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Research Article

Identification and Classification of the Unique Features of Mass Housing Projects

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Mass housing projects (MHPs) are said to differ significantly from the "one-off" traditional building projects often encountered in the construction industry and thus require unique management skills and approach in MHPs delivery. This unique nature of MHPs contributes to managerial inefficiencies that result in delivery failures when management approaches are not adapted to the project characteristics. However, understanding and knowledge of the unique attributes of MHPs are critical towards improving the organisation, planning, managerial effectiveness, and delivery success of mass housing projects. To date, extensive studies establishing the unique features of mass housing projects are lacking. This study is set out to identify what constitutes the unique features of mass housing projects by comparing mass housing projects to traditional "one-off" building projects. A questionnaire survey was used to establish mass housing practitioners' perception of the unique characteristics of MHPs. Data analysis involving mean scores and ANOVA revealed 10 unique features of MHP. A clear and systematic understanding of these unique features of MHPs is crucial for evolving effective project management practices and critical competencies towards successful delivery of current and future MHPs.

1. Introduction

Construction projects are said to be unique and share distinct physical, organisational, and operational characteristics from one project to another [1]. The physical, organisational, and operational features of projects have significant impact on the initiation, planning, procurement organisation, decisions, and management and consequently contribute hugely to construction project delivery success or failure. Mass housing projects (MHPs) share attributes and characteristics that make their management inherently more difficult and distinct in comparison to "one-off" traditional construction building projects and thus require distinct management approaches and skills in MHP delivery [2–5]. According to Enshassi and Burges [6] and Enshassi [7], the unique nature and characteristics of MHPs often influence managerial inefficiencies and communication ineffectiveness among the projects team in the delivery. Unfortunately, even though there is widespread agreement from literature that MHPs share unique attributes which impose enormous and diverse influence on the operational, organisational, and managerial task functions during the construction process [4, 7, 8], what constitutes these features of mass housing projects (MHPs) remains to be determined and the implications for efficient management in MHP delivery is also not well researched.

Unlike many studies that have identified features of "one-off" traditional construction building projects from different perspectives [1, 2, 9–12], studies on mass housing have primarily admitted to the unique particularities but lacked an attempt to clearly define and determine these features [7, 13–15]. Given that, from managerial perspective, organisational and operational task functions are key components of management practice that require much attention if management efficiency is to be achieved, this study aims to determine and classify the unique characteristics of mass housing projects. By adopting the classification approach in the study by Manu et al. [1] due to their management inclination, the attributes of MHPs are explored. It can further be asserted that clearly

known and established characteristics of any type of project will be a significant tool towards evolving and enabling frameworks for effective management and delivery success.

Similarly, the need to register improvement in housing delivery has been influenced by the fact that emerging developments in recent times indicate mass housing approach as a veritable strategy towards the reduction of the huge housing deficit that confronts many countries [14, 16, 17]. This recognition has drawn attention to the numerous and growing level of managerial ineffectiveness and project failures that occur on mass housing schemes needing immediate attention and probably solution [8, 18]. With the housing construction industry continually being a major contributor to the gross domestic product (GDP) of mangy countries, offering employment to a significant proportion of both skilled and unskilled labour [19], it is imperative to engender a project based sector which is managerially efficient to enhance success. Hence, the findings from this study and its implications for management are very significant towards helping to ensure effective project management practices on current and future mass housing project for improved delivery performance and success.

2. Definition and Unique Features of Mass Housing Projects

The term mass housing was imbibed into the construction industry (CI) from the manufacturing sector to describe mass production techniques of housing development projects [19]. In this regard, all attempted definitions of mass housing draw on the physical attributes of the project such as size, nature of designs, and extent of resources involved [4, 15, 20, 21]. From these attributes, it is clearly evident that the main underlining themes in most definitions of mass housing are "*large unit production,*" "*multiple site location,*" and "*repeated schemes*" [4, 15, 20, 21]. These definitions, however, fail to incorporate the managerial and contractual connotations of the project that make them distinct compared to traditional "one-off" construction building projects. In the context of this study, it is very crucial to highlight the definition of mass housing project as follows:

> *The design and construction of standardised multiple domestic house-units usually in the same or several geographical locations, executed within the same project scheme and under the same management and contract.*

