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Impediments to FM Professionals' Engagement at the Design Phase of a Building

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Abstract:

Despite extensive documentation of the benefits of involving FM professionals at the design stage of a building project in the literature, there are still a number of barriers to their participation. This study thus sought to investigate the perception of built-environment professionals in Lagos State of the impediments to the engagement of FM professionals. Three hundred and forty questionnaires were distributed to builders, engineers, architects, and quantity surveyors in the study area, and a response rate of 78 percent was obtained. The Mean and Kruskal-Wallis test were used to analyse the data, and tables were used to present the findings of the analyses. The outcome of the analysis using mean shows that all the built-environment professionals agree that the major impediments to the engagement of FM professionals at the design stage of a building project are: the belief that FM professionals are required only when construction is complete (mean=3.69), non-awareness of the advantages gained by engaging them at the design stage (mean=3.67), and discord between FM specialists' professional judgment and the client's desires (mean=3.57). Moreover, the results of the Kruskal-Wallis test indicates that there is no significant difference in the mean of the built-environment professionals. The study concluded, among other things, that FM professionals need to work hard to establish a presence within the built environment that will demonstrate their significance, if they want to succeed in today's fiercely competitive market.

Keywords: Built-environment, FM professionals, Impediments, Project design, Nigeria

1.0 Introduction

The field of facility management (FM) dates back to the 1970s. It is a profession committed to ensuring and upholding the built-environment's sustainability, comfort, and functionality. FM professionals are the individuals tasked with discharging these responsibilities. They are responsible for more than just basic maintenance (such as security and cleaning), they now have a significant impact on how building projects are planned and carried out (Engstrom, 2021; Eguare, 2022). Therefore, removing them from the design and construction processes could result in costly consequences in future. Clients should bring FM professionals to the table as soon as possible to ensure building sustainability. They ought to take part in pre-construction meetings when issues that may have an effect on the project's design, layout, materials, and other aspects are discussed (Engstrom, 2021).

The effectiveness of FM professionals depends critically on their ability to have access to information, which is also a crucial factor in determining how they make decisions concerning facilities. Therefore, they must be aware of the types of systems in use, the range of components, and their locations or positions within the facility, among others (Aldowayan, Dweiri and Venkatachalam, 2020). These can be readily achieved if they are on board at the early stage of a building project. According to Smith (2021) and Engstrom (2021), the duties of FM professionals at the design stage include conducting inspections and quality checks, reviewing designs, ensuring that buildings are not too expensive and are easy-to-maintain, assisting with the selection of finishes and equipment, as well as overseeing installations. Alhammadi (2019), Neuman (2015) and Attobrah, Asante, and Attah (2021) added that FM professionals ensure end-user satisfaction, appropriate

design and equipment selection in terms of maintainability and building performance over the course of the building's life. In the opinion of Wang, Wang, Wang, Yung, and Jun (2013), their engagement from the early design stage may be able to minimise maintenance requirements during a facility's operational phase. The authors emphasised that early FM adoption will help to reduce the number of significant repairs and modifications that would otherwise be required during the operational phase. To support this point of view, Abeydeera, Karunasena, and Hussain (2017) emphasized that when FM professionals join in the design process, it enhances the probability of delivering a durable project with reduced operating and maintenance costs.

In view of the foregoing, it is obvious that the advantages of engaging FM professionals at the design stage of a building project are substantial and well-documented in literature (Wang *et al.*, 2013; Razaq, 2015; Kalantari *et al.*, 2017; Olunwa, 2018; Alhammedi, 2019; Bako, 2020; Ashworth, 2020; Smith, 2021; Engstrom, 2021; Attobrah, Asante, and Attah, 2021). There are also other research efforts that focused on the hindrances to FM professionals' participation at the early stage of building design (Elmualim, Shockley, Valle, Ludlow, and Shah, 2010; Ahmed, 2012; Tladi, 2012; Elmualim, Valle, and Kwawu, 2012; Abeydeera, Karunasena and Hussain, 2017; Ashworth *et al.*, 2020; Bako, 2020; Smith, 2021). Despite the volume of research efforts on FM professionals' neglect at the design stage, there is little or no record of contributions

from the Nigerian context; consequently, there seems to be a paucity of research in this area in Nigeria. This study thus seeks to fill this gap. Taking this into account, this research, in a bid to get first-hand information, focused on the built-environment professionals in Lagos State to ascertain what they believe to be the reason why FM professionals are often not considered in the design phase of a building.

