Research Article

Analysis of Facility Condition Assessment Practice: Facility Managers Hiring Preferences of AEC Service Providers

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ABSTRACT

Facility Condition Assessments (FCA's) in the facility management (FM) profession is a growing area of research. However, the study of who is providing FCA services in the facility management profession has largely not been explored. Thus, this research aims to identify a current state of academic research and industry standards on FCA service providers and AEC stakeholders, which AEC service providers conduct FCA's and how FCA service providers are selected. A study consisting of 303 decision makers in the facility management profession identified which Architects, Engineers and Construction (AEC) service providers are conducting FCA's, hiring preferences of FCA service providers, how FCA projects are procured and awarded and limiting factors to conduct an FCA with in-house personnel. The results of the study identify an industry trend to outsource FCA services to a multi-disciplinary team of AEC professionals, with experience conducting FCA's as a primary hiring preference. Globally, this is the first study of its kind to identify who FM's are hiring to provide condition assessments in facilities or buildings. This research contributes to the body of knowledge by taking the first step towards providing owners and or operators considerations regarding varying service providers when deciding to pursue an FCA project. Further, the apparent lack of asset organization methods, standards and guidelines used in the practice of FCA's in the FM profession presents an opportunity for future research efforts.

Keywords: facility condition assessment; property condition assessment; facility engineering management; architectural engineering

Introduction

Many FM's simply do not have the time and or labor resource pool to conduct a large scale Facility Condition Assessment (FCA). For this reason, outsourcing of FCA services may be an attractive project delivery method. An FCA team can be comprised of stand-alone or combination architectural, engineering and or asset management firms. The topic of FCA service providers' selection criteria and evaluation is not well researched and there are limited literature sources.

Outsourcing of FCA's can prove useful depending upon the purpose or strategic vision of the organization. For example, if the organization is considering using condition assessment results to develop a facilities master plan, the utilization of an FCA team that includes architects could be of value. However, careful consideration should be given based upon recommendations from an architecture firm as overall findings could be motivated by business development efforts. Specific system evaluators, such as a roof consultant should be included in the assessment team so that assumptions are not made about remaining useful life.

The aim of this research is to: 1.) identify which professional services are performing condition assessments of buildings or facilities; 2.) determine what criteria FM's feel is important in the selection of an FCA service provider; 3.) evaluate and rank which credentials, licensure or certifications FM's feel are valuable for conducting an FCA; 4.) Recommend further areas of research.

Background and Literature Review

This section identifies literature review search methods used in this study, which included a review of existing research on facility condition assessments service providers to conduct or support the practice of FCA's.

Search keywords "facility condition assessment service providers", facility condition assessment engineering, facility condition assessment architecture" were used in Google Scholar, Emerald, Taylor and Francis and Elsevier search databases. The literature search identified a scarce presence of facility condition assessment research in reference to FCA service providers. Comparatively, a search of industry books, standards and guidelines was performed to identify stakeholders who provide FCA's to the facility management profession.

TABLE 1.—FCA Service Provider Narratives in Literature Review

Reference	FCA Service Provider Narrative
ASTM (2015)	ASTM refers to condition assessment service providers as consultants who may or may not possess professional architectural or engineering designations.
Bartels (2014)	A facility condition assessment is generally conducted by a multi-disciplinary team of architects and engineers, working closely to receive valuable input from local facility engineering staff members.
IFMA (2008)	A detailed facility condition assessment typically involves an assessment team of three professionals (architect, mechanical engineer, electrical engineer) and depend upon robust, scalable methodologies to assure accurate and consistent information.
Lewis & Payant (2000)	Condition assessments are best done by architectural-engineering (A-E) firms. Most large firms are staffed to conduct these assessments but require a clearly defined scope of work, otherwise expectations by facility manager will not be met.
Roper & Payant (2014)	Almost all architectural-engineering (A-E) firms have the FCA capability and many niche consultants offer the service.
RICS (2020)	Undertaking an investigation of a large building can involve the need for several different consultants, each covering their specific area of expertise. It is unlikely that a single consultancy will be able to provide all disciplines required.

