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Adopting Design and Build (D&B) as an Alternative Construction Procurement System to the Traditional Method in Ghana

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Abstract Since the inception of construction consultancy practice in Ghana, the Design-Bid-Build (DBB), otherwise known as the Traditional System of Procurement has been the main method of procurement of construction projects. Despite several criticisms for its slowness, litigious, cost and time escalations, the procurement system dominates all other forms of procurement in the Ghanaian construction industry. Over ninety per cent of all building projects especially in the public sector are procured through this arrangement. In the wake of changes in clients' characteristics and demands, coupled with the existence of a wide range of procurement alternatives that seek to satisfy these concerns, the Ghanaian construction industry continue to use DBB system as the main system of procurement. *This study investigated the factors accountable for its continuous use and the readiness of clients, contractors and consultants in Ghana to adopt and use Design and Build (D&B) as an alternative procurement system to the traditional one.* In carrying out the research, extensive literature on DBB in Ghana and Design and Build (D&B) in UK and Europe was reviewed. Issues arising out of the literature were developed into questionnaire. The questionnaire was administered on consultants, contractors and employers (clients) in the three Northern Regions of Ghana in particular where the study was carried out. The findings pointed out that, stakeholders do not only recognise the problems inherent in DBB, but demanded certain objectives that can best be achieved by adopting D& procurement method. Specifically, industry players wants contractors' involvement in the design process as early as possible, single point responsibility, risk avoidance, reduced claims, reduction or elimination of cost and time overruns etc. However, construction firms/organisations in Ghana, especially in the Northern parts lack the necessary competence and expertise to undertake D&B. The industry is also dominated by one major client i.e. the Government/Public Sector who mostly uses DBB system for its projects. The aggregation of these findings suggests that, D&B is desired, but can only be adopted in the near future since contractors and clients (suppliers) are *ill prepared* at present to adopt the method of procurement.

Keywords Construction Procurement Method, Design-Bid-Build, Design and Build, Northern Ghana

1. Introduction

A construction procurement system is "the organisational structure adopted by the client for the implementation, and at times eventual operation, of a project" [1]. [2] describes procurement system as a method of obtaining and organizing the external resources needed to complete a project whilst [3] considers procurement to be the process of identification, selection and commissioning of the contributions required for the construction phase of a project. Several definitions have been given by several authors all of which points to a common idea; *a contractual and coordinated arrangement that brings together the various parties in a construction contract with specific roles and responsibilities for the delivery of a construction project.* There are different procurement systems and several ways of classifying them. On the basis of how the interaction between design and construction, how funding and operations are managed, mode of reimbursement of the contractor, level of information available or required before a construction contract is let, and the magnitude of risk taken by participating parties, [1] identified four main categories of procurement systems. These includes separated procurement systems with main type being design-bid-build (traditional system); integrated procurement systems such as design-build (D&B) and private finance initiative (PFI); management oriented procurement systems such as construction management and management contracting; and discretionary systems which include partnering, alliancing, joint ventures.

For the purpose of this research, the discussion was

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limited to the separated and coordinated (traditional) and the integrated systems of procurement (D&B). In the separated, mostly referred to as the Traditional System of Procurement, the design and construction of a project are the responsibilities of separate organisations [1]. Typically, design consultants, engineers, quantity surveyors had to finish with their designs before a contractor is sought to construct. The client deals with all these members as separate entities/organisations. Under the integrated procurement (main system being Design and Build whilst others are variants), one organisation usually a construction firm is responsible for both the design and construction of the project. This implies that the client at least deals with one organisation.

[4] observed that the choice of a procurement method (path) is influenced by a number of factors that vary both in degree and significance. Key among these factors are the type of client (public or private, lay or experienced), type of business (design input, time available for the development of the design), level of fixed design achievable at the time of entering into the contract, management team, availability of resources like consultants, general workforce, contractors plants and equipment, level of risk as well as legal requirements.

[5] further recognized that the choice of a procurement method especially in Ghana is affected by factors including expected benefit from the chosen procurement path, previous experience and desire for change, level of quality required, source of funds, nature of project, value of proposed work and financial commitment.

1.1. Design-Bid-Build (DBB) Characteristics in Ghana

Known as the traditional system of procurement, DBB method has been the main form of procurement in the Ghanaian construction industry since independence [5]. Despite limited literature on the knowledge and the level of use of the other forms of procurement in Ghana, recent studies [6] have revealed that consultants, clients and contractors favoured the traditional system of procurement to other arrangements. [7] observed that about ninety per cent of all building contracts are procured using the DBB method in Ghana. Though both studies were carried out primarily in Southern Ghana, the situation is generally the same across the country and in particular the three Northern regions (Upper West, Upper East and Northern Region).

In Northern Ghana, almost every contractor is conversant with what has become more of a 'norm' in building construction procurement i.e. designs are completed after which tenders are invited and a project awarded to a successful tenderer for execution. The common practice for instance is to have consulting firms that comprises typically of an architect, a quantity surveyor, civil and electrical engineers working together in one firm commonly referred to as a *consortium*. This arrangement which is very popular in Ghana, especially in the study area, tends to reduce the number of separate professional firms that the client had to contract with [8]. A typical contractual and coordination relationship in DBB structure in Ghana is simplified and shown in figure 1(a) below. There is however a few architectural, quantity surveying and engineering firms which have been registered and are practicing as specialist independent consulting firms.