This definition is very relevant to this study based on the knowledge and understanding of the theoretical and the practical perspective of the housing project environment. From the above definition, it is worth to note that the designs and schemes may be speculative or specific customer/owner defined as opposed to the main assumption of speculative development by Ahadzie [19]. The underlining fact is that the designs remain standardized, repetitive, and managed by same defined team, under uniform contractual arrangement and mass-scale delivery of the house-units. Edmonds and Miles [22] recommended that an annual production rate of 10 house-units per 1000 populations for developing countries is very suitable to meet their present and future housing needs. Against this background, the study adopted a minimum delivery of 10 units per scheme as a precondition for the housing scheme to be accepted as mass housing delivery.

2.1. Mass Housing Project Features. The features of projects are major parameters and inputs for the right choice of management approach and technology for the delivery of the project [2]. It is, however, emphasized that every project shares its own characteristics and these characteristics require specific competencies and skills from teams, organisations, and companies to effectively manage and execute them [2]. It can unequivocally be stated that the clear understanding of the nature and features of projects is crucial towards its effective management to ensure successful delivery [10]. Mass housing projects (MHPs) share attributes that are significantly different from "one-off" construction building projects [13, 19, 23]. These attributes of MHPs influence the operational, organisational, and managerial actions during the construction process. This justifiably makes planning concepts and managerial interventions on "one-off" traditional building projects more likely nonapplicable to MHPs. For instance, it is well noted that whereas Gantt chart is more suitable for planning traditional building projects, line of balance is most suited for mass housing projects [24].

Project features (PF) or characteristics thus refer to the physical and managerial attributes of projects which define the technical nature of the work [25]. The lack of consistency and agreement in the approach for classifying construction projects remains a critical challenge [26]. Several authors have sought to classify project features (PFs) from different perspectives [3, 10, 27, 28]. The approach in determining the features by assessing the related cost, size of project, number of participants, volume of resources, and managerial and construction challenges has been the dominant criteria used [10, 27]. It can be said that, in management practice, operational and organisational tasks are the key components of effective management systems and as such building efficient management concepts require understanding of the operational and organisational tasks requirement related to the project. Hence, the classification approach by Manu et al. [1] was adopted for this study. This was influenced by the theoretical underpinning that all construction building projects share distinguishing "physical, operational, and organizational" features and these attributes have implications for its management and success [2]. Also, Crawford et al. [26] further contended that project management concepts must rigorously be pursued to embrace the unique attributes of projects life cycle models, methods, planning, execution, and organisation so as to increase delivery success.

Additionally, it has been argued that, construction building projects that are classified as mega are charaterised by large size, exhibit managerial challenges, adopt complex technologies and innovations, beset with varied delivery durations, and complex socio-political and organisational network of relationships [10]. It is also suggested that project characteristics are essential to defining the contract

packaging, delivery strategy, and planning for human resources, procurement, and management [2]. Manu et al. [1] further argued that attributes of construction projects defined by the physical, organisational, and operational characteristics immensely influence its safety practices, planning, and management on construction sites. Mackay et al. [12] revealed that, projects which are often considered as unique when compared to other project typologies have enormous implications for management, health and safety when standardisation is adopted in the design and pre-assembly of such projects. Khanzadi et al. [14] studying mass housing projects in Iran established factors due to project organisation, project specification, and project environment on mass housing projects to differ significantly and require adaptable approach towards its management and project performance. Similarly, Toole and Member [29] established empirically that adopting nondiffused technological innovations on mass housing projects taps into more sources of information about new products of their organisational environment than traditional building projects. Thorpe et al. [3], however, argued that projects which have multiple sites over large geographical areas with repetitive schemes such as mass housing encounter complex challenges and exhibit unique physical and organisational attributes.

From the literature review, the knowledge gap identified was the lack of studies defining the exact physical, operational, and organisational characteristics of MHPs. Hence by comparing mass housing projects to "one-off" traditional construction building projects, 14 attributes were identified based on the physical, operational, and organisational characteristics (see Table 1). Synthesising all these arguments, it can generally be conceptualised that the degree of potential managerial inefficiencies, communication ineffectiveness, loss of productive time, and other management challenges experienced in the delivery of mass housing projects will be the combined influence of the physical, operational, and organisational attributes. Against this background the following hypotheses were formulated to meet the objectives of the study.