Purpose and Value of FCA's

Previous research reviewed condition assessments literature (Hillestad, et. al 2021). 94 various sources of literature were mapped to various purpose themes based upon content presented. Results indicated that FCA's are used to increase knowledge of assets within an organization, with special emphasis related to strategic capital renewal or budget planning. Hillestad also found the practice of FCA's assists in determining capital funding allocations within organizations.

FCA Service Providers

Various service providers in AEC professions are practicing facility condition assessments. ASTM (2015) suggests that a single individual will not have knowledge, expertise or experience with all building codes, building systems and asset types and therefore should be an individual having general, well-rounded knowledge of pertinent building systems and components. In lieu of one individual, an integrated team of facility professionals could address specific attention to particular systems or assets for the organization. For example, if a building built prior to 1970 is being assessed and the owner would like to include an asbestos assessment, likely a specialized service sub-consultant could be of value to the overall condition assessment report. It is likely that a large presence of asbestos in the building would result in higher project costs due to remediation efforts. Thus, specificity in assessment team composition by facility managers could increase accuracy of customized cost estimates that aligns with organizational purpose and use of FCA results. RICS (2020) suggests specialist subconsultants should be determined by the lead consultant or directly by the client who is requesting FCA services. In most cases, the selected FCA service provider will indirectly select subconsultants based upon an initial client interview to customize scope.

Bartels (2014) argues the typical facility assessment team should consist of Subject Matter Experts (SME's) as well as their respective facility component responsibility areas for the assessment. In other words, roof or enclosure engineering firms should be performing the assessment of roof condition and likewise electrical engineering firms should be addressing condition of electrical distribution equipment such as motor control centers, transformers, distribution panels and automatic power transfer switches. Bartels (2014) also presents a responsibility matrix aligned with ASTM 1557 Uniformat II building classification system.

Regardless of who is performing FCA's, knowledge barriers exist. Alam (2019) suggests that conflicting advice from professionals regarding the best way to renovate or propose energy retrofits lead to skepticism amongst the consumer (or facility manager). There appears to be a research gap in criteria for a facility manager to evaluate and select an FCA service provider.

TABLE 2.—Example Responsibility Matrix

Architect or Subject Matter Expert	Mechanical Engineer	Electrical Engineer
• A-10 Foundations	D-10 Conveying	D-50 Electrical
• A-20 Basement Construction	D-20 Plumbing	
• B-10 Superstructure	D-30 HVAC	
• B-20 Exterior Enclosure	D-40 Fire Protection	
• B-30 Roofing		
• C-10 Interior Construction		
• C-20 Stairs		
• C-30 Interior Finishes		

Source: Bartels, 2014

Architecture Firms

Winters (2003) states that facility managers are often put into the position of selecting and negotiating contracts for architecture services. Conceptual solutions for projects resulting from FCA findings could be delivered through an architectural services provider. The evaluation of space utilization in conjunction with the facility condition assessment could yield the participation of an architect to facilitate proposed conceptual solutions for an organization. Other programmatic considerations could be identified and prioritized as part of deliverables.

Winters (2003) suggests that some owners have projects which contain beautiful details but fail as buildings and facility managers must impress upon the architect the importance of functionality. While architecture firms

specialize in space utilization planning, interior finishes and aesthetic looks which are all important facility functions, there must also be an equal effort towards operational and functional building systems performance of assets. A key limitation that may be present with the selection of a stand-alone architecture firm is operational and specific requirements of MEP systems relative to efficiency, maintenance, serviceability, and asset optimization.

Engineering Firms

As suggested earlier in this literature review, significant opportunity exists to align FCA proposed solutions with energy retrofit projects and engineering firms may be best positioned to represent this opportunity. Mechanical, electrical and control commissioning engineers offer services that can align asset replacement solutions to operational cost savings.

Capital Planning / Asset Management Firms

Hillestad, et. al (2021) mapped the key purpose of an FCA via literature review. In this research, the use of FCA's to make capital planning decisions was a lead factor / reason to conduct the FCA. Limited research has been performed on evaluating owner value of asset management or capital planning firms to the practice of FCA's. Given that an FM best practice is to align FM functions with organizational strategy, this area of research affords unique perspective and warrants consideration.