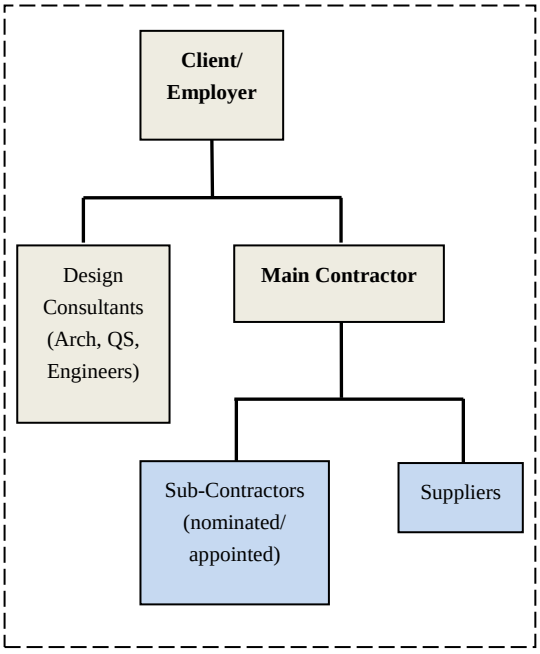

Figure 1(a). Typical Contractual Relations in DBB System in Ghana [6]

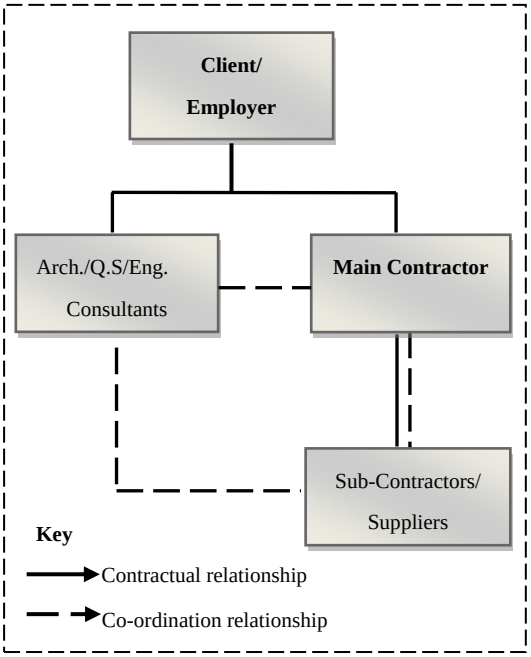

Figure 1(b). Contractual and Co-ordination Relationship in DBB [1]

By virtue of its presence and use over a long period of time, familiarity with its procedures and wider applicability, it continues to thrive particularly among public clients who are the major employers in the construction industry [7]. Other major reasons for its use includes size of firms and contracts involved, the only procurement system with legal backing through the form of contract [6]; offers competitive

fairness and satisfactory public accountability in the procurement of contracts, goods and services [9]. Again, there is relative ease in quality checks, changes can also be arranged and valued under the system especially with the use of the traditional bill of quantities. DBB also provides for fully developed and detailed designs as well as access to small firms [5].

Notwithstanding its advantages, DBB system of procurement is widely criticized as projects often lead to "finger pointing" between the consultants/architects and contractors. When a problem arises, the consultant accuses the contractor of faulty construction, and the contractor blames the consultant for faulty design and so on. This makes it so adversarial and does not encourage coordination among the parties. One other major flaws of this system is the separation of design and construction. As indicated above, the designer, who is entirely different from the builder, will have to complete with the design before a builder is sought. This phenomenon creates a problem of lack of 'buildability' which is one of the major criticisms of DBB [4]. The sequence of these phases which include brief, design, tendering and construction is illustrated in the figure 2 below.

[6] noted that under DBB system in Ghana, the owner is exposed to contractor claims, over-design and constructability issues since he (the owner) accepts liability for design in its contract with the contractor. The system is also criticized for being time consuming; the fact that the process of design, bidding and building are separated gives room for delays. Before a project procured under DBB system is actualized, so much time might have elapsed at the pre-construction stage [10, 11].

During the last half of the twentieth century, interest in non-traditional construction procurement methods grew as clients demanded quicker delivery times and earlier knowledge of construction costs. Alternative procurement approaches including D&B, construction management and other discretionary systems emerged over time (around the 1970s) to respond to the weaknesses of DBB [12]. A number of researchers and practitioners do reckon that notwithstanding the benefits of DBB as enumerated earlier, the system is fraught with several problems; lack of inherent buildability, adversarial relations, requires increased oversight, multiple contractual relations, slow in starting on site, proliferation of miniature construction firms, unwieldy variations. In the wake of these challenges coupled with the continuous changes in clients' demands and characteristics (listed below), the Ghanaian construction industry cannot continue to rely only on the traditional system as the main route for the procurement and/or delivery of construction contracts.

1. Movement of corporate businesses and clients into the construction market
2. Clients increased awareness of alternative procurement paths and hence demanding better value for money
3. Early knowledge of project cost and its certainty for planning purposes
4. Increased interest in collaborative working and joint ventures
5. Risk avoidance and/or transfer
6. Early start and completion of projects
7. Better co-ordination of the construction delivery process

This research therefore sought to find out whether clients, contractors and consultants in Ghanaian construction industry are ready to adopt and use D&B as an alternative procurement system.

There is evidence that major projects have been delivered using other procurement routes [7]. For instance, Brunei International Student Hostel at Kwame Nkrumah University of Science and Technology-Kumasi was constructed under BOOT by a group of lecturers of the university. Major Banks such as Barclays, Stanbic, Cal-Bank, National Investment Bank, and many others are constructing new branches in other parts of the country as quickly as possible. Private universities and secondary institutions are delving into construction and requiring multi-storey complexes that could provide multi-purpose functions.

The successful execution of these projects demands a high level of expertise and integration of project teams, which require more collaborative and co-ordinated procurement arrangement rather than the mundane conventional procurement system (DBB). The presence of a good number of well-established construction firms such as Taysec Construction Ltd., P. W. Ghanem Ltd., Consar Construction Ltd., Myturn Construction Ltd. some of which have their head-quarterses in Northern Ghana suggest that these firms may be able to undertake projects on D&B bases. These construction firms are so developed that they established branches in many regions of the country, with in-house professionals and with vast experience in construction, thus they are capable of undertaking projects on the basis of D&B given the opportunity and appropriate forms of contract.