2.0 Literature Review

Impediments to the engagement of FM professionals at the design stage are those factors that are hindering them from being part of a design team. Some of these factors include an alleged lack of skills necessary to add value in the design process (Hakkinen and Belloni, 2011; Gleeson and Thomson, 2012), lack of understanding about sustainable buildings (Gleeson and Thomson, 2012; Hakkinen and Belloni, 2011), conviction that FM professionals are required only when construction is complete (Ahmed, 2012; Tladi, 2012) and a belief that FM professionals have a low level of understanding about basic information required to implement sustainability policies (Elmualim, Valle and Kwawu, 2012).

From existing literature, some of the prominent impediments to the engagement of FM professionals at the design stage are identified and summarised in Table 1.

Table 1 Impediments to FM Professionals' Engagement at the Design Stage

S/N	Author(Year)	Impediments
1	Finch and Clements-Croome (1997); Ahmed (2012); Tladi (2012)	The conviction that FM professionals are required only when construction is complete
2	Finch and Clements-Croome (1997); Brown and Pitt (2001); Elmualim <i>et al.</i> (2010); Häkkinen and Belloni (2011); Gleeson and Thomson (2012); Elmualim <i>et al.</i> (2012)	The conviction that FM professionals lack the skills necessary to add value in the design process
3	Finch and Clements-Croome (1997); Elmualim <i>et al.</i> (2010)	Non-awareness of the advantages gained by engaging FM professionals at the design stage
4	Bako (2020); Smith (2021)	FM professionals are reputedly inflexible over compliance issues with respect to FM operations
5	Bako (2020)	Discord between FM specialists' professional judgment and the client's desires
6	Enoma (2005); Elmualim <i>et al.</i> (2010); Häkkinen and Belloni (2011); Gleeson and Thomson (2012)	The conviction that the involvement of FM professionals will lead to a greater cost of construction

It is clear from the aforementioned literature review that earlier studies looked at the hindrances to the engagement of FM professionals at the design stage. To the author's knowledge, no analogous study has been carried out in Nigeria. Therefore, to expand the compendium of knowledge in the field of FM in the Nigerian context, it is necessary to carry out research of this nature.

2.1 Conceptual Framework

A conceptual framework (see Figure 1) was developed for the current study based on the results of the literature review in the earlier section of this paper. In particular, the development of the conceptual framework was informed by prior studies (Ahmed, 2012; Tladi, 2012; Gleeson and Thomson, 2012; Elmualim *et al.*, 2012; Bako, 2020; Smith, 2021). On the basis of these research

efforts, this framework suggests that the factors impeding FM professionals from joining the design team at the outset of a building project are as follows: the conviction that FM professionals are required only when construction is complete, discord between FM specialists' professional judgment and the client's desires, conviction that FM professionals lack the skills

necessary to add value in the design process, non-awareness of the advantages gained by engaging FM professionals at the design stage, FM professionals are reputedly inflexible over compliance issues with respect to FM operations, and conviction that the involvement of FM professionals will lead to a greater cost of construction.