Specialty FCA Firms

A key finding in the literature review associated with this study is consistent mention of a multi-disciplinary approach to FCA service delivery. Specialty FCA firms that integrate architecture, engineering, capital planning, asset management and energy engineering may be best positioned to appeal to facility managers as the next generation of FCA practice emerges.

Specialty Consultants

Further clarifying of FCA project team members roles reveals the need for specialty consultants to address customized needs for organizations. RICS (2020) details that an asbestos / environmental engineer, a fire protection engineer, a materials testing specialist, a building façade engineer, a drainage contractor (or civil engineer) and a structural engineer be a part of the assessment team.

Regardless of who is performing FCA services, a critical specification is to align the asset data hierarchal standard for the FCA report with existing asset management systems for ease of data and or results migration for continuous use after the FCA is complete. Mayo and Karanja (2018) found no specific standard for facility condition assessment reporting in their research effort centered on building condition methods and metrics.

In conclusion, the literature review indicates gaps in facility condition assessment research associated with selection of FCA service providers. 1.) identification of a standard to identify and select an FCA service provider; 2.) Evidence of previous research efforts to validate who facility managers selected to conduct an FCA; 3.) What credentials, qualifications or certifications could be part of an evaluative procedure to select an FCA service provider.

Research Method

The research method for this study involved a mixed-methods design, considering both qualitative and quantitative approaches. First, a literature review of existing research, books, industry standards and industry guidelines was conducted. Then, an FM panel of 12 subject matter experts was used to develop qualitative themes to research questions. These questions were then further developed and deployed via a national survey to facility managers and key decision makers in the FM profession for quantitative validation. Research question 1 was answered as part of the literature review.

FM Panel

A subject matter expert panel of facility managers and key decision makers in the facility management profession was assembled to validate themes found in literature, books, industry standards and industry guidelines. Interviews with 12 FM professionals contained two main criteria. The first criterion was a minimum of 5 years' experience in a senior level FM position. The second criterion required participants to have completed an FCA in the past 5 years for their organization.

National Survey

Using feedback from the FM panel, a pilot study was conducted and a final survey was created with the assistance of the Ira A. Fulton School of Engineering at Arizona State University. The pilot study aimed to obtain feedback on survey clarity, content and ease of use in order to further refine the final survey for nationwide distribution.

The survey was organized into various sections. The first section focused on participant background including participant title of position in the organization, how many cumulative years in an administrative role in the facility management profession and total number of employees and or occupants serviced by the organization's facility management department. The second section focused on the 2nd research aim, asking participants who performed their FCA and what prevented the participant's organization from conducting the FCA with in-house personnel. The third section asked participants what type of solicitation method was used for the FCA. For this study, request for qualifications (RFQ) and request for proposal (RFP) was selected as procurement methods as these are common to facility management outsourcing. The fourth and final section asked how important specific criteria was in the selection of the FCA service provider.

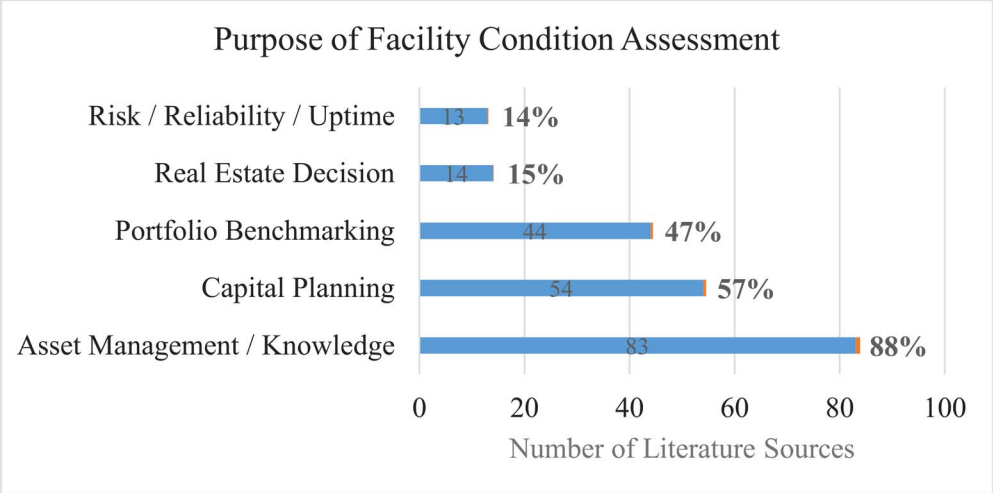

FIGURE 1.—Purpose of a Facility Condition Assessment Source: Hillestad, et al (2021)