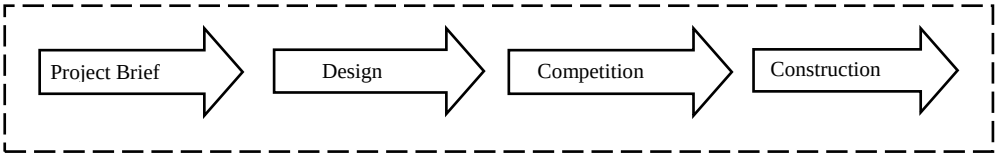

Figure 2. Sequence of Project Delivery under DBB [4]

Also, with the recent discovery of oil, there exists a host of opportunities in several sectors including the construction sector in Ghana. The industry in particular will soon be tasked to supply physical infrastructure to meet the growing/development needs of the country. There is also the Savannah Accelerated Development Programme which seeks to inject massive capital investment in the Savannah Regions in order to bridge the development gap between the North and the South. This obviously will include the construction of ultra-modern facilities and edifices and hence place a huge responsibility on the construction industry to deliver within the near future.

These factors and others points to a daunting future for DBB system of procurement since by its very nature, it may not be able to respond adequately to address these demands. There is therefore the need to vigorously adopt modern contemporary procurement systems such as D&B in readiness for these challenges.

1.2. Design and Build (D&B)

Design and Build (D&B) is a construction procurement method where the client/owner enters into a single contract with a single firm (design-builder) who designs the client brief and carries out the actual construction of the project. Many authors and researchers [1, 5, 6, 10, 12, 16] described the system variously but what is common to them all is that D&B employs the contractor to undertake both to design and to construct a project for a single contract sum. The design-builder may employ architects or engineers (either on the design-builder's staff or from outside firms), but such design professionals are directly responsible to the design-builder and not the client/owner.

Emerging in the 1970's and 1980's, Design and Build has become the dominant procurement method for more and different types of buildings [13], and has greatly sharpened and oriented the UK construction industry. D&B was trumpeted as the ideal way to avoid delays and cut down on costly claims and litigations. It is claimed by the UK construction industry to have produced measurable cost and time benefits in the construction of industrial buildings, hotels and repetitive housing schemes. In the US and UK, D&B experienced a rapid growth in market share from less than 10% in the 1980s to 23% by 1990, and further up to more than 30% by the early 2000. Currently, D&B's market share in the UK construction industry stands at more than 43% [13]. In the USA, the increase in the number of D&B projects has been astounding; from 15% in 1990, to 35% in 1999 [14]. Customers of D&B reckon that single point responsibility, a guaranteed maximum price and avoidance of design and construction risks are the most important reasons for using the method [15]. D&B embodies other forms (variants) such as Turnkey, Develop and Construct, Novation and Package Deals. Figure 3 below shows the contractual and co-ordination relationship under the D&B method of procurement.

Design and build (D&B) system increases the likelihood that the building will be constructed within the owner's budget. Projects procured under D&B are 50% more likely to be completed on time and on budget [15]. Contractors often can provide better prices and information regarding construction methods than architects. The contractor is able to conduct value engineering and constructability analysis from the start. D&B is characterized by certain essential features unique to this type of procurement. These features according to [16] are best dealt with in terms of how the client/employer describes his requirements (employer's requirements), how the contractor proposes to achieve them (contractor's proposal), the pricing mechanism, and the roles and responsibilities within the project delivery process.

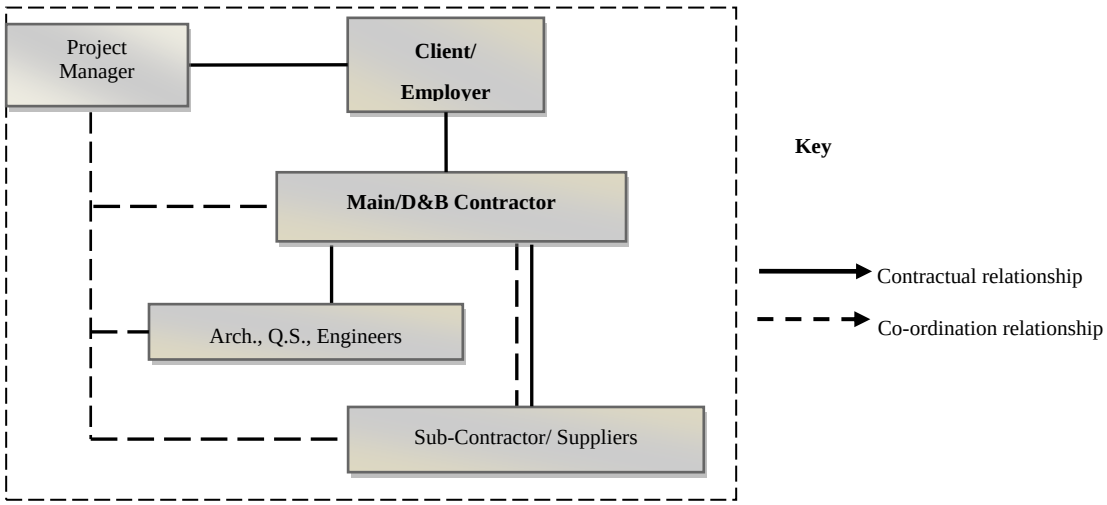

Figure 3. Design and Build (D&B) Contractual and Co-ordination relationship (Adopted from [4])

1.2.1. Employers' Requirements and Contractors Proposals

The process of D&B commences with a client (employer) approaching a contractor with a set of requirements known contractually as "Employer's Requirements", defining what he (employer) wants. The contractor responds with a proposal, also known contractually as "Contractor's Proposals", which include production and design works [16]. The extent of design work carried out by the contractor usually depends on the level of preparatory designs commissioned by the employer. The contractor's design work ranges from detailing the employer's brief to the full design process with proposals of sketch schemes and information on fabrication [17].

Upon the agreement of the employer's requirements and the contractor's proposals, the contract can be entered into and the work executed. At this point, the contractor assumes total responsibility for undertaking the outlined design and for the construction of the bespoke project, including the integration and co-ordination of the entirety of the process. The contractor is equally responsible for appointing consultants (if he does not have the necessary skill within his firm). The client may also wish to appoint his own consultants to monitor various aspects of the project, even though this is not always the case [4].