2.1.1. Hypothesis Testing 1 (H1)

Null Hypothesis 1 (H_0). There is no significant difference in the perception of respondent on the attributes as unique to mass housing projects.

Alternative Hypothesis 1 (H_1). There is significant difference in the perception of the respondents on the attributes as unique to mass housing projects.

2.1.2. Hypothesis Testing 2 (H2)

Null Hypothesis 2 (H_0). There is no significant difference in the classification of the attributes as physical, operational, and organizational features of mass housing projects.

Alternative Hypothesis 2 (H_1). There is significant difference in the classification of the attributes as physical, operational, and organizational features of mass housing projects.

3. Study Methodology

The fourteen attributes identified from literature (see Table 1) by comparing mass housing projects to "one-off" traditional construction building projects were developed and operationalized into a questionnaire instrument. The appropriateness of quantitative approach for testing prior formulations justifies its suitability for this study [23]. The primary data were collected through structured questionnaires administered to persons involved in MHPs delivery in Ghana. In this context, persons in housing construction, research, education, and policy and management were chosen as the unit of analysis as they constitute the nucleus of mass housing stakeholders in Ghana [4]. Given that only persons involved in mass housing construction have structured recognised association as compared to those in research, policy and management, and education, snowball sampling was adopted for those in research, policy and management, and education, whereas active members in construction of mass housing were selected by purposive sampling from the standing register of the Ghana Real Estate Development Association (GREDA) which is the umbrella body regulating mass housing construction in Ghana. Those in policy and management were drawn from the Ministry of Water Resources, Works, and Housing in Ghana whereas persons in research and education were also drawn from Building and Road Research Institute (BRRI) and were private practitioners in Ghana.

The respondents drawn were to indicate their level of agreement on the features (variables) from a 5-point Likert scale interpreted as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. They were also to classify each of the attributes into physical, operational, and organisational features of MHPs. In order to get reliable data for defining the distinguishing attributes of mass housing projects, assessment of the background information in respect of experience and nature of involvement in MHPs was done [23]. A total of 36 questionnaires were received from the 58 numbers distributed, representing a response rate of 55%. The mean score, frequency scores, and analysis of variance (ANOVA) were used to establish the relative acceptance and classification of the variables.

4. Results and Discussions

4.1. Background of Respondents. The summary of the background of the 36 respondents used in the study is presented in Table 2.

From the results, about 83% of the respondents had above 5 years of experience in mass housing development. This level of experience in MHPs suggests that the respondents are more likely to understand the subject matter and give right and accurate interpretations to the variables. Also, 42% of the responses were from persons in housing construction whilst persons in research and teaching & education constituted 39% (see Table 2). Furthermore, 19% were in policy and management. This gives a fairly balanced spectrum of responses from the main stakeholders and participants in mass housing delivery and implementation in Ghana.

Table 1: Deriving the unique MHPs features from traditional one-off projects.

S/No.	Literature source "one-off" project feature	Authors [30]	[2]	[10]	[11]	[12]	[1]	Derived comparative **MHP** features
1	Single construction site for project	√			√			Multiple construction sites for various housing units under each scheme
2	"One-off" unrepeated building unit design	√		√	√	√		Various multiple standardized unit-designs under each scheme
3	Easily defined source of environmental impact		√	√		√	√	Multiple sources of environmental impact from various units
4	Scheme often located at one geographical location	√			√			Multiple geographical location for various schemes
5	Relatively easier subcontracting		√		√		√	Multiple interdependent subcontracting under various schemes
6	Relatively controlled complimenting "one-off" infrastructure'	√		√		√		Series of several complimenting "one-off" infrastructures, for example, roads, water, and so forth
7	Relatively simple procurement systems in material and services		√				√	Complex network of procurement systems in material and services
8	One-off preliminary activities for project			√	√			Multiple-collinear repeated "preliminary" activities on each unit
9	One-off interrelated skill tasks on the project		√			√		Repetitive interrelated skill tasks on standardized housing units
10	Controlled and low extent of virtual team participants			√				High level virtual team participants
11	Simple network of team relationship			√		√		Complex network of team relationship on various units and schemes
12	Easily determinate construction method to single project	√					√	Complex construction process/method
13	Relatively fewer known sources of risks		√				√	High anticipated/related complex network of risks on schemes
14	Single duration for project			√		√	√	Multiple duration for various standardized design-units under schemes

Source: authors compilation from literature.