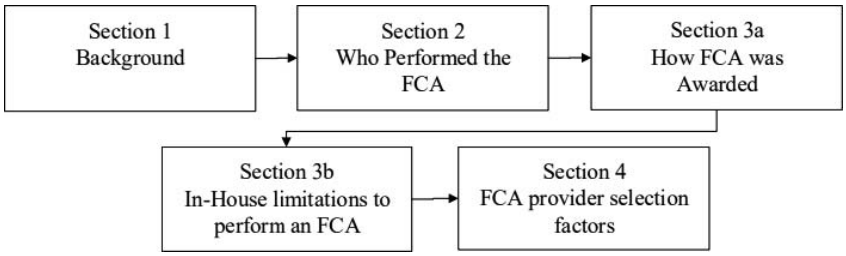

FIGURE 2.—Survey Instrument Design

The national survey was distributed to facility managers and FM leadership positions across various FM sectors. The research team assembled 4,237 email addresses of facility management leadership positions across 7 sectors of the facility management industry. These email addresses were sent a Qualtrics link of the survey, which was left open for one month to collect responses. Some of the email addresses were invalid or individuals had left the organization. This left 4,090 potential participants of which 380 respondents opened the survey. Additionally, a LinkedIn post with an anonymous survey link yielded 59 responses. A total of 439 facility management leadership positions responded to the survey. The first question asked if respondents had made decisions with FCA results, participated or reviewed results of an FCA or if they had not participated in an FCA. The survey ended for those answering no to any FCA participation, which left 356 participants. 303 respondents continued on and participated in remaining research questions associated with this study.

Findings & Results

There were four sections within the survey (Figure 1) and results are organized by each section.

Section 1: Background

The questions in the background section of the survey aimed at gaining insight from participants on their position and how many cumulative years of experience they possess within the facility management profession. The first question asked participants to identify their current position title in the organization. The goal of this question was to determine at which level in the organization decisions are made regarding an FCA.

The second question in this section asked participants how many years of cumulative experience they possess in order to analyze if decisions are made at varying levels of experience in the profession. In this study 77% of respondents indicated they possess at least 10 years of experience in the FM profession, indicating that experience does play a significant role in FCA decision making.

Section 2: Who Performed the FCA

In this section, participants were asked which AEC stakeholder participated in their FCA. The list of options for participants to choose from was derived from the FM panel and pilot study performed. Participants were allowed to select more than one option. Of 303 responses to this question, 71 participants (23%) identified two or more of these stakeholders as part of their FCA delivery method. An interesting finding from this question is the level of in-house participation, indicating an FCA approach should be inclusionary with the facility management department.

Section 3: How was the FCA Awarded

The goal of questions in this section was to collect data targeted at how the facility manager or key decision maker in the organization obtained the service provider for the facility condition assessment. Variables were selected based upon a review of existing literature and interviews with subject matter experts earlier in the study. Results indicate a surprisingly large representation of FCA services procured by the method of sole-source or negotiated with a single firm. Upon further review of responses, we found re-assessments or a continuation of FCA services from previous FCA work was a leading variable in single source procurement.

This study aimed to better understand what limiting factors prevent in-house personnel from completing an FCA project. Variables were chosen based upon feedback from the FM panel and the pilot study. Results indicate that FM professionals choose to outsource FCA services due to a lack of time, personnel or resources (51%), a lack of internal expertise and experience needed to perform an FCA (45%). Strategically, FM's elect to outsource FCA's to remove bias through the use of an independent, 3rd party review (41%). Other factors noted in the study that contributed to outsourcing FCA services included; political reasons within the organization, the FCA was provided by another stakeholder in the organization and the FCA service provider was selected without any inclusion from the facility manager or facility management department.