1.2.2. The Price Mechanism

"One of the commonest features normally present in most D&B contracts is a guaranteed maximum price (GMP), which helps to reassure the employer that he is not signing a blank cheque" [17]. In the Joint Contract Tribunal (2005) Design and Build Contract (JCT DB 05), the price for this system is governed by what is referred to as Contract Sum Analysis (CSA). The CSA differs from the traditional bill of quantities (BoQ) in nature, and its form is not determined by the contract. It is prepared in any form appropriate to the project but most are parallels to the BoQ, i.e. calculations of stage payments. In the Engineering and Construction Contracts as contained in [18], option clause A (priced contract with activity schedule) gives a useful guide on pricing of D&B.

1.2.3. Roles and Responsibilities of Parties under D&B

The D&B form of procurement also differs from other forms, in that the arrangement exhibits a lack of an independent certification role in the contract. Under the procurement system, there is no contract administrator to settle differences between parties, neither is there an independent quantity surveyor responsible for preparing the basis upon which contractors tender. [17] stated that "*this changes some of the basic assumptions about the roles which are required on construction projects".* [12] noted that the JCT DB 05 does not provide for the appointment of an architect or a quantity surveyor by the employer, instead an Employer's Agent is appointed who acts on behalf of the employer and receives or issues applications, instructions, consents, notices, requests or statements in accordance with the conditions.

In the D&B system of procurement, the contractor is responsible for 'everything' (single-point responsibility). Clients are quite attracted to this single point responsibility, especially those who may not be interested in distinguishing the difference between a design fault and a workmanship fault [16]. Once the contractor is responsible for the design under the contract, he bears the same professional liability as a consultant designer. The contractor must therefore exercise reasonable skill and care expected of a competent designer. Consequently, greater risk in the project is transferred to the contractor owing to the single point of responsibility that rests in him [4]. Due to the numerous advantages and inherent flexibility of the D&B procurement system, it is applied to a wide range of buildings. The common characteristics of the projects to which D&B is ideally used, are seen in the nature of the employer's requirements regarding risk apportionment, the nature of the client's experience and the availability of construction firms suitable to undertake project on D&B basis [16]. These features are considered under the following areas;

1. The client's familiarity with the construction
2. The relative importance of client's priorities (time, cost, function, quality, value for money etc)
3. The technical complexity of the project
4. The need to make variations to the requirements as work progresses
5. The pattern of responsibility and communication
6. The need for an early start and completion

1.3. The Processes Involved in D&B

After identifying the need for a building, the client states his requirements adequately in terms of physical design needs and the intended use of the building. A selected number of building contractors are invited to submit their proposals together with their estimated cost. The system invokes design competition among contractors, which is absent in other procurement systems [6] and permits the optimization of design and production costs.

The D&B system is suitable for standard industrialized buildings such as factories and warehouses, office buildings/complexes, residential flats and complexes, educational and/or institutional buildings and hotels. On large complex or specialist projects, D&B companies may employ, or appoint a designer from consultancy firms. In such cases, the appointed designer's responsibility is to the D&B Company and not to the employer. However, the client normally appoints an agent to look after his interest, and to ensure that the contractor's proposal receives planning approvals [6]. The processes involved in D&B procurement system are illustrated in figure 4 below.

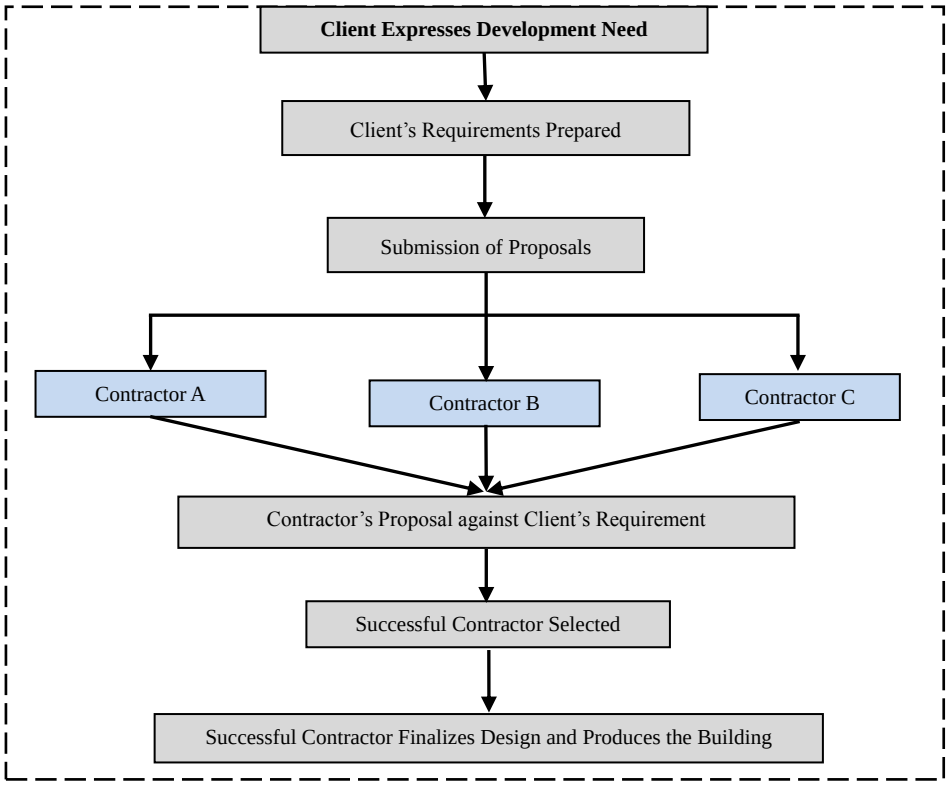

Figure 4. Design and Build (D&B) Process (Adapted from [6])

1.4. Advantages of D&B over DBB

Single-point Responsibility is a unique characteristic of D&B where the client has the advantage of dealing with a single organization that is responsible for all aspects of the project [1]. Expressing a similar viewpoint, [10] stated that direct contact between the client and the contractor is one of the numerous advantages claimed for the use of a D&B arrangement. In support of this claim, [12] indicated that the responsibility for the design, construction and the required performance of the building lies entirely with one party, the contractor.

