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Procurement of Developmental Projects in Ghana: A Literature Review of the Designer-Led System Verses the Producer-Led Systems

Joseph Ignatius Teye Buertey[1, *], Emmanuel Dadadzogbor[2], Felix Atsrim[1]

[1]Department of Built Environment, Pentecost University College, Accra, Ghana

[2]School of Engineering, Accra Institute of Technology, Accra, Ghana

Email address:

jbuert@yahoo.co.uk (J. I. T. Buertey)

[*]Corresponding author

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Abstract: Procurement is a very important aspect of the chain link process of infrastructural delivery. Through procurement choices in terms of project delivery and construction technology is agreed by key stakeholders. Irrespective of the concomitant challenges of the traditional Design Bid Build (DBB) method of project delivery commonly employed in Ghana, which has been noted for schedule delay, corruption, cost overrun and low quality; project stakeholders still employ this method in the delivery of over 90% of infrastructural project. The purpose of this review is to advance the reasons for the continuous use of the traditional method of procurement, factors hindering the adoption of other procurement methods and explore the possibility of stakeholders embracing other producer-led procurements. As a qualitative based study, the work was based on extensive desktop literature review from journal, periodicals, articles and previous related works. Findings from the study pointed out that the use of the DBB was basically due to familiarity by stakeholders, the small scale of projects executed in Ghana, the competence and capacity characteristics of the local contractor and the form of contract used in the delivery of construction projects. The study concludes that the construction industry in Ghana is not fully ready for a switch to producer-led system as an alternative to DBB since less than 10% of local contractors have the capacity. Again, most of the high profile firms ready for the adoption of DB are foreign-based firms; a switch would disadvantage the local contractor who lacks the necessary capacity. In conclusion, the Ghanaian contractor needs to build capacity in terms of human and technical skills to help position on the right pedestal.

Keywords: Local Contractor, Design and Build, Design Bid Build, Procurement, Designer-Led, Contractor Led, Relationship

1. Introduction

Since the inception of the architectural and quantity surveying practice in Ghana, the traditional system of procurement has been the main procurement method adopted in Ghana [1]. On the level of knowledge of the various procurement systems by contractors, consultants and clients, Kyei [2], ranked design and build second to the traditional system even though it is sparingly used. However, the Ghanaian construction industry continued to use the traditional system basically for reasons of familiarity with its procedures and wider applicability. Other major reasons for its use include size of firms and contracts involved, and because it is also the only procurement system with legal backing through the form of contract. Its advantages include competitive fairness and satisfactory public accountability, relative ease in quality checks, arranging and valuing changes and probably fully developed designs details prior to commencement of construction. The traditional system of procurement is however widely criticized for a number of weaknesses. The system is generally slower to start and open to abuse resulting

in less certainty [3]. It commits the client to several contractual relationships and does not encourage coordination and integration amongst project delivery teams, it is adversarial, and tends to encourage the proliferation of small inexperience firms in the market. The concept does not bring the rich expertise of the contractor to bear on the project during the design stage [4]. It is important to note that with the current trends and requirements of the constructions industry in the world over and Ghana in particular, the traditional system of procurement may have to studied and reviewed as the main procurement option for delivering construction projects. This is particularly so since it lacked the 'character' to adequately address the challenges of today's construction needs as in early start of construction, more integration and collaborative working, early cost certainty, risk management and avoidance by clients, better buildability etc. It is therefore time the Ghanaian construction industry started reviewing the strength and weakness of the traditional procurement method vis-vis contemporary systems to enable a re-orientation towards modern contemporary procurement systems for the purpose of strategic positioning. For the purpose of this research the focus shall be a review of the key characteristics, advantages and disadvantages of the designer led and producer led systems [5].

Winter [6], classifies procurement into 3 broad categories: designer-led, management oriented and producer-led as displayed in figure 1 below. The designer-led system is primarily the traditional design and build system whilst the producer led system an amalgamation of integrated procurement systems and discretionary systems.