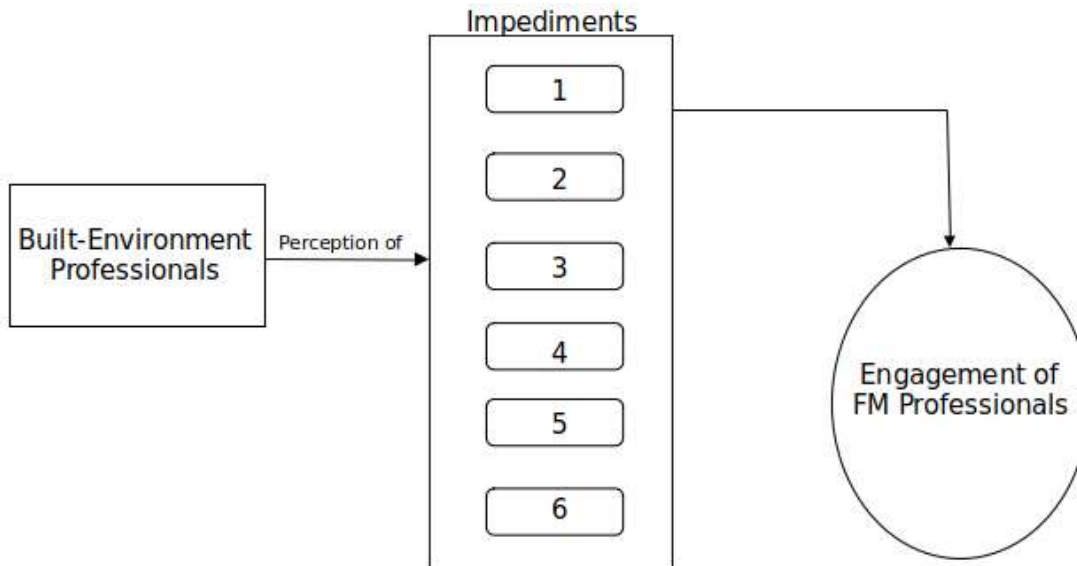


Figure 1 Study's Conceptual Framework

Where:

Impediment 1 = Conviction that FM professionals are required only when construction is complete

Impediment 2 = Discord between FM specialists' professional judgment and the client's desires

Impediment 3 = Conviction that FM professionals lack the skills necessary to add value in the design process

Impediment 4 = Non-awareness of the advantages gained by engaging FM professionals at the design stage

Impediment 5 = FM professionals are reputedly inflexible over compliance issues with respect to FM operations and;

Impediment 6 = Conviction that the involvement of FM professionals will lead to a greater cost of construction.

3.0 Methodology

The built environment professionals in Lagos State are the study's primary focus. Lagos state was chosen because it is the centre of commercial activity in Nigeria, has a considerable concentration of build-environment professionals and a significant number of Architecture, Engineering and Construction (AEC) firms are also located in the area (Babatunde, 2015; Nduka and Ogunsanmi, 2015; Babatunde, Udejaja and Adekunle, 2020). The professionals sampled are architects, builders, engineers and quantity surveyors (QS). Three hundred and forty built-environment professionals were purposefully sampled because the researcher was unable to obtain a comprehensive list of all registered built-environment professionals in Lagos State. Per group, 85 professionals were sampled. This is based on a recommendation made by Babatunde, Udejaja, and Adekunle (2020) which concluded that for a population

with multiple categories, a study needs at least 50 participants from each category. A standardised questionnaire was used to gather data for this research. This approach was adopted to conserve both time and resources. The questionnaire was designed using the factors hindering the engagement of FM professionals identified from literature. The questions were devised using a five-point Likert scale in order to standardize responses. The researcher and her assistants distributed the questionnaires to built-environment professionals in construction, quantity surveying, engineering, and architectural firms in the study area. The scale was interpreted according to the interpretation put forth by Bringula *et al.* (2012), which is as follows: 5.00 - 4.51 = Strongly Agree, 4.50 - 3.51 = Agree, 3.50 - 2.51 = Uncertain, 2.50 - 1.51 = Disagree, and 1.50 - 1.00 = Strongly Disagree. A total of 340 copies of the questionnaire was distributed, and 266 (78 percent) were

retrieved and deemed fit for analysis. A mean was used to show the hindrances to the engagement of FM professionals at the design stage from the perspective of each group of built-environment professionals. Furthermore, the Kruskal-Wallis test was utilised to check for a statistically significant difference between the means of the sampled groups. Tables are used to present the findings of the analyses.

4.0 Results and Discussion

To calculate the mean score, the researchers utilised a 5-point Likert scale and assigned each participant a score ranging from "Strongly Disagree" to "Strongly Agree" on a range of 1 to 5. Tables 2 to 5 indicate the views of the professionals by group.

