexibility, prompt payment to labour, work-size capacity.	Tender comparison, financial information, payment history and commercial assessment.
6. Collaboration and project risk	Assess the subcontractor's ability to work constructively within the wider project team and manage emerging risks.	Relationships, cooperation with other subcontractors, flexibility in resolving delays, risk planning, creativity/innovation.	References, coordination history, risk register/plan and documented professional judgement.

The empirical results are translated into a practical assessment sequence through a six-phase workflow, avoiding the use of RII values as universal decision weights. The sequence allows contractors to begin by establishing key eligibility requirements and then evaluate capability, past performance, quality, safety,

commercial capacity and collaboration in a step-by-step approach. The emphasis placed on individual criteria may be adjusted according to project type, contract value, technical complexity and risk profile.

Theoretical And Empirical Contributions

The theoretical contribution lies in reinforcing the multidimensional conceptualisation of subcontractor prequalification. The evidence shows that practitioners simultaneously recognise commercial, performance, temporal, technical, quality, safety and governance considerations. This challenges an overly narrow conceptualisation in which subcontractor selection is treated primarily as a price comparison exercise. The study also contributes to context-sensitive understanding of subcontractor selection. Previous studies demonstrate broad convergence in the types of criteria considered important, but the Sarawak ranking shows that their relative priorities can vary. This supports the proposition that subcontractor-selection frameworks should be sensitive to contractor profile, regional construction conditions and project characteristics.

Empirically, the study provides evidence from 182 valid practitioners associated with G7 construction companies in Sarawak. The findings establish a clear priority pattern led by tender price, previous similar-project performance, completion on time, specialist capability and quality performance. The study therefore adds regional evidence to the Malaysian subcontractor prequalification literature. A further contribution is the demonstration that high importance should not be confused with high rank. All reported criteria are classified as extremely important, meaning that criteria appearing lower in the ranking should not simply be discarded. Instead, the ranking can guide the intensity of scrutiny and the design of mandatory versus weighted criteria.

The study provides a criterion and priority foundation for subsequent research. Future researchers can validate the criterion structure, establish statistically defensible weights and examine whether the criteria predict actual project outcomes. This creates a logical progression from practitioner perception, to validated measurement, to performance-based decision support.

Limitations

This study has some limitations. First, the sample was restricted to the practitioners who are affiliated with the G7 construction companies in Sarawak. The findings should not, therefore, be automatically generalised to smaller contractor grades, other Malaysian states or international construction markets where organisational characteristics, project conditions and procurement practices may differ.

Second, the study measured perceived importance rather than actual subcontractor or project performance. The RII findings show what criteria practitioners consider important, but they do not show that these criteria statistically predict project cost, time, quality or safety outcomes.

Thirdly, the analysis was largely descriptive. The study did not test for causal relationships and statistically confirmed whether the seven dimensions are different latent constructs. The 29 criteria should thus be considered as an empirically prioritised set of criteria, rather than a validated measurement scale.

Finally, the concentration of responses at the high end of the five-point scale suggests a possible ceiling effect. The RII values are relative ranks and the small differences between some of the highly ranked criterion should be interpreted with caution. Alternative measurement designs and project level performance data should be included in future research to improve discrimination and establish predictive validity.

Future Research

Future research should first validate the criterion structure using a larger and more diverse sample. Comparative research involving G5, G6 and G7 contractors could determine whether contractor grade influences the importance assigned to price, performance, quality, time, safety and capability. Comparative studies between Sarawak and Peninsular Malaysia could further establish whether regional differences exist.

Second, research should move from perceived importance toward actual project outcomes. Project-level data could be used to examine whether subcontractors with stronger previous-performance records experience fewer delays, lower defect rates, fewer safety incidents or better cost outcomes. Such research would distinguish criteria that practitioners perceive as important from criteria that demonstrate predictive value.

Third, the criterion set can be incorporated into a multi-criteria decision-making framework. AHP could be used to establish relative weights, TOPSIS could rank subcontractor alternatives, while grey-system or evidential-reasoning methods could address uncertainty. The performance-based work of Bingol et al. (2024) demonstrates the potential of this direction.

Fourth, future research should investigate project-specific weighting. High-rise buildings, infrastructure projects, industrial facilities and specialist engineering projects may require different priorities. Technical capability and safety may be particularly important for high-risk specialist packages, whereas financial capacity and schedule reliability may become more prominent where cash-flow and programme constraints are severe.

Fifth, qualitative interviews with project managers, quantity surveyors, engineers and senior management could explain why the highest-ranked criteria received their positions. Such evidence would complement the numerical ranking and provide deeper understanding of the decision-making mechanisms. Finally, environmental and sustainability criteria could be incorporated into an extended framework. This would align subcontractor selection with emerging multiobjective approaches that consider environmental performance alongside cost, duration, quality and safety.

CONCLUSION

This study examined subcontractor prequalification priorities from the perspective of G7 construction practitioners in Sarawak, Malaysia. Using 182 valid responses and a literature-informed framework described in the source study as containing 29 criteria across seven dimensions, the analysis demonstrates that subcontractor prequalification is regarded as highly important. The reported ranking places tender price first, followed by performance in previous similar projects, completion of the project on time, specialty in a specific type of work and quality performance with standard and commitment.

The findings provide an important qualification to a price-centred view of subcontractor selection. Although tender price is the highest-ranked criterion, the next four priorities concern previous performance, schedule reliability, specialist capability and quality. This indicates that practitioners recognise the need to balance commercial attractiveness with evidence of delivery capability. Safety, compliance, financial stability, resources, relationships and risk planning also remain highly important even where their relative rankings are lower.

The principal contribution is a Sarawak-specific empirical priority structure that can support more transparent and systematic subcontractor prequalification. The study should not be interpreted as establishing causal relationships with project success or as producing universal decision weights. Its strongest value is as a regional evidence base for the next stage of research: validating the criteria, linking them with observed subcontractor performance and developing a context-sensitive multi-criteria decision-support model.

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The authors remain fully responsible for the accuracy, originality, interpretation and integrity of the research, including the research design, data collection, data analysis, findings, discussion, conclusions and references. All AI-assisted content was reviewed and critically evaluated by the authors before inclusion in the manuscript. The authors also verified the relevant references and research findings against the original sources. AI tools were not used to generate, fabricate or manipulate the research data, statistical results or empirical findings. The final manuscript reflects the authors' own academic judgement and interpretation of the research findings.

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