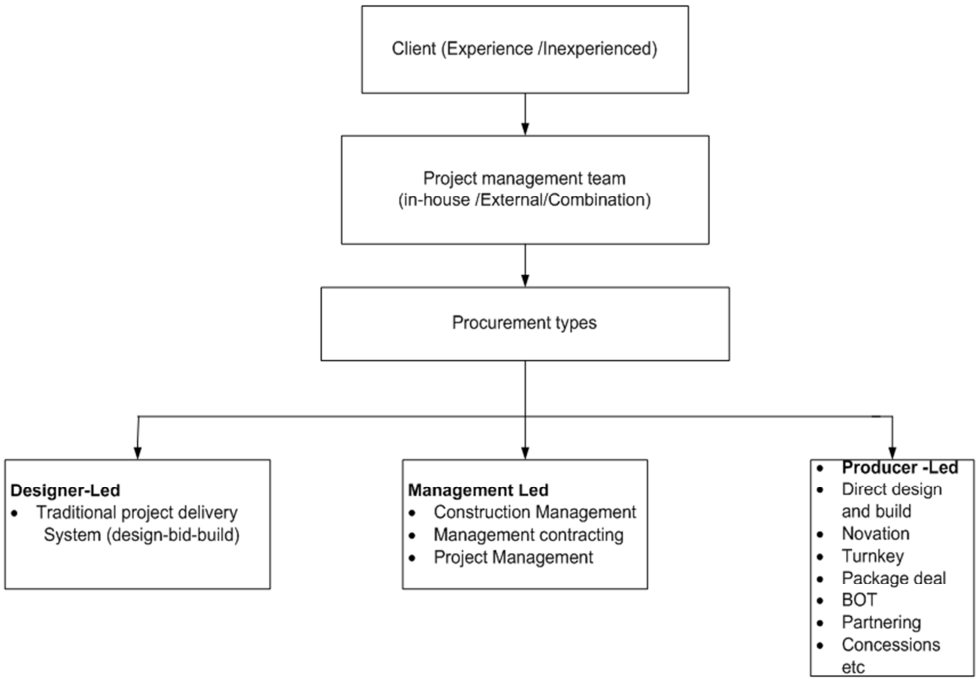

Fig. 1. *Classification of Procurement System. Source [6].*

2. Design and Build Procurement System

According to [5], Design and Build (D&B) is an "arrangement where one contracting organisation takes sole responsibility, normally on a lump sum fixed price basis, for the bespoke design and construction of a client's project". This means that the responsibility for design and construction rests with one organisation. [2], describes D&B as a procurement system where the client manages the design and construction process by using a single point of contact, i.e. the main builder, usually referred to as the Design-Builder. This is displayed in figure 2 below. In their book entitled Procurement, Tendering and Contract Administration, [2], referred to D&B as an arrangement in which the contractor undertakes both to design and to construct a project for a single contract sum. In addition, [9], described the system as a method of procurement that enables one building contractor, or a construction company, to take the full responsibility and to carry the sole liability for the design and construction of the building.

In agreement to the above definitions, the Construction Round Table (1995) in "*Thinking about Building: the Business Round Table Ltd."* sees the procurement approach as design combined with construction. This source stated that, D&B is the arrangement where the finished building is bought from a single contractor who is responsible for its design and construction. In effect, apart from the construction role, D&B essentially combines all the fundamental tasks in the construction project design, production and the management in one single package. Various authors and construction professionals give several definitions and explanations of D&B, but the simplest idea of the system that is contained in all definitions and descriptions is that the contractor takes the responsibility for both the design and construction for a lump sum [10] as shown in figure 2. The

system is generally a procurement approach that encompasses variants such as novation, develop and construct ('turnkey'), and package deals, which are dealt with in much more detail later.

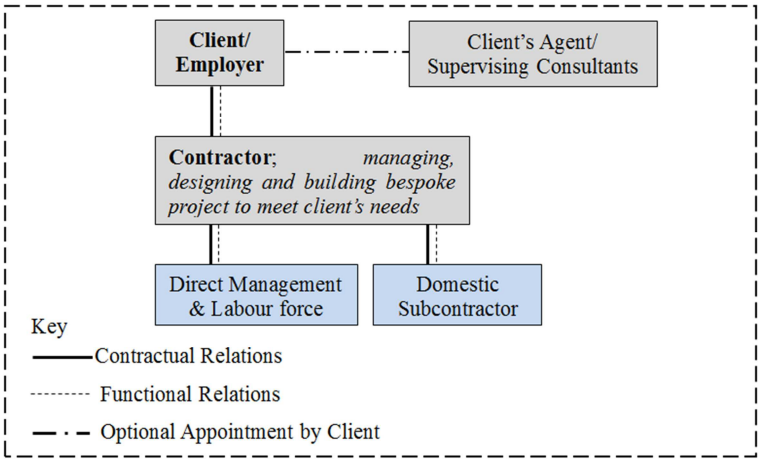

Fig. 2. *Contractual and Functional Relationships in Design & Build Source: [7].*

Once the main contractor or the contracting organisation takes sole responsibility for both the design and construction, the contractual and functional relationship between the construction team becomes simpler when compared with most other procurement systems. The contractual and functional relationship between the various members of the project team is illustrated in figure 2 above.