Table 2 Impediments to FM Professionals' Engagement at the Design Stage (Builders' Views)

Impediments	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Rank
The conviction that FM professionals are required only when construction is complete	29	13	5	7	8	3.77	1 st
Non-awareness of the advantages gained by engaging FM professionals at the design stage	26	12	8	8	8	3.64	2 nd
Discord between FM specialists' professional judgment and the client's desires	14	21	20	3	4	3.61	3 rd
FM professionals are reputedly inflexible over compliance issues with respect to FM operations	14	23	13	8	4	3.57	4 th
The conviction that FM professionals lack the skills necessary to add value in the design process	22	15	8	10	7	3.57	4 th
The conviction that the involvement of FM professionals will lead to a greater cost of construction	15	12	19	9	7	3.30	6 th

According to the analysis in Table 2, the builders agree that the reason why FM professionals are not considered at the early stage of a building design is because FM professionals are required only when construction is complete (mean=3.77), that so many stakeholders in the built-environment (e.g., clients and professionals) are not aware of the advantages that accrue due to FM professionals' engagement (mean=3.64), that there might be disagreement between the FM specialists' professional judgment and the client's desires (mean=3.61), that FM professionals are reputedly inflexible over compliance issues with respect to FM operations (mean=3.57), and that there is a general view that FM professionals lack the skills necessary to add value in the design process (mean=3.57). This outcome corroborates that of Elmualim *et al.* (2010), Tladi (2012), Bako (2020) and Smith (2021). Additionally, the table indicates that they (i.e. builders) are uncertain whether their engagement will result in greater cost of construction or not (mean=3.30).

Table 3 shows the architects' opinion of the impediments

to the engagement of FM professionals at the design stage of a building. According to them, "construction stakeholders are unaware of the advantages of engaging FM professionals at the design stage" ranked 1st (with a mean score of 3.71). This is closely followed by the fact that FM professionals are required only when construction is complete, which ranked 2nd (with a mean score of 3.66), and that there might be discord between FM specialists' professional judgment and the client's desires, which ranked 3rd (with a mean score of 3.56). However, the architects cannot say affirmatively that the FM professionals are not considered at the early stage of a building because they lack the skills necessary to add value in the design process (mean=3.45), or that they are reputedly inflexible over compliance issues with respect to FM operations (mean=3.42), or that their engagement will lead to a greater cost of construction (mean=3.27). The last three outcomes of this analysis are at variance with that of Gleeson and Thomson (2012) and Smith (2021).

Table 3 Impediments to FM Professionals' Engagement at the Design Stage (Architects' Views)

Impediments	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Rank
Non-awareness of the advantages gained by engaging FM professionals at the design stage	23	10	10	10	3	3.71	1 st
The conviction that FM professionals are required when only construction is complete	24	11	6	8	7	3.66	2 nd
Discord between FM specialists' professional judgment and the client's desires	13	19	14	6	4	3.56	3 rd
The conviction that FM professionals lack the skills necessary to add value in the design process	17	15	8	8	8	3.45	4 th
FM professionals are reputedly inflexible over compliance issues with respect to FM operations	10	20	14	8	4	3.42	5 th
The conviction that the involvement of FM professionals will lead to a greater cost of construction	13	11	18	6	8	3.27	6 th

Table 4 Impediments to FM Professionals' Engagement at the Design Stage (Engineers' Views)

Impediments	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Rank
The conviction that FM professionals are required only when construction is complete	33	18	10	9	10	3.69	1 st
Non-awareness of the advantages gained by engaging FM professionals at the design stage	32	15	15	10	8	3.66	2 nd
Discord between FM specialists' professional judgment and the client's desires	17	28	23	8	4	3.58	3 rd
The conviction that FM professionals lack the skills necessary to add value in the design process	25	22	12	11	10	3.51	4 th
FM professionals are reputedly inflexible over compliance issues with respect to FM operations	14	32	18	11	5	3.49	5 th
The conviction that the involvement of FM professionals will lead to a greater cost of construction	17	16	27	11	9	3.26	6 th

The analysis in Table 4 indicates that the engineers agree that FM professionals are rarely part of the design team because they are required only when construction is complete (mean=3.69), that built-environment stakeholders are not aware of the advantages of engaging FM professionals at the design stage (mean=3.66), that there might be issues emanating from discord between FM specialists' professional judgment and the client's desires (mean= 3.58), and the fact that they lack the skills necessary to add value in the design process (mean=3.51). This result is consistent with findings from Elmualimet *al.* (2010), Tladi (2012) and Bako (2020). The table also shows that the engineers are unsure if FM professionals are reputedly inflexible over compliance

issues with respect to FM operations (mean=3.49), or if their engagement will increase the cost of construction (mean=3.26).