Early Certainty of Contract Price is another major advantage associated with D&B, especially where the JCT form of contract is used [14]. According to the USA's Legislative Analyst's Office (LAO) Report [19], D&B system offers price certainty because the employer (agency) specifies what he is willing to pay for a building before proposals are solicited from D&B contractors. Interested contractors respond with configurations, material specification and methods of fabrication that they are willing to provide for the specified price. [1] observed that once the client's requirements are accurately specified, certainty of final project cost can be achieved. [16] claimed that a feature sometimes present in D&B deals is the guaranteed maximum price (GMP), and where this is so, the client has a feeling of reassurance that he is not "signing a blank cheque".

D&B systems increase the likelihood that the building will be constructed within the *Owner's Budget*. Projects procured under D&B are 50% more likely to be completed on time, and on budget [15]. Contractors often can provide better prices and information regarding construction methods, than architects. The contractor is able to conduct a value engineering and constructability analysis from the start.

D&B involves the contractor at an early stage of the development process, and resulting in a greater degree of *Co-ordination between the members of the team*. Given this co-ordination and single point responsibility, variations during construction tend to be fewer and risk of post-contract price escalations are reduced [12]. [17] argues that the D&B process increases the opportunities for harnessing the benefit of the contractor's experience during the design stages of the project. Good team work and cohesion between the various experts/specialists to function as a unit, engenders buildability [4].

Furthermore, [10] noted *possible Reductions in the Overall Timescale* of the project as an advantage unique to this type of procurement system. D&B imposes a discipline on the employer to define the brief fully at an early stage, making it possible to overlap the design with construction and thus leading to shorter project durations [12]. Adding to this, [1] stated that the integration under D&B, enabled overlapping of the design with the construction and improved the communication between the client and contractor.

One other benefit of using the D&B system of procurement in the UK and Europe as observed by [10] is that it offers little/no claims for possible delays due to lack of drawn information. D&B was trumpeted as the ideal way to avoid delays and cut down on costly claims and litigations.

Because the designer and builder are part of the same D&B entity, and especially with the employer not being the guarantor of the completeness and accuracy of the work of the architect/engineer, the employer may avoid conflicts and disputes that can arise between the architect, or the engineer, and the main contractor.

In an analysis of the JCT D&B Contract in UK, [17] suggests that one of the strengths of D&B is that the contractor's proposals will normally include design solutions to problems posed in the employer's requirements. By this, contractors are not only competing on price as in most other procurement systems, but also on any other criteria important to the client. The method through such an approach motivates the use of innovation and creativity while ensuring buildability.

1.5. Disadvantages of D&B

The greatest difficulty with the D&B system is that the employer is required to provide a great deal of project information/briefing with all necessary operational considerations at the outset of the development, usually referred to as Employer's Requirements. [17] stated that *"one of the biggest disadvantages of D&B is that the brief (in terms of the employer's requirements) must be clear and unambiguous at a very early stage".* Inadequate and hazy briefs which are unable to communicate precisely to the contractor the client's need may engender difficulties in evaluating proposals and tender submissions [1].

With the D&B system of procurement, the design and construction work generally is awarded based on subjective criteria such as experience, qualifications, and best value for money. Where several tenders are invited, comparison can be difficult as the end product in each case is different. The final decision is most often than not influenced by subjective judgment [12]. In support of this criticism, [4] indicated that there is a relative difficulty in comparing tenders/bids under D&B since the process is often characterized by the subjective opinion of the evaluator. [10] asserted that D&B is found to be unwieldy where it is necessary to provide competition between building firms, as it poses difficulty in evaluating a project across a wide range of attributes.

D&B is a very rigid method of procurement and despite some level of tolerance for variations; it does not lend itself to the developing requirements and ideas by the client. This means that any variation required by the employer, especially after signing the contract, can be expensive and difficult to evaluate. [17] stated that a client who wishes to reserve the right to make extensive alterations to the requirements during the construction and fabrication process, should not use the D&B system of procurement.

Limited access for small contractors as mentioned before is another shortfall of the system of procurement. Because D&B contracts mostly are awarded based on qualification and experience, it tends to lockout small newly established contractors who may not have the range of experience possessed by large, long-established firms. As a result, access to D&B contracts, especially the large contracts, may be limited for these smaller contractors. The presence of fewer firms in the D&B market is reckoned to a minimal extent, as a disincentive to the use of the system [4].

The single point responsibility, coupled with the fixed prices, imply that much risk is borne by the D&B contractor than would have been under general contracting [4]. This risk carries a premium and it is to be expected that the D&B contractor would add this factor to a tender in order to allow for the extra risk [16].

Evidence available [10], indicates that the client, under normal circumstances of contract will be able to obtain a better deal or arrangement if some form of competition on price, quality and time exists. Though this assertion superficially does not seem to favour the D&B form of procurement, there are several circumstances under which a direct contact with the contractor and a negotiated approach with a single organisation, may pay particular benefits to the clients [10]. The following (non-exhaustive list) are some of the key concerns of employers in the construction industry that tend to favour the use of D&B.

1. Cost certainty and firmness
2. Reduction in lines of legal responsibility
3. Minimizing project cost and time overruns
4. Better integration of design and construction
5. Early start on site
6. Continuation contracts
7. Continuous Business relationship

These factors, amongst others, which are better responded to or are addressed using D&B system of procurement, suggest that the method stands to dominate other procurement options in the delivery of construction projects.

2. Research Methodology

The research was undertaken in two main stages; with the first stage being a desktop study of existing literature on the traditional method of procurement (DBB) in Ghana as well as Design and Build (D&B) in the UK, Europe and America. This stage also highlighted the factors that gave rise to the continuous use of DBB in Ghana's construction industry. In the second stage, a combination of structured interviews and survey questionnaires were employed to obtain first-hand information from the target groups in the industry.

2.1. Target Groups

The category of respondents constituting the sample population of the research included consultants, contractors and clients in the three northern regions of Ghana where the study was carried out. This was specifically targeted at:

(a) Building consultants and construction industry professionals that provided technical and professional services such as drawings and designs, supervisions and

general contract administration and management services. This category plays several key roles in the construction sector and hence their views could help shape up decision relating the choice and selection of a particular procurement path.