Section 4: What Factors Influenced Selection of FCA Provider

In this section, participants were asked what credentials, qualifications or certifications do FM owners and operators look for when selecting FCA service providers. Participants scored all four options presented important to highly important when evaluating who to select to conduct their FCA, with experience conducting FCA's as the most prominent factor. This is consistent with results from the FM panel and pilot study.

The second question in this section asked which licensure or certifications would be valuable in conducting an FCA. 91% of responded agreed professional engineer licensure is valuable in conducting an FCA.

Discussion

Results of this study revealed participants that make FCA decisions (77% of participants) possessed at least 10 years of FM experience, indicating that experience in the profession plays a role in who makes decisions associated with FCAs in the organization.

It appears that organizations are conducting FCA's with in-house personnel as 78 respondents (26%) indicated that FCA services are performed in-house with no participation from outsourced FCA service providers. Interestingly, participants noted significant barriers that limit the ability for FCA's to be conducted with in-house personnel. 51% of respondents identified that their department or organization did not possess enough time, personnel or resources for an FCA effort. Similarly, 45% responded that their in-house personnel did not possess enough expertise or experience with the practice of FCA's. 41% of participants agreed that the use of an independent, 3rd party assessor aids in removing bias or blind spots from an in-house FCA delivery method.

When FCA services are outsourced in the FM profession, a multi-disciplinary approach is popular, which supports findings from the review of literature. (ASTM, 2015; Bartels, 2014; IFMA, 2008; RICS, 2020). Organizations that receive FCA services tend to maintain a relationship with that provider, as evidenced by survey results where organizations have awarded work via single source or negotiated with a single firm. This logic is understandable, as once data is collected on assets, an existing inventory and analysis can be revisited on a reoccurring basis for expedited re-assessment work. In addition, knowledge acquired during initial assessments can be valuable in profitability for FCA service providers as arguably a more condensed scope is associated with a re-assessment than an initial assessment where limited information is available.

This study produced interesting findings with facility manager perceptions of which licensure or certifications are valuable with the practice of FCA's. While professional engineers (1st) and registered architects (2nd) ranked highest, the 3rd most valuable certification is the Certified Facility Manager (CFM) by IFMA. The CFM, which requires successful demonstration of knowledge and expertise in facility management, may be most closely identified as a desirable FCA qualification as it combines multiple discipline areas into a body of knowledge that connects facility management to organizational objectives. Topic areas relevant to the practice of FCA's include communication, finance/business, operations/maintenance, performance/quality, risk management, project management, facility information management, sustainability, leadership/strategy and real estate (IFMA, 2021).

The main limitation of this study is that only facility executives in the United States of America were utilized. Therefore, the results of this study are not representative globally. Thus, results of this study may be different in other parts of the world. Another limitation is the sample may not be generalized by of all decision makers in the facility management field and specificity of the sample is acknowledged.

This study took the first step forward in identifying how FCA services are delivered in facility management organizations. Future recommendations for research on this topic are abundant due to the lack of academic research on FCA practice in the FM profession.

Recommendations for Future Research

Further research could explore frameworks that detail how to conduct an FCA and standardization methods for the practice of facility condition assessments in the built environment. There also seems to be a need for the