Table 5 shows the analysis from the point of view of quantity surveyors on the hindrances to the involvement of FM professionals at the building design stage. According to them, the conviction that they are required only at the post-construction stage ranked 1st (with a mean score of 3.66). The QS' also agree that the level of awareness of their (FM professionals) utility at the design stage is low (with a mean score of 3.62) and that disagreement between the FM specialists' professional judgment and the client's desires (with a mean score of

3.53) are also factors that can hinder their engagement at the early stage of building design. The QS', however, are unable to state categorically that FM professionals are not taken into account during the early stages of a building because they lack the expertise required to add value during the design process (mean=3.46), or that

they are known for being reputedly inflexible over compliance issues with respect to FM operations (mean=3.44), or that their engagement will increase building costs (mean=3.26). The final three findings of this research differ from those of Gleeson and Thomson (2012) and Smith (2021).

Table 5 Impediments to FM Professionals' Engagement at the Design Stage (Qs's Views)

Impediments	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Rank
Non-awareness of the advantages gained by engaging FM professionals at the design stage	26	14	14	7	7	3.66	1 st
The conviction that FM professionals are required only when construction is complete	25	17	10	7	9	3.62	2 nd
Discord between FM specialists' professional judgment and the client's desires	13	23	22	7	3	3.53	3 rd
The conviction that FM professionals lack the skills necessary to add value in the design process	17	22	12	9	8	3.46	4 th
FM professionals are reputedly inflexible over compliance issues with respect to FM operations	10	27	17	11	3	3.44	5 th
The conviction that the involvement of FM professionals will lead to a greater cost of construction	14	13	25	9	7	3.26	6 th

4.1 Impediments to FM Professionals' Engagement at the Design Stage (Professionals' Opinion)

Table 6 shows the general view of each group of professionals. This analysis will help to ascertain their collective views and subsequently draw a conclusion.

Table 6 reveals the professionals' general opinions. They collectively agree that FM professionals are required only when construction is complete (mean=3.69), that there is a lack of awareness of the advantages gained by engaging FM professionals at the design stage (mean=3.67), and that there may be discord between FM specialists' professional judgment and the client's desires (mean=3.57). This outcome is in line with the findings of

Tladi (2012), Bako (2020) and Smith (2021). They are unsure, however, that one of the impediments to FM professionals at the design stage is that they are reputedly inflexible over compliance issues with respect to FM operations (mean=3.48), that FM professionals lack the skills necessary to add value in the design process (mean=3.50), and that FM professionals' involvement will result in a greater cost of construction (mean=3.27).

4.2 Comparison of Mean of the Built-environment Professionals (Kruskal-Wallis Test)

The researcher further used the Kruskal–Wallis test to compare the mean of the sampled groups of professionals. The analysis is as shown in Table 7.

Table 6 Impediments to FM Professionals' Engagement at the Design Stage (Professionals' Opinion)

Impediments	Builders	Architects	Engineers	QS	AM	Remark
	M	M	M	M		
The conviction that FM professionals are required only when construction is complete	3.77	3.66	3.69	3.62	3.69	Agree
Non-awareness of the advantages gained by engaging FM professionals at the design stage	3.64	3.71	3.66	3.66	3.67	Agree
Discord between FM specialists' professional judgment and the client's desires	3.61	3.56	3.58	3.53	3.57	Agree
The conviction that FM professionals lack the skills necessary to add value in the design process	3.57	3.45	3.51	3.46	3.50	Uncertain
FM professionals are reputedly inflexible over compliance issues with respect to FM operations	3.57	3.42	3.49	3.44	3.48	Uncertain
The conviction that the involvement of FM professionals will lead to a greater cost of construction	3.30	3.27	3.26	3.26	3.27	Uncertain