(b) Class D1/K1contractors who have well organized and identifiable establishments, requisite equipment and stature with key technical and professional staff either in-house or capable of engaging similar professionals for purposes of constituting a project team. This stratification is necessary taking cognizant of the kinds of projects, level of integration of team and high risks associated with contracts under D&B. this therefore requires specialized contractors or firms to be able to handle contracts and project D&B arrangements.

(c) Commercial, industrial, corporate and private sector clients as well as central government agencies. Clients such tertiary educational institutions, international banks, SSNIT, metropolitan, municipal and regional coordinating councils (RCCs) all within the three northern regions constituted the targeted respondents in this category. These classes of clients were studied because they constituted the group that is most likely to commission and contract builders and/or contractors to deliver projects in Ghana especially the kind of projects that are best procured under D&B contracts.

2.2. Sampling Technique and Sample Size

As noted in section 2.1 (a), (b) and (c) above, the various categories of targeted respondents were *purposely* identified. The D1K1 classification for example refers to the uppermost grading that a contractor can obtain which is based on experience, financial turnover, technical and equipment holding and the general stature of the firm. Taking into accounts the unique characteristics of D&B method of procurement and narrowing the scope of respondents to groups with specific characteristics, the research used ***purposive sampling technique*** to select the sample.

According to [20], there are ten practicing building consulting firms based in the three northern regions of Ghana. With this relatively smaller sample population which is clearly identifiable and also constituting one of the targeted groups under purposive sampling, the entire population was taken for the study. Also one architectural firm based in Upper West Region (one of the three regions where the study was conducted) and four individual professionals who provided general quantity surveying services constituted part of this category of respondents. This therefore gives a sample size of fifteen (15) for this category.

The total number of building contractors of the caliber described in 2.1(b) above that are head-quartered in the three northern regions was thirteen [21]. At the time of the research, there were eight other construction companies implementing projects at various locations within the study area. Given that all twenty-one firms fit the targeted classification of respondents under the objective of this study, the researcher considered all as constituting the sample size. However, due do difficulties in locating the offices and key officers of some of the firms, only ten (10) questionnaires were successfully administered to this category.

Table 1 gives a summary of the clients' groups that were visited with questionnaire in conducting this research. Again, these institutions and organizations were *purposely* selected across all three regions on the basis of their unique clientele potential in contracting under the D&B arrangement. A total of twenty-five (25) respondents were selected from this category as detailed in table 1 below.

Table 1. *Clients category*

Category	Clients/Respondent	Number of Questionnaires
Tertiary Educational Institution	University for Development Studies, Tamale Polytechnic, Wa Polytechnic and Bolgatanga Polytechnic)	4
Banks	Barclays, Stanbic, Ecobank, Stanchart, First National and Access.	6
Central Government Agency	Tamale metropolitan, Yendi, Saveligu, Wa, Bolgatanga, Bawku and Navrongo municipalities, NRCC, UWRCC, UERCC	10
Others	SSNIT and four private hotel developers	5
Total		**25**

Source: Author's Field Study, 2016

2.3. Response Rate

In total, fifty (50) questionnaires were administered to target groups, 42 of which were retrieved giving a response rate of 84%. The distribution of the questionnaires administered and those received for the analysis is indicated in table 2 below.

Table 2. *Response Rate*

Target Group	*Questionnaires Administered*	*Questionnaires Returned*	*Percentage*
Employers or Clients	25	20	80%
Consultants/ professionals	15	14	93%
Contractors	10	8	80%
Total	**50**	**42**	**84%**

Source: Author's Field Study, 2016

3. Data Analysis

The research made use of tables, bar and pie graphs as the main statistical tools to present the data obtained. This was because the questions constituting the questionnaires were structured closed-ended and in most cases allowed for multiple responses. Frequency tables, bar charts and simple pie charts are thus clearer in presenting the data whilst the analysis is largely descriptive.

A question on the level of information provided by clients at the outset revealed that employers in Ghana usually provide significant amount of information (project briefing) adequate for design and bidding purposes. The relevance of this question lies in recognition of the importance of details and unambiguous project briefs for a successful project delivery under D&B. Respondents however acknowledged that *detailed* information especially regarding operations, management, and possible leasing are often not provided in Ghana.

The research revealed that the project consultants are mostly relied upon for advice relating the decision as to which procurement path to adopt for a particular project. Almost all the contractors and clients interviewed mentioned that they rely 'heavily' on the professional advice of the team of consultants to the project.

This is particularly so since most of the employers are not equipped with the knowledge and technical expertise on which procurement system is suitable for what project, especially in recognition of the availability of a number of alternatives. This analysis suggests that project consultants play a key role in the procurement decision. Hence, the adoption and use of D&B will depend largely on the professionals' commitment to it.

The field study also confirmed that the main reason for which the traditional system of procurement (DBB) enjoys poll position in Northern Ghana in particular is familiarity with its procedures. About 86% (shown in table 3) of respondents asserted that DBB is vastly applicable to a wide range of projects across the country. It has been the common practice over a long period of time, making stakeholders become more familiar with it. Other determining factors that are significantly recognized by respondents include the type of client, quality standards desired, size of projects, the nature of contractors in the local market (small and inexperienced), desire to introduce variations in the future as work progresses.

Table 3. *Factors Promoting the Continuous Use of DBB System of Procurement*

Determining Factor	Nº of Respondents	Percentage
Familiarity with Method	36	86%
Public Clientele	18	43%
Quality Standards Desired	15	36%
Size of Projects	10	24%
Possible Future Changes	8	19%
Kind of Building Contractors in North	8	19%
Level of Influence by Client	6	14%
Cost Certainty	6	14%
Level of Risk	2	5%
Others	2	5%

Source: Author's Field Study, 2016

On the basis of this finding alone, the building industry in Northern Ghana is likely to stay 'glued' to the traditional system (DBB) of procurement. This suggests that, the introduction or adoption of newer and contemporary procurement systems may have to be done with care.

Table 4 below illustrates results on the shortcomings of DBB from the view point of clients and contractors. High claims, time and cost overruns were identified as major problem of DBB. Others included delay in starting due to design and contractor selection procedures, changes and variations, disputes and adversarism (lack of co-ordination). Although the professionals did not see direct contact between the employer and the contractor as a problem, the contractors who responded to the questionnaire thought otherwise.