2.1. Evolution of Design and Build

Design and Build (D&B) is believed to be the oldest procurement system that is still in use, preceding the emergence of architecture as a profession in the middle of the eighteenth century. During these early times, it was first the client, then the architect and finally master builder who was solely responsible for both the design and construction of most building projects. Hughes [11] indicated that, the emergence of the traditional general system of procurement in the nineteenth century was as a result of separation of the responsibility for fabrication from that of design, and which saw the dominance of the traditional system of procurement. The period between the middle of the eighteenth century and the middle of the twentieth century, which marked the renaissance of architectural profession, saw the 'traditional' general system of procurement dominate all other forms of procurement. However, in the late 1960's and early 1970's, or the period after the Second World War, D&B begun to re-emerge from its period of dormancy but only initially to answer the needs of ambitious targets set by the UK government for the public housing sector [7]. At about the same time, there was a greater use of D&B system for industrial and commercial projects in the USA, and gradually, following the lead from across the Atlantic, private-sector clients began to adopt the approach which was vigorously marketed by contractors. These developments therefore, culminated in significant increases in the level of popularity and usage, of D&B system, in UK and across Europe from the 1970's to date. The D&B began to emerge as the dominant procurement method in the construction industry in the 1970's and 1980's. It was used for more and different types of industrial buildings, hotels and repetitive housing schemes. The growth of D&B and its market share are further discussed below.

2.2. Features of Design and Build

Design and Build (D&B) is characterized by certain essential features that are unique to this type of procurement. These features according to [12], 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.

2.2.1. 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 [12]. 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 [11]. 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/her firm). According to [3], the client may also wish to appoint his/her own consultants to monitor various aspects of the project, even though this is not always the case.

2.2.2. 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/she is not signing a blank cheque" [12]. In the Joint Contract Tribunal, The Design and Build Contract, 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 (The New Engineering Form of Contracts) 3nd Edition, 2005, option clause A (Priced contract with activity schedule) give a useful guide on pricing of D&B [12].

2.2.3. 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. [11], stated that "*this changes some of the basic assumptions about the roles which are required on construction projects".* According to [8], the DB 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 [12]. Once the contractor is responsible for the design under the contract, he bears the same professional liability as a consultant designer. The contractor is therefore expected to 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/her [3]. 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 [12]. These features are considered under the following areas;

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

2.2.4. The Processes Involved in D&B

After identifying the need for a building, the client states his/her requirements adequately in terms of physical design needs and the intended use of the building. According to [14] from figure 3 below, 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 [9] and permits the optimization of design and production costs.

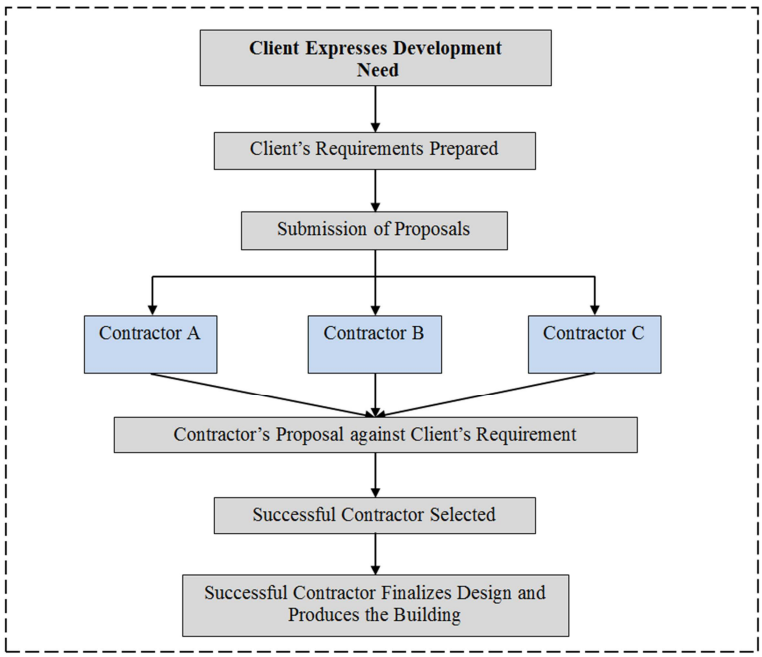

Fig. 3. *Design and Build (D&B) Process [14].*

The D&B system is suitable for standard buildings: industrialized 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 directly to the employer. However, the client normally appoints an agent to look after his/her interest, and to ensure that the contractor's proposal receives planning approvals [9]. [14] describes the process involved in D&B procurement system as illustrated in figure 3 above.