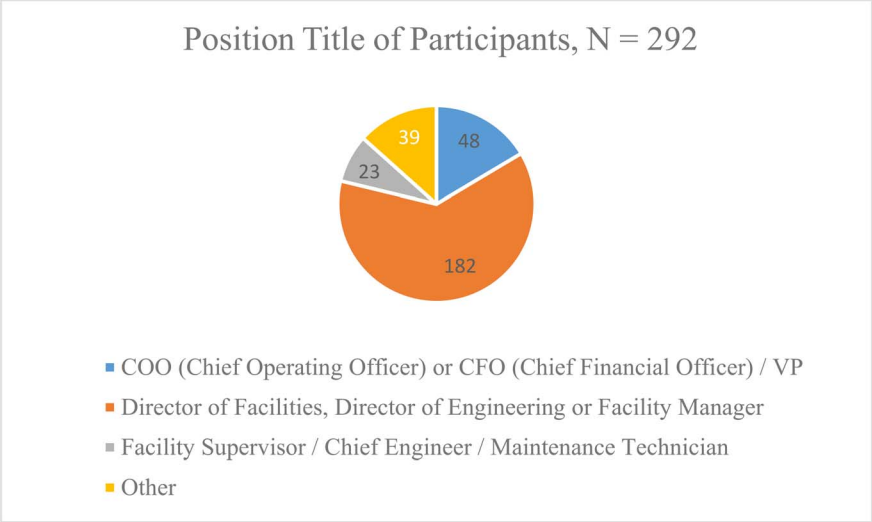

FIGURE 3.—Position / Title of Participants

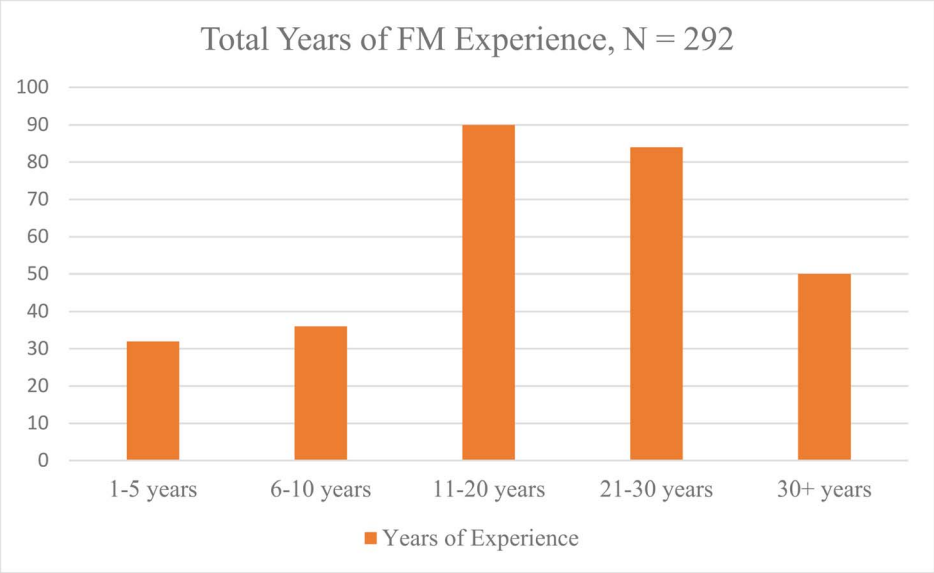

FIGURE 4.—Participants Total Years of FM Experience

TABLE 3.—Value of licensure or certifications to conduct an FCA, N=165

Licensure / Certification	Issuing Entity	Total Count	Rank
Professional engineer	National Society of Professional Engineers (NSPE)	151	1
Registered architect	American Institute of Architects (AIA)	90	2
Certified facility manager	International Association of Facility Management (IFMA)	71	3
Commissioning professional	Various entities – ASHRAE, BCxA or equivalent	67	4
Certified energy manager	Association of Energy Engineers	50	5
LEED AP	United States Green Building Council (USGBC)	34	6
Other		6	7