Table 4. *Problems of the Traditional System of Procurement (DBB)*

Problem or Weakness	Nº of Respondents	Percentage
High claims, cost and time overruns	22	79%
Delay in starting due to separation of process	16	57%
Changes and variations as project proceeds	8	29%
Adversarial	6	21%
No contractor's input	4	14%
Lack of control by contractor	2	7%
Too many parties to the contract	2	7%

Source: Author's Field Study, 2016

4. Design and Build (D&B) Characteristics

A fieldwork question that on the kind of procurement path that is preferred for complex multi-storey projects obtained a responds represented in figure 5. It revealed that stakeholders recognised D&B as the most appropriate procurement method for complex multi-storey projects though a significant percentage asserts that DBB was capable of responding to the requirements of all kinds of building projects.

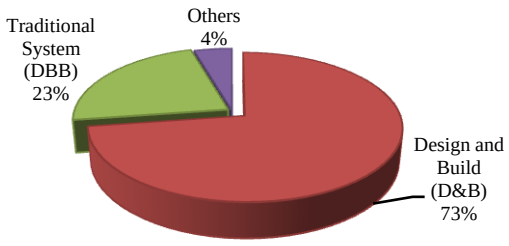

Figure 5. Construction Procurement System Recommended for Complex Multi-purpose Building. Source: Author's Field Study, 2016

Most of the respondents in favour of D&B were the professionals and consultants group probably because of their training and understanding of the various procurement arrangements in use. Perhaps, the revelation that building

forms and sizes that are recently being undertaken is shifting towards multi-storeys is an indication that it is time to start thinking D&B. This view was expressed on the basis of increasing delivery of modern edifices especially by International Banks, Educational Institutions and Entrepreneurs such as Hoteliers.

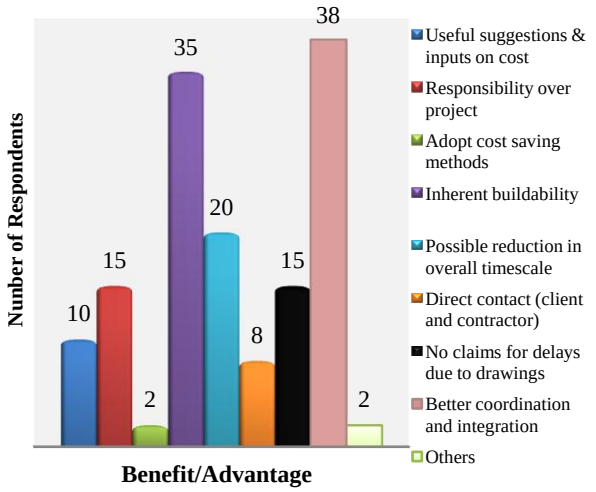

Figure 6. Benefits of Contractor's Early Involvement in Project Design. Source: Author's Field Study, 2016

They added that, D&B system allows for greater integration and teamwork by all project members and ought to be adopted sooner rather than later. Respondents here further indicated that the deficiencies of the local contractors to solely handle projects on D&B arrangements would be compensated for, by the presence of professionals and consultants in all construction specialties who, as a matter of necessity, must be utilized by the construction firms. This finding suggest that the adoptability and use of D&B in Ghana will depend on the trend of buildings delivered, and the extent of involvement of private and commercial sector in the formal building construction industry.

One significant research finding justifying the study and seeking to point towards the need for adoption and use of D&B is the recognition of the importance of contractor's early involvement in the design process. Figure 6 elicits the benefits of contractors' involvement and points to the possibility of adopting D&B as a construction procurement system in Ghana (See figure 6).

On the issue of capacity of local contractors, it was found that in a random sample of every five (5) contractors, only one (1) or none may have the technical and professional staff necessary to undertake in-house design and construction of a project at the same time. In other words, only less than ten percent (10%) of Ghana's contractors have the competences, experience and professional staff to be able to undertake projects on D&B basis.

The construction sector stakeholders in Northern Ghana also attested that the following are significantly important and are considered at the early stages of the project conceptualisation; early start and completion of projects, need to have firm prices at early stages of the project, inputs from the contractor and risk avoidance. Majority of the respondents here (79%) saw quality standards desired as very important and must not be compromised under any circumstance. They however attached very little importance to single point responsibility stating that for a long time, it was not feasible to contemplate entrusting design responsibility onto the contractor alongside construction. This analysis meant that stakeholders in the industry especially consultants and employers are thinking D&B unconsciously, but the long usage of the current system makes them sceptical about practicing these systems. These concerns however, gave a fertile ground that D&B and other procurement alternatives could be adopted and made to work in Ghana. (See table 5 below).

Table 5. *Consultants View on the Level of Importance of the Procurement Path Influencing Factors*

Procurement Decision Influencing Factors/Criterion	RATING							
	Not Important (1)		Less Important (2)		Important (3)		Very Important (4)	
	No of Response	*Percentage*	*No of Response*	*Percentage*	*No of Response*	*Percentage*	*No of Response*	*Percentage*
Early Start and Completion of Project	0	0%	1	7%	8	57%	5	36%
Need to have Firm Price before Committing to Proceed	0	0%	2	14%	8	57%	4	14%
Quality Standard Desired	0	0%	0	0%	3	21%	11	79%
Obtaining a Building at the Lowest Cost	2	14%	2	14%	2	14%	8	57%
Single Point Responsibility	3	21%	9	64%	2	14%	0	0%
Obtaining a Functional Building to Fit for Purpose	0	0%	4	29%	8	57%	2	14%
Input from the Contractor	0	0%	3	21%	9	64%	2	14%
Risk Avoidance	0	0%	1	7%	8	57%	5	36%
Averages	0.6	4%	3	20%	6	43%	5	33%

Source: Author's Field Study, 2016

In addition to the above features of D&B, the research further revealed that detailed project information or project brief and reduction in time and cost overruns are deemed very important to the client in his consideration of the influencing factors. However, need to maintain direct contact with the contractor which is one of the attributes of D&B was considered less important to the Ghanaian employer particularly in the Northern Regions. Again, the ease with which changes and variations could be introduced as the project progresses is of reasonable importance to the client.