3. Development of Design and Build in UK and Europe

Since its emergence in the 1970's and 1980's, D&B has experienced a continuous growth in market share as it is used for more and different kinds of buildings. Over the years, this method has greatly sharpened and oriented the UK construction sector with numerous advantages. 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 USA as well as the UK, D&B experienced a rapid growth in market share from less than 10% in the early 1980's to 23% by 1990, and was further up to more than 30% by the early part of 2000. According to [15], figures published in the Royal Institution of Chartered Surveyors (RICS) "*Contracts in use survey"* (1994) indicated that in 1993, D&B accounted for 35% (by value) of contracts. Currently, D&B's market share in the UK construction industry stands at more than 43% [15]. In the USA, the increase in the number of D&B projects has been astounding. D&B has risen from 15% in 1990, to 35% by 1999. Compared with the traditional procurement system, D&B exceeds construction speed by 12% and total project delivery speed by 30%. Customers of D&B reckoned that the single point of responsibility, a guaranteed maximum price and avoidance of design and construction risks, are the most important reasons for using Design and Build [16].

The 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 [16]. The system makes for better co-ordination amongst the various professionals involved in the construction project. According to Rimmer [17] of Slough Estates, "*the biggest surprise is that D&B performs well on more complicated, hi-tech buildings rather than simple ones"*. The present trend, coupled with the numerous advantages (that are discussed later in section 3.6) that D&B offers, is an indication that, the system could soon dominate all construction procurements especially in the non-public sector [15]. Design and Build (D&B) system of procurement encompasses four main variants, stated earlier in sections above.

The four variants discussed here include turnkey, develop and construct, novation and package deals. It is however important to note that, like all other procurement systems, many other less common variations of the method may be in use within the construction industry.

3.1. 'Turnkey' Method

According to [9], the D&B approach is referred to as "turnkey" when it includes the complete equipping and/or staffing and commissioning of the building. Under the turnkey system, one organization, generally a contractor, is responsible for the total project from design through to the point where the key is inserted in the lock, turned and the facility is immediately operational [7]. It is stated that the responsibility of the contractor under this variant often extends to include the installation and commissioning of the client's process equipment and sometimes the identification and purchase of the site, recruitment and training of management and operatives as well as arrangement for funding of the project. The operation of the project could equally be taken up by the contractor as part of his/her responsibility under this variant, especially through a private finance initiative (PFI). A typical contractual relationship between the client and the contractor is illustrated in figure 4 below.

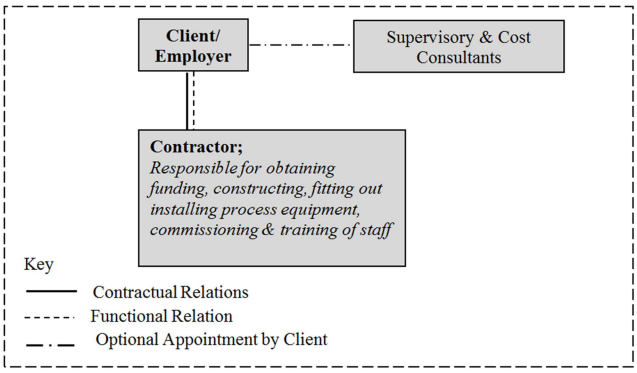

Fig. 4. *Contractual and Functional Relationships in 'Turnkey' Source: [7].*

The 'turnkey' method according to [7] "was pioneered in USA in the 1900s, where it has been extensively used since that time by the private sector, for the construction of process plans, oil refineries, power stations and other complex production facilities". The system has been used sparingly in UK as the amount of work carried out in the industrial and commercial sector appears to be small by comparison to the USA. However, the introduction of the PFI by the UK government in the early 1980's, resurrected the concept which is being used to build and operate major public projects such as the Channel Tunnel, the Dartford river crossing and more recently, various hospitals, prisons, with private finance [3]. From a construction viewpoint, this arrangement echoes all the features of D&B, and provides the client the advantage of being able to take over a fully

operational facility. Where PFI is used, the scheme reduces public-sector capital expenditure in the short term while establishing a commercially viable development in the future. These benefits notwithstanding, [7] asserts that the cost to the client of using the 'turnkey' method can be higher than other more conventional procurement systems.