Note: M = Mean; AM = Average Mean

Table 7: Comparison of Mean of the Built-environment Professionals (Kruskal-Wallis Test)

Impediments	Profession	Mean Rank	Chi-Square	df	Asymptotic Significance
Discord between FM specialists' professional judgment and the client's desires	Engineers	130.11	.22	2	.974
	QS	134.20			
	Architects	133.93			
	Builders	136.14			
FM professionals are reputedly inflexible over compliance issues with respect to FM operations	Engineers	129.76	.91	3	.822
	QS	134.19			
	Architects	129.90			
	Builders	141.04			
The conviction that FM professionals are required only when construction is complete	Engineers	128.75	.55	3	.907
	QS	133.64			
	Architects	133.94			
	Builders	138.58			
The conviction that FM professionals lack the skills necessary to add value in the design process	Engineers	129.51	.53	3	.913
	QS	134.45			
	Architects	131.81			
	Builders	138.85			
Non-awareness of the advantages gained by engaging FM professionals at the design stage	Engineers	132.45	.07	3	.995
	QS	133.11			
	Architects	135.65			
	Builders	132.95			
The conviction that the involvement of FM professionals will lead to a greater cost of construction	Engineers	132.68	.05	3	.997
	QS	132.89			
	Architects	133.58			
	Builders	135.29			

a. Kruskal-Wallis Test

* The difference is significant if $P < 0.05$

b. Grouping Variable: Profession * The difference is insignificant if $P > 0.05$

Table 7 reveals the analysis on the differences in the mean of the built-environment professionals with respect to their perception of the impediments to the engagement of FM professionals at the design stage. From the analysis, it is clear that there is no significant difference in the mean of the built-environment professionals' perception on "discord between the FM specialists' professional judgment and the client's desires" ($H(2) = .22, P = .974$), "FM professionals are reputedly inflexible over compliance issues with respect to FM operations" ($H(3) = .91, P = .822$), "FM professionals are required only when construction is complete" ($H(3) = .55, P = .907$), "FM professionals lack the skills necessary to add value in the design process" ($H(3) = .53, P = .913$), "non-awareness of the advantages gained by engaging FM professionals at the design stage" ($H(3) = 0.7, P = .995$) and "involvement of FM professionals will lead to a greater cost of construction" ($H(3) = .05, P = .997$). The implication of this outcome is that the difference in opinions between the groups of professionals regarding the impediments to FM professionals' engagement in the design process is negligible.

4.3 Validation of Conceptual Framework

In light of the study's findings - which reveal that only 3 of the 6 impediments identified from literature and analysed are pertinent from the built-environment professional's collective standpoint - the conceptual framework (shown in Figure 1) is validated. The 3 pertinent impediments from the findings are: FM professionals are required only when construction is complete, non-awareness of the advantages of engaging FM professionals at the design stage and discord between FM specialists' professional judgment and the client's desires.

5.0 Conclusion and Recommendations

This study is based on the built-environment professionals' perception of the impediments to FM professionals' engagement at the design stage. At the end of the study, there were two significant findings. First, all the sampled professionals agreed that the hindrances to the involvement of FM professionals at the early stage of a building project are: the belief that FM professionals are required only when construction is complete, non-awareness of the advantages gained by engaging them at the design stage, and discord between the FM specialists' professional judgment and the client's desires. Second, there is no significant difference between the mean of each group of built-environment professionals' perception with respect to the six items listed for them to rate. Based on these outcomes, the author makes the

following suggestions:

1. To avoid the typical misconception and practice of engaging FM professionals only after construction is complete, it is essential for them (i.e. FM professionals) to clearly communicate the scope of their work to stakeholders associated with the built environment (architects, builders, engineers, QS and clients, among others).
2. To create awareness of the value they offer at the design stage, FM professionals need to embark on vigorous and long-term advocacy with both clients and fellow professionals in the built-environment. In addition, the professional body governing the FM profession (International Facility Management Association) should organise seminars to educate built-environment professionals as well as other stakeholders in the built-environment on why it is crucial to involve FM professionals early in the design process.
3. FM professionals should go the extra mile to resolve any disagreement with clients (should any arise) by crafting alternate options that marry the concerns of both parties (i.e. FM professionals and clients).

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