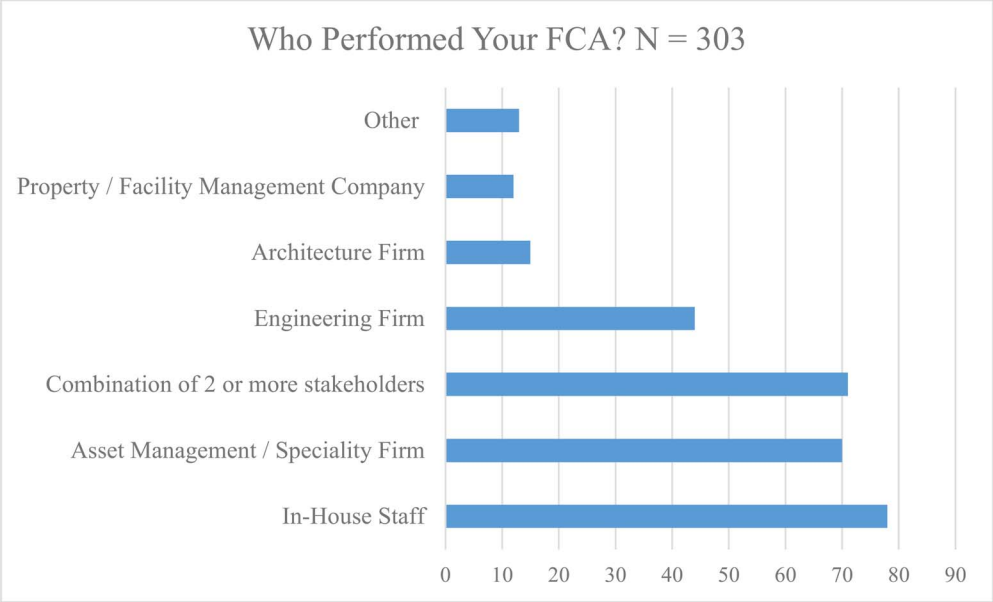

FIGURE 5.—FCA Provider Selection

identification of information requirements within an FCA bidding document (RFQ, RFP or other) in an effort to establish leveled comparisons of proposals for FCA provider selection. This framework may assist in lowering overall costs associated with performing an FCA as service providers can use this information as part of their FCA process and limit the creation of new work. Data from facility managers on whether or not they specified an asset data hierarchy standard in their information requirements within an FCA could further explore standardization themes.

Other future research could include:

- A closer look at asset organization standards and practice of facility managers
- Inputs and outputs of FCA practice
- Study that evaluates various standards and guidelines for an integrated FCA delivery method for the facility management profession
- Influence of biases of in-house personnel with in-house FCA delivery methods
- Selection criteria of an FCA provider
- Strategy of communicating FCA results
- Re-assessment practices or protocol

Conclusion

This study aimed to take the first step in establishing evidence of FCA practice in the facility management profession. 303 participants identified that asset management, specialty FCA firms, architecture firms and engineering firms are practicing FCA's. When outsourced,