Table 2: Characteristics and analysis of the respondents.

Variables	Years and nature of experience	Frequency	Percentage
Years of Involvement in MHPs	0–5 years	6	16.7%
	6–10 years	10	27.8%
	11–15 years	12	33.2%
	16 years and above	8	22.2%
Total		**36**	**100%**
Nature of involvement in MHPs	Construction	15	41.7%
	Research	10	27.8%
	Teaching & Education	4	11.1%
	Policy and management	7	19.4%
Total		**36**	**100%**

Source: field data.

4.2. Determining the Unique Features of Mass Housing Projects

4.2.1. Mean Score and ANOVA. Here, it was important to determine significance of agreement on each attribute by the population. Descriptive and inferential analysis were carried out to determine whether the population considered a specific attribute to be unique to mass housing projects or otherwise. In doing this, means scores and ANOVA on each attribute were computed to provide a clearer picture of the consensus reached by the respondents. In this regard, considering each attribute, the null hypothesis formulated was that there is no significance variation in the perceptions of respondents on the attributes of mass housing projects whereas the alternative hypothesis was that there is significance variation in the respondents' perceptions on the attributes. The summary of the mean scores and ANOVA are presented in Tables 3 and 4. Table 3 reports the mean scores for each of the attributes including the associated standard deviation and standard error.

From the five-point Likert rating scale for the study (see Section 3), an acceptable attribute is reached when the mean score is greater than 3.5. The standard error measures how representative a sample is likely to be to the population [31, 32]. A large standard error (relative to the sample mean) suggests that there is a lot of variability between means of different samples. A small standard error suggests that most sample means are similar to the population mean and so the sample is likely to be an accurate reflection of the population [31, 32]. From Table 3, all the standard errors associated with all the means were relatively close to zero suggesting that the sample chosen is an accurate reflection of the population. Similarly, all standard deviations were less than 1.0. This indicates that there is low variability and high consistencies in the agreement among the respondents [31, 32].

As indicated in Table 3, variables 3, 6, 11, and 12 had means scores less than 3.5 which was the "cut-off" point. This suggests that respondents do not regard them as unique attributes of MHPs. Table 4 shows the one-way ANOVA of responses with respect to *Hypothesis 1*. The results reveal that all sig. values were greater than 0.05 ($P > 0.05$). This result therefore suggests that there is no significance variation in the perceptions of the respondents on the variables and thus there are no differences in the means across population for each of the attributes; hence the null hypothesis is therefore accepted. More importantly, the ANOVA results (see Table 4) are evidence of significant consensus among the respondents. This is therefore an indication that the mean ratings yielded are trustworthy results.

Additionally, respondents were to classify the attributes as physical, organisational, or operational. In testing this hypothesis (*Hypothesis 2*) the three variables with mean scores less than 3.5 were deleted. Here frequency scores were used to classify the variables as presented in Table 5.

Consequently, the variables with the dominant frequency among the three groups were determined to belong to the group. From Table 5, for example, variable PF1 scored 33 for physical and 3 for organizational and none for operational features. It was seen that physical feature had the dominant frequency and as such the variable PF1 was accepted as a unique *physical feature* of MHPs.

In statistical analysis, it is always considered very critical to draw from a more robust analytical approach in order to make trustworthy generalisation and conclusions and thus inferential statistics is most suitable [31, 32]. In this regard, the null hypothesis set was tested (*see Hypothesis 2*). Given that the targeted groups were more than two (2), ANOVA was considered most suitable over one sample t-test. The results of the ANOVA are presented in Table 6. The significance level was set at conventional 95% in accordance with conventional risk levels as indicated by Field [32].

The output of the ANOVA test for Hypothesis 2 as given in Table 6 shows that the sig. values reported on all the variables were greater than 0.05 ($P > 0.05$). Hence with the P-values (sig.) being greater than 0.05, the null hypothesis was accepted, suggesting that there is an acceptable degree of agreement among the respondents from construction, policy and management, education, and research regarding the attributes as being physical, organizational, and operational features. This indeed supports the null hypothesis and offers credibility to the inferences and generalization drawn from the results, thus increasing reliability of the results and trustworthiness [31].