3.2. Develop & Construct

Under this variant, the client appoints a consultant to design the building to a certain stage and then invites tenders from contractors to develop and complete the design either using the client's consultants, or their own designers and to construct the building [3]. With this approach, the client provides his consultant with a detailed brief, which in some cases he has helped to formulate and from which conceptual drawings/sketch designs and a site layout, including the disposition of individual buildings and their plan forms are prepared [7]. The contractor develops the conceptual design, produces detailed drawings, chooses and specifies materials and submits these proposals with a bid in the same way as with design and build proper. The figure 5 below illustrates the relationship between the construction team under a Develop and Construct arrangement.

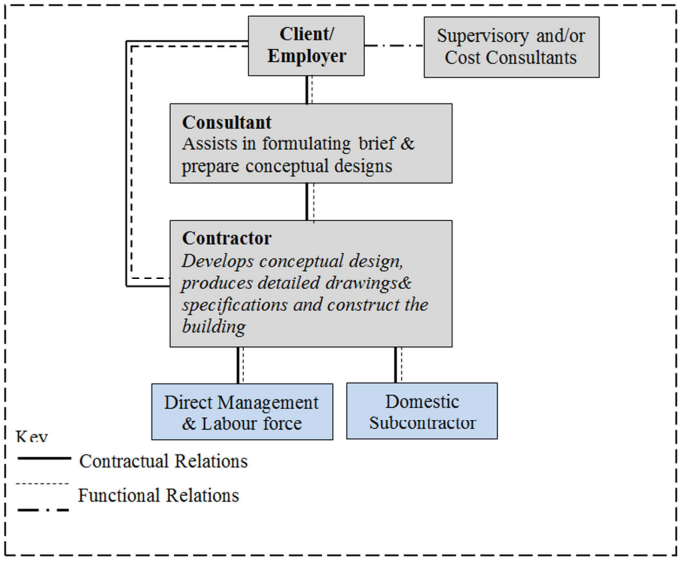

Fig. 5. *Contractual and Functional Relationships in Develop & Construct Source: [7].*

The most appropriate circumstances under which develop and construct form of procurement operates is where the client desires to determine the detailed concept of a project before inviting competitive tenders and yet still requires a single organization eventually to take responsibility for the detailed design and execution of the project. Develop and construct variant differs from the rest in the extent to which the design of the project has been developed by the client before inviting tenders [7]. In most cases, the design will be developed at least up to outline planning stage and may, in sensitive planning locations, be taken to the point where full planning approval could be obtained. The method is said to be frequently used where the client:

- Sees advantages in using a consistently retained consultant with previous experience of similar types of projects
- Employs his/her own in-house consultant
- May wish to limit knowledge of his/her intentions to a trusted few
- Wishes to minimize the differences, so often experienced at tender stage, among normal, individual design and build submissions.

The main benefits associated with this approach as espoused by [10] are: full integration between design and construction through collaborative working, overlapping of the design and procurement without risk of un-priced design development, the reduced need for an additional shadow design team especially where the original team is "novated" and progressive co-ordination. "*The basic criticism for develop and construct lies in possible dispute owing to the involvement of both the design consultants and the contractor in the design of the project*" [7]. Once again, all aspects and characteristics of Develop and Construct echo those of the other forms of D&B which are together classified as "integrated methods". The form of contract for this variant is same as those previously described for the parent design and build approach.

3.3. Novation

Novation is one of the common arrangements under D&B contracts that emerged in recent time, and takes the form of an extended develop and construct. By this approach, the client appoints an architect to design/develop an outline, and the contractor is then made to contract the (same) architect to further develop the details of the outline and to construct the bespoke project [3]. According to [18], "*novation is a form of design and construct agreement in which the client initially employs the consultant to carry out design and documentation to an extent that the client needs and intent are clearly identified and documented (pre-novation contract). On the*

basis of these documents, tenders are invited and a building contractor selected. The client then novate the consultant's agreement to the contractor (post-novation contract), who then takes responsibility for the project completion". Masterman [7], noted that the tender documentation will normally contain details of the client's consultants and the proposed novated procedures, together with a requirement that the eventual winner of the contract will have to accept responsibility for the total design of the project, including the initial work carried out under the client's auspices. The novated arrangement should enable the design of the project to proceed more smoothly from the pre-contract to the post-contract stage. *"Once the contract is novated, the consultants will no longer be available to provide advice to the client on the detailed design, and it is therefore likely that he will need to employ new consultants to examine the final scheme and to confirm or otherwise its suitability".*