These responses strengthened the view that clients' requirements and demands are changing and are gradually shifting towards those of the contemporary building procurement systems such as D&B. Although the desire to exercise control over the project delivery process may not be effectively achievable under D&B, majority of the issues that the Ghanaian Client/Employer attaches importance to, are better addressed under D&B system of procurement and thus points to the possibility of its adoption as a construction procurement system.

Clients willingness or otherwise to contract with one construction firm for both design and construction process (single point responsibility) was also sought. Sixty (60%) of the respondents' especially private and corporate clients indicated their desire for single point responsibility (D&B). This means that private clients in particular would prefer single point responsibility. Most respondents however added that the calibre of contractors in Ghana's construction market lack the technical and professional competence to engage in the design of projects.

Public sector clients (metropolitan, municipal and district assemblies) were quite sceptical about allowing the contractor to engage in the design and at the same time the construction. Most of these respondents saw it as a recipe for 'confusion' in project delivery and may raise issues of conflict of interest. The respondents also stated that, it was unacceptable under the current codes and ethics for one organisation to be the consultants and the contractor at the same time. This group constituted forty (40%) of the respondents.

On whether clients are ready to pay someone else for the risk of time and cost slippages, majority of respondents, most of whom were private and corporate clients answered in the affirmative. The public sector respondents stated that irregularities and bureaucracies on their (employers) part were to blame for the time overruns which mostly culminate into additional costs. They added that if these processes can be streamlined, there would be no need to pay extra or someone for time and cost overruns.

This group however acknowledged that avoidance or transfer of risks associated with project delivery will be preferable to its management or absorption. The responses clearly indicated a willingness to apply the elements and characteristics that are inherent in D&B in the Ghanaian construction industry. They cited effective and efficient co-ordination, stronger integration and the need to adequately prepare the construction industry towards future challenges as the main motives for their preference.

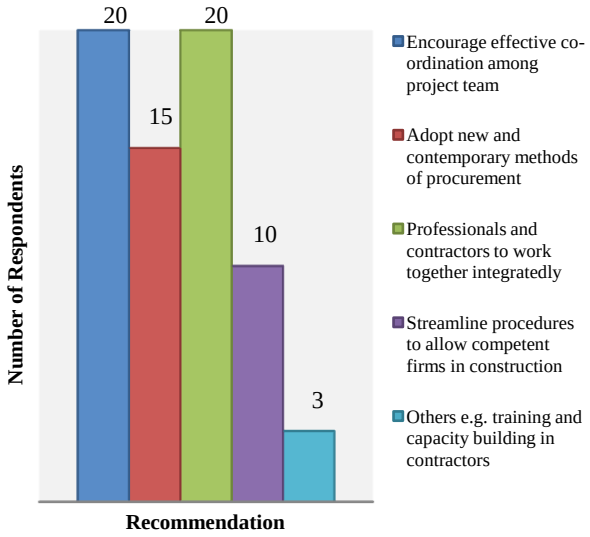

Figure 7. Recommendations on Preparing the Construction Industry towards Future Demands. Source: Author's Field Study, 2016

5. Conclusions and Recommendations

The Ghanaian construction industry is still immersed in DBB despite greater knowledge of D&B and other alternative systems. The research findings revealed that the construction industry is beset with problems including delays in starting projects, high claims, cost and time over-runs, uncontrolled variations and disputes. The industry is also dominated by small size construction firms which are largely inexperienced and lack the requisite professional competence to undertake projects on D&B bases. Moreover, the kind of construction projects being delivered does not encourage the use of D&B method of procurement in Ghana and particularly in the North Regions. The above findings tend to signify lack of readiness of the Ghanaian construction industry to immediately adopt and use D&B as a procurement system. Despite the observation that clients' and employers' demands in recent times suggests a shift from the current trend of procurement, the continuous dependence on one employer (Government through its ministries, departments and agencies) continuous delivery of large proportions of simple and mundane kinds of buildings, proliferation of small sized construction firms and the dogmatic nature of professionals to introduce new procurement systems might make it difficult for D&B to be adopted sooner. Therefore, a number of measures may have to be put in place or addressed in order that D&B can be adopted as an alternative construction procurement system in Ghana or alongside DBB.

The construction firms should be adequately conscientized to as a matter of necessity, employ professionals and technical staff. This will develop capacity and competence in the organizations to enable the delivery of projects on D&B basis. A chunk of the construction

organizations lack the expertise to design mainly because of the absence of professionals within these firms. Construction firms should be ready to pay adequate and appropriate remunerations to professionals in order to encourage the professionals to accept to work with the firms. This will ensure greater integration and eventually equip the contractors with the requisite expertise to undertake D&B in Ghana.

Government should take steps to review institutional procedures and building codes to give room for D&B as an alternative procurement system. This particularly recommend that, the Ghana Government Articles of Agreement and Conditions of Contract and the Public Procurement Act be reviewed and updated to include specific clauses on the responsibilities of parties under a D&B arrangement. The current codes of ethics debar consultants from doubling as contractors.

A nationwide seminar should be conducted for employers/clients, consultants and contractors on the benefits and advantages of D&B procurement system. This will help facilitate the partnership between employers, architects, engineers, quantity surveyors and contractors to undertake projects via D&B.

In order for D&B to work in Ghana especially in the public sector, administrative procedures need to be streamlined and sanitized to eliminate the bureaucracies that do not allow speedy and timely implementation of projects. A number of respondents inferred that the current administrative and public sector ethics is characterized by a lot of procedural bottlenecks with respect to the procurement and delivery of building projects.

D&B system should be introduced on pilot basis in some selected projects, especially in the public sector. This can be achieved by encouraging and facilitating professionals to work with some selected contractors. Although evidence [7] suggests that significant number of projects have been delivered under D&B system of procurement in Ghana, this is largely on an adhoc arrangement and members' responsibilities are not clearly defined by statute. If this is not addressed, the method if adopted could have litigious consequences.

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