Table 3: Mean score results on the attributes.

S/No.	Features	Mean	Std. deviation	Std. error mean	Remarks
1	Multiple site for various units	4.42	.554	.099	Accepted
2	Multiple standardized design-units in scheme	4.28	.615	.112	Accepted
3	*Multiple environmental impact*	*1.83**	*.811*	.169	*Rejected*
4	Multiple geographical location for schemes	4.06	.715	.131	Accepted
5	Multiple interdependent subcontracting under scheme	4.22	.637	.117	Accepted
6	*Multiple one-off infrastructure*	*1.64**	*.961*	.141	*Rejected*
7	Complex network of procurement systems	3.78	.681	.149	Accepted
8	Multicollinear repeated preliminary activities on units	4.39	.549	.096	Accepted
9	Repetitive tasks on standardized units	4.14	.639	.117	Accepted
10	Virtual team participants	4.17	.655	.677	Accepted
11	*Complex construction method*	*1.67**	*.894*	.100	*Rejected*
12	*Complex network of risk from various units*	*1.72**	*.815*	.156	*Rejected*
13	Complex network of team relationship	4.44	.558	.139	Accepted
14	Multiple duration for units under schemes	4.03	.654	.114	Accepted

Source: field data (*mean scores less than 3.5).

4.3. Discussion of Findings. The theoretical foundation of this study is premised on the fact that mass housing projects possess unique features compared to the traditional "one-off" building projects often encountered in the construction industry [4]. Here in this study, the empirical data collected has revealed 10 unique characteristics and features of mass housing projects. Recent studies by Ahadzie et al. [33] have revealed that mass housing projects exhibit unique characteristics in the adopted site organisation, management concepts, repetitive tasks, and design units which impact on project performance and delivery success. From this study, it has been established that mass housing projects are undertaken across multiple geographical locations and also the design units are repetitive and standardised in schemes compared to traditional building projects. Consequently, the classification of the variables yielded three (3) physical features as "*multiple sites for various units,*" "*multiple standardized design-units in scheme,*" and "*multiple geographical locations for schemes,*" three (3) operational features as "*multiple duration for units under schemes,*" "*multicollinear repeated preliminary activities on units,*" and "*repetitive tasks on standardized units*." The organisational features were "*virtual team participants,*" "*complex network of team relationship,*" "*multiple interdependent subcontracting under scheme,*" and "*complex network of procurement systems.*"

The variables multiple sites for housing units, multiple geographical location for schemes, and multiple interdependent subcontracting under scheme indeed reflect the unique project environment on mass housing delivery. Traditionally, mass housing projects are composed of housing units on separate sites, across geographical location, and implement defined contextual labour and works specialist subcontracting. In the context of Ghana, it could be said that schemes spreading across different geographical locations experience different cultural, political, and socioeconomic practices unique to the different geographical locations. Ahadzie et al. [14] further revealed that wide geographical area within mass housing construction sites offers documentation complexities that affect information flow and site communication. According to Egberton and Davidson [34], efficient contract packaging is useful for delivering repetitive works but challenges are encountered when packaging is characterised by large smaller units of trades work, large geographical locations, and other characteristics.

Similarly, Zairul and Rahinah [35] revealed that mass housing projects are inherently unique in the procurement systems, labour management, planning, and site management. They further argued that mass housing often entails smaller units of several concurrent engineering elements which induce technology and method implications. Hence, through this study, the revelation that MHPs have complex procurement systems, interdependent subcontracting is a confirmation to this assertion. Also, repetitive tasks on standardised housing units emerged as an attribute of mass housing. According to Thorpe et al. [3], repetitive tasks are unique to multiple site projects than traditional building project and thus induce implications for labour supervisions and control as well as attendant challenges of management programming and planning.

From the study, it can be said that the question of what constitutes the unique features of mass housing has to some extent been answered by establishing 10 unique features of MHPs. These findings can be said to be generic to mass housing projects but the inherent practices under each feature could be said to be contextual and different across countries. Hence stakeholders and professionals in mass housing delivery must respond beyond conventional approach to project delivery if success is to be made. This is because Russell and Voropaev [36], Crawford et al. [26], and Crawford et al. [37] emphasized that the categorization of project characteristics and attributes enables project stakeholders and participants to focus on the specific practices, systems, and methods of authorizing, planning, and controlling projects to attain success. According to Zairul and Rahinah [35], the standardised repetitive designs adopted on mass housing projects are advantageous to smoothen manufacturing, enhance speed

Table 4: ANOVA test of significance on the attributes.