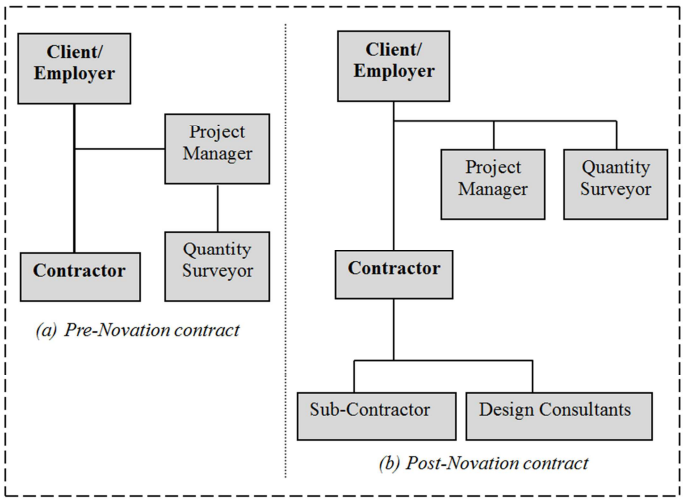

Fig. 6. *Contractual Arrangements in Novation Source: [18].*

Maintaining the same design consultants through all stages of the process which seeks to ensure that design standards are consistent throughout the pre-contract and post-contract phases of the project is reckoned as the main benefit of this system. Siddiqui [18] identified novation to offer additional advantages in several respects; certainty of time and cost, single point responsibility, better transfer of risks, better buildability, less adversarial relationship, easier co-ordination, less bidding competition etc. Figure 6 above, illustrate the contractual relationships between the project team under novation procurement. Like any other construction procurement system, novation cannot be a panacea to all the problems confronting the industry and is indeed beset with certain flaws. It was observed that the main of novation are less control over design quality and less flexibility. As observed by [7], problems can arise when the contractor is compelled to adjust to some predetermined consultants rather than being able to choose his own designers whom he may have successful working relationship with on projects of such nature. This kind of 'forced' arrangement may well produce a less than happy team and productive team compared to the results of a design and build arrangement

According to [7], "while many successful projects have been carried out using this method of procurement, there appears to be no general consensus among any of the participants as to its suitability for use on the majority of design and build projects". However, the University of Reading (1996) report found that novation led to the worst possible outcome for D&B projects, where just about 28% of client's quality expectations were met [19].

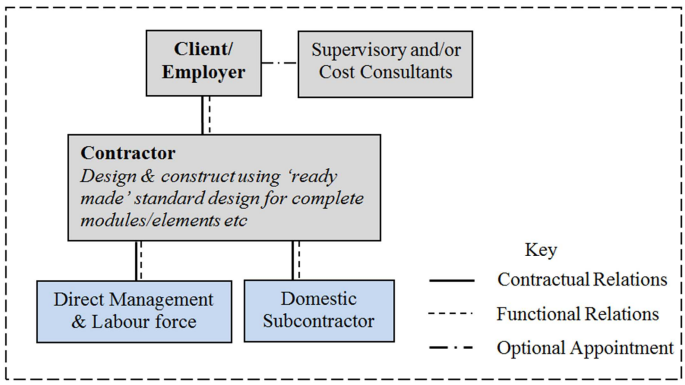

Fig. 7. *Contractual and Functional Relationships in 'Package Deal' Source: [7].*

3.4. Package Deals

The package deal system is reckoned to be the antecedent of D&B method of procurement. The original concept was to give clients the opportunity to purchase a complete 'package', virtually off the shelf, in order to satisfy speedily their building needs at an economic price [7]. The unique features of a package deal are that it uses proprietary building systems to produce scheme. The most fundamental difference between package deals and the other variants is that whereas other variants provide a custom-made design solution to suit the client's specific requirements, package deal uses proprietary systems for the delivery of the scheme. The majority of package deal contractors by their very nature, employ own in-house designers and can thus be categorized as pure Design Builders. These contractors are therefore better disposed to perform well, particularly as a team, and to deliver with speed. It is argued that some of the products of this method lack aesthetic appeal. However, once *"the potential client is often able to see actual examples of the contract's product before reaching a decision this potential difficulty can often be avoided"* [7]. Figure 7 above illustrates package deal system and the various relationships between the members of the project team.