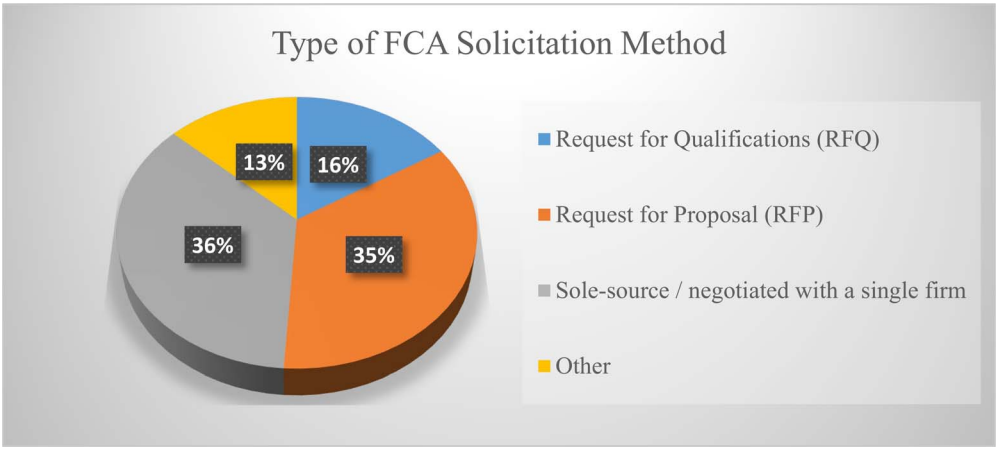

FIGURE 6.—FCA Solicitation Method

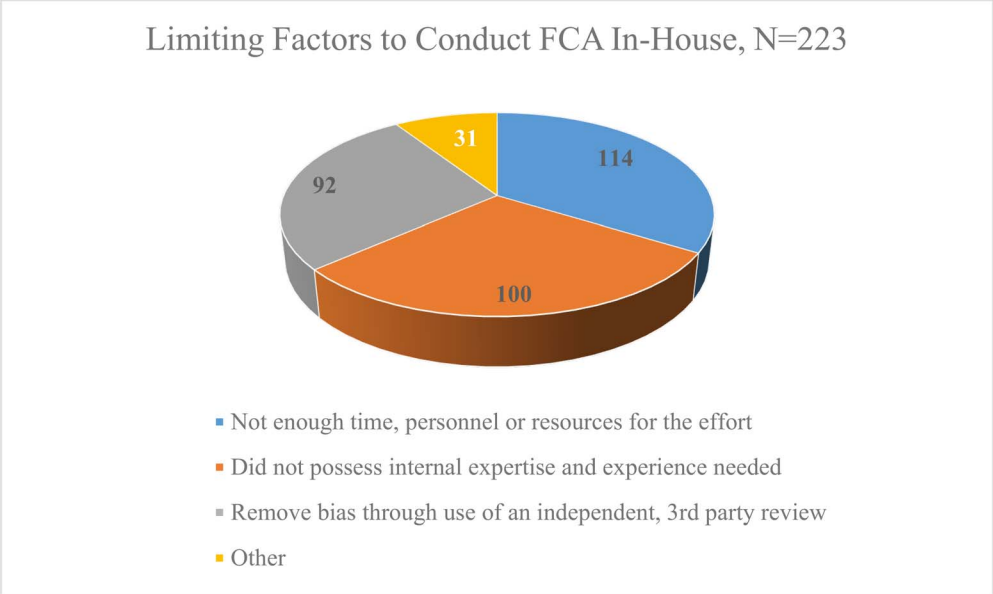

FIGURE 7.—In-House Limitations to Conduct an FCA

respondents agreed that experience conducting FCA's (96%), overall cost (90%), professional licensure or certifications (89%) and guidance of an industry standard (84%) are highly important when selecting an FCA service provider. This study revealed that participants identified the top three licensure or certifications of value with FCA practice are professional engineer, registered architect and the certified facility manager credential. Further research opportunities include analysis of asset organization standards, key inputs and key outputs of FCA practice.

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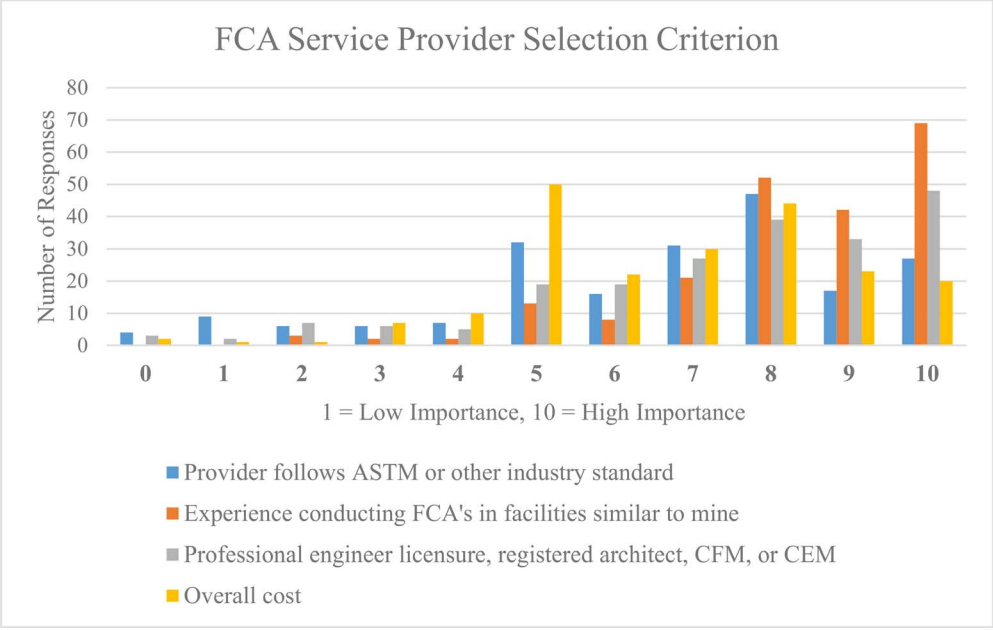

FIGURE 8.—Service Provider Selection Criterion

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