	Sum of squares	df	Mean square	F	Sig.
Multiple site for various units					
Between groups	1.973	3	.658	2.377	.091
Within groups	7.746	28	.277		
Total	**9.719**	**31**			
Multiple standardized design-units in scheme					
Between groups	2.532	3	.844	2.379	.091
Within groups	9.937	28	.355		
Total	**12.469**	**31**			
Multiple environmental impact					
Between groups	.723	3	.241	.243	.866
Within groups	27.746	28	.991		
Total	**28.469**	**31**			
Multiple geographical location for schemes					
Between groups	1.413	3	.471	.848	.479
Within groups	15.556	28	.556		
Total	**16.969**	**31**			
Multiple interdependent subcontracting under scheme					
Between groups	1.651	3	.550	1.304	.293
Within groups	11.817	28	.422		
Total	**13.469**	**31**			
Multiple one-off infrastructure					
Between groups	2.449	3	.816	1.323	.286
Within groups	17.270	28	.617		
Total	**19.719**	**31**			
Complex network of procurement systems					
Between groups	.754	3	.251	.332	.802
Within groups	21.214	28	.758		
Total	**21.969**	**31**			
Multicollinear repeated preliminary activities on units					
Between groups	.806	3	.269	.894	.456
Within groups	8.413	28	.300		
Total	**9.219**	**31**			
Repetitive tasks on standardized units					
Between groups	.730	3	.243	.534	.663
Within groups	12.770	28	.456		
Total	**13.500**	**31**			
Virtual team participants					
Between groups	3.616	3	1.205	3.183	.069
Within groups	10.603	28	.379		
Total	**14.219**	**31**			
Complex network of team relationship					
Between groups	.889	3	.296	.914	.447
Within groups	9.079	28	.324		
Total	**9.969**	**31**			
Complex construction method					
Between groups	2.401	3	.800	1.027	.396
Within groups	21.817	28	.779		
Total	**24.219**	**31**			
Complex network of risk from various units					
Between groups	1.124	3	.375	.579	.633
Within groups	18.095	28	.646		
Total	**19.219**	**31**			

Table 4: Continued.

	Sum of squares	df	Mean square	F	Sig.
Multiple duration for units under schemes					
Between groups	3.651	3	1.217	3.658	.074
Within groups	9.317	28	.333		
Total	**12.969**	**31**			

Table 5: Classification of unique features of mass housing projects (MHPs).

S/No.	Variables	Responses on variables (features)			Remarks
		Physical	Organisational	Operational	
PF1	Multiple sites for various units	**33**	3	0	**Physical**
PF2	Multiple standardized design-units in scheme	**32**	2	2	**Physical**
PF3	Multiple geographical location for schemes	**31**	5	0	**Physical**
PF4	Virtual team participants	3	**31**	2	**Organisational**
PF5	Complex network of team relationship	1	**30**	5	**Organisational**
PF6	Multiple interdependent subcontracting under scheme	0	**30**	6	**Organisational**
PF7	Complex network of procurement systems	0	**29**	7	**Organisational**
PF8	Multiple duration for units under schemes	2	10	**24**	**Operational**
PF9	Multicollinear repeated preliminary activities on units	3	5	**28**	**Operational**
PF10	Repetitive tasks on standardized units	0	7	**29**	**Operational**

Source: field data.

in construction, and promote the adoption of concurrent engineering elements.

Thus within the mass housing industry, it will be expected that stakeholders and practitioners gaining full knowledge and understanding of these attributes can help them devise strategies and adapt management concepts necessary to engender success in the delivery. In this respect, it can well be noted that the findings also offer implications for practitioners and professionals.

4.4. Implications of Findings for Mass Housing Planning and Management. As noted by Favié and Maas [2], project characteristics significantly influence the human resource requirement, procurement approach, and the planning and management intuitions on the projects. The findings reported herein are thus useful for both practitioners and professionals to develop and match their task functional skills and behavioural competencies to the unique requirement of the mass housing project environment. It is also necessary for professionals to apply their knowledge and understanding of these attributes towards effectively contributing to the needed performance level necessary to trigger the needed delivery success.