The package deals contracts also replicate most of the characteristics of the D&B system. The forms of contract used are likely to be contractor drafted rather than any of the recognized standard forms and care must be taken by the client if this type of contract is to be used. One outstanding advantage of the system is that the client is usually able to see actual examples of the product in real situations, and be able to assess their practical and aesthetic appeal before entering into the contract (purchase). Also, if the client's requirements are flexibility, the method becomes an attractive proposition particularly as the probable reduction in the design, approval and construction stages of the project can lead to savings in time and cost. The main criticism of this approach lies in the fact that package dealers are unable to satisfy fully the needs and criteria of the majority of clients because they provide an adapted standard product. Some serious structural failures have occurred amongst some of these proprietary systems. The product of this procurement system have also suffered from other less serious defects as a result of poor design and detailing [5]

3.5. Engineering Procurement and Construction

In recent times, the design and build has been branded into an Engineering Procurement and Construction (EPC) for huge engineering projects. The features of the DB and EPC and similar: In both cases, the contractor carries out the engineering design for the project, procures all equipment and materials necessary and construct to deliver a functioning facility. During the execution of an EPC, the client usually procures the services of a Project Management Consultancy team to manage the project on behalf the client. Usually the team that does the Front End Engineering Design (FEED); a preliminary design which forms the basis for the bidding and selection of the EPC contractor. It must be however emphasized that the EPC is different from EPCM (Engineering, Procurement and Construction Management), which is a core professional service contract.

Generally, the EPC contractor has to execute and commission the project within agreed time, lump sum budget and according to the agreed deliverables. This places the risk of time and schedule on the EPC contractor. It is particularly associated with developing and operating facility eg hotel, mine, power plant, water station etc and functions as a turnkey contract when it is expected to commission the facility.

The EPC contract provides a single point of responsibility, provides a fixed time and a fixed cost. In the EPC, procurement is the responsibility of the contractor, who will as well guarantee the achievement of certain performance standards, efficiency and reliability of the facility.

4. Benefits/Advantages of Design and Build

The D&B procurement system, which encompasses amongst others, the variants discussed earlier provides a wide range of benefits both to the client and the contractor. Some of the benefits (advantages) associated with D&B are stated below.

(1) Hackett [8] identified early certainty of contract price as a major advantage, especially where the JCT form of contract is used. According to the USA's Legislative Analyst's Office (LAO) Report (2005), 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. [7] observed that once the client's requirements are accurately specified, certainty of final project cost could be achieved. It has also been established 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" [12].

(2) 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 [16]. 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.

(3) Another important benefit associated with the D&B system of procurement as put forward by [7] is that of single point responsibility. *"The single point of contact between the client and the contractor that is unique to D&B system means that the client has the advantage of*

dealing with a single organisation that is responsible for all aspects of the project. Expressing a similar viewpoint [19], 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, [18] indicated that the responsibility for the design, construction and the required performance of the building lies entirely with one party, the contractor.

(4) D&B involves the contractor at an early stage of the development process, and this results 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 [8]. [11] 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. Some professionals and stakeholders in the construction industry recognize that the involvement of the building contractor in the design process from the beginning provides helpful insights on the construction materials and methods used, and that can make the design more efficient and less costly to construct. Good teamwork and cohesion between the various experts/specialists to function as a unit, engenders buildability [3].

(5) Furthermore, [19] 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 [8]. Adding to this, [7] noticed that the integration under D&B, enabled overlapping of the design with the construction and improved the communication between the client and contractor.

(6) One other benefit of using the D&B system of procurement in the UK and Europe as observed by [19], is that it offers little/no claims for possible delays due to lack of drawn information. In supporting this assertion, [14], stated that 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.

(7) In An Analysis of the JCT D&B Contract in UK, [11] 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.

5. Disadvantages of Design and Build Procurement

Notwithstanding the above benefits that the construction industry stands to enjoy, and indeed has enjoyed through the use of D&B, the procurement system is criticized for a number of shortcomings.

(1) 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. [11] 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, and may engender difficulties in evaluating proposals and tender submissions [11].

(2) 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 [8]. In support of this criticism, [3] 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. Ashworth [20] noticed 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.

(3) D&B is also criticized for its limited assurance on quality control. [7] asserts that *"although well-designed and aesthetically pleasing buildings can be obtained using D&B, the client's control of this aspect of the project is less when compared to other methods of procurements"*. There is always a risk regarding quality and standards as observed by [8]. The view expressed suggests that where the client's brief is not precise and the specifications offered by the contractor are vague, there is likelihood for the builder to reduce standards. Postulating further that the benefits attributed to the system often amount to a mere shifting of the risk from the employer to the contractor. Private sector clients for instance, believed they are escaping having to pay design fees, and that *"the major item that suffers from this is usually overall quality"*.

(4) 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. [11] did state 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.

(5) 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 [3].

6. Challenges Inherent in the Adoption of D&B (Firms and Products in a Design and Build Market)

The manner in which D&B contracts are organized can profoundly affect the quality of the final product. [7], indicated that the recommendation to use the system must therefore be based not only on the type of building required, but also upon the client's expectations in terms of programme, cost in construction, cost in use, risk level, level of specification and quality of design.

The D&B systems or contracts are suitable for a range of standard buildings:

- Industrialized buildings such as factories and warehouses where an early return on capital outweighs design excellence considerations.
- Building using proprietary systems where the manufacturer of the system might well become the main contractor, examples include repetitive housing or low cost hotels, office buildings, residential flats and complexes, educational and/or institutional buildings and hostels.
- On complex/specialized projects for which some contractors are specialists.

By its very nature, D&B requires a well-established and highly experienced firm to undertake such projects. The firm, or organisation, should be capable of employing architects, engineers and/or quantity surveyors either as in-house members, or on fee consultancy basis. According to [3] very few specialist construction organisations undertake D&B contracts, since most firms in the construction industry are smaller or medium-sized and may not have the resources to engage the services of professionals. 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. This risk carries a premium according to [12] 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. Figure 8 below illustrates the level of risk (speculative) that the contractor bears under D&B contract in relation to the level of risk borne under other forms of procurements [5].

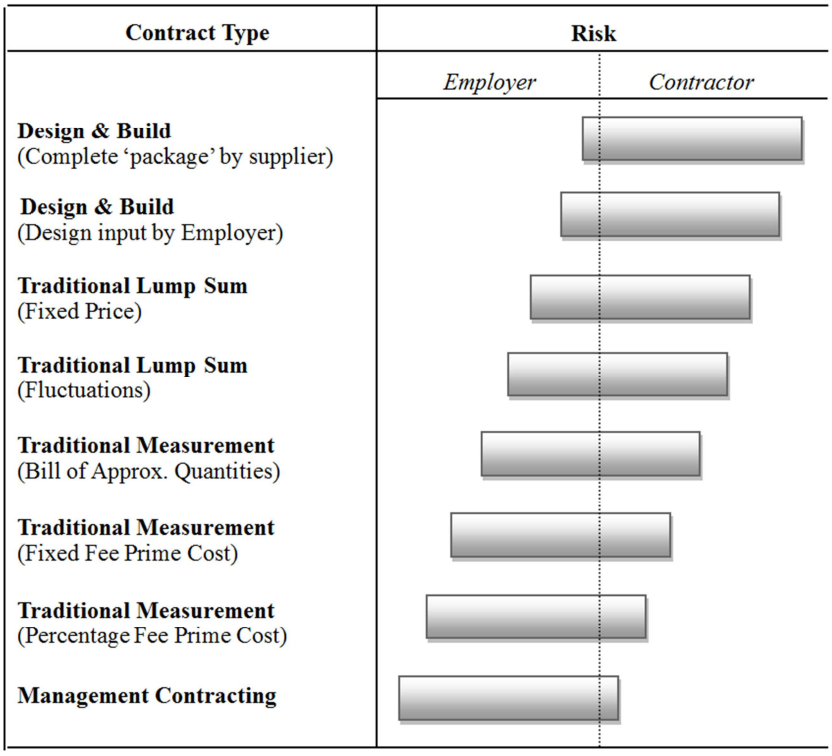

Fig. 8. *Speculative risk by Contract Type Source: [3].*

7. Design-Bid-Build Procurement System

The traditional system of procurement, also called the conventional system, involves discrete design development, tender and contract award and the construction delivery phase. Each phase in theory is separate and distinct as depicted in figure 9 below [21]. The procurement process begins when a client commissions an architect to design a facility; on completion of the design and documentation, contractors are invited to tender for the work. The client subsequently enters into a contract with the successful tenderer to execute the construction process. This process requires that design development is close to 100% complete before tenders can be invited. In practice, however, there are many design issues left incomplete and unresolved requiring amendment or further detailing during the construction process. Open tendering and pre-qualification are the two methods adopted during the tendering process in the above process [21]. The above system has as well 'cast roles in stones' for all parties, making it difficult to negotiate outside the risk of the contract. Another major challenge is that the contractor is isolated during the design process, without any input into the management and buildability of the project. The above has high cost implications since the rich experience and advice of the contractor on specification and cost is not brought to bear in this procurement process. Research has shown that the above results in high contract claims from the contractor. The designers and employers have highlighted the poor design coordination, subsequent design changes to make design detail workable. The implication