The insight into the factors and their potential influence on managerial effectiveness could also be extremely useful to practitioners and professionals in planning and management. A major benefit could be seen in using the knowledge and understanding of these attributes to effect sound decisions as well as providing evidence-based justification for devising and developing frameworks and management concepts critical to mitigate the potential challenges inherent from these characteristics. The findings could also provide the necessary stimulus for the housing industry as a whole to place greater emphasis on addressing inherent challenges of communication performance among the project team and loss of productive time, device effective contract packaging, and develop the needed training programmes for tradesmen and artisans for mass housing development. These interventions could be seen in the implementation of innovative technologies to enhance communication, management, procurement, and development of standardized contract packaging for similar housing unit and training programmes to equip artisans on the construction technology and health and safety implications of these attributes.

5. Conclusion and Recommendations

There is enough evidence to the fact that the nature of mass housing projects and the inherent managerial and delivery challenges is very much recognized among professional hierarchy, practitioners, and stakeholders. However, the exact unique particularities of mass housing project are what is not well known and understood among practitioners and in literature. Against the background of limited studies on clearly delineating the unique attributes of MHPs, this study has been undertaken in an effort to bridge the gap in knowledge regarding the characteristics of mass housing projects.

Drawing on a concept used by Manu et al. [1], the study has revealed ten (10) attributes of mass housing projects in comparison with traditional building construction projects. To a large extent the theoretical position adopted in this study is supported and thus mass housing projects possess unique physical, organisational, and operational features. The findings suggest that from the perspective of the main stakeholders in mass housing delivery in Ghana, MHPs

Table 6: ANOVA test of significance on the classification of the attributes.

	Sum of squares	df	Mean square	F	Sig.
Multiple site for various units					
Between groups	.235	3	.078	.882	.463
Within groups	2.484	28	.089		
Total	**2.719**	**31**			
Multiple standardized design-units in scheme					
Between groups	1.319	3	.440	1.630	.205
Within groups	7.556	28	.270		
Total	**8.875**	**31**			
Multiple geographical location for schemes					
Between groups	.282	3	.094	.669	.578
Within groups	3.937	28	.141		
Total	**4.219**	**31**			
Multiple interdependent subcontracting under scheme					
Between groups	.362	3	.121	.875	.466
Within groups	3.857	28	.138		
Total	**4.219**	**31**			
Complex network of procurement systems					
Between groups	.612	3	.204	1.175	.337
Within groups	4.857	28	.173		
Total	**5.469**	**31**			
Multicollinear repeated preliminary activities on units					
Between groups	.504	3	.168	.370	.775
Within groups	12.714	28	.454		
Total	**13.219**	**31**			
Repetitive tasks on standardized units					
Between groups	.223	3	.074	.396	.757
Within groups	5.246	28	.187		
Total	**5.469**	**31**			
Virtual team participants					
Between groups	.421	3	.140	.864	.471
Within groups	4.548	28	.162		
Total	**4.969**	**31**			
Complex network of team relationship					
Between groups	.616	3	.205	1.400	.263
Within groups	4.103	28	.147		
Total	**4.719**	**31**			
Multiple duration for units under schemes					
Between groups	1.806	3	.602	1.700	.190
Within groups	9.913	28	.354		
Total	**11.719**	**31**			

exhibit unique attributes as classified in Tables 3 and 5. Consequently, the ANOVA results indicate that there was no significant variation in the determination and classification of the variables. Hence, from the results of the hypotheses testing, the study has also provided empirical evidence that these variables are indeed unique to MHPs.

It is well posited by Ahadzie et al. [4] that the unique nature of mass housing projects requires unique management approach and skills. However, it can be argued that, with the unique feature of delivery being across different geographical locations and variations in management practices, a very important recommendation from this paper is the need for future research to explore these established features to understand their underlying contextual factors and impact on management practices to enable for a more pragmatic management framework on MHPs. This is because unique skills and management concepts are critical for MHPs success [38, 39]. Also, project categorization and identification of construction projects features can be said to be a complex, multifaceted phenomenon and construct and exhibit varied

influence on project success. It is thus very crucial for these features to be further explored on how they impact on mass housing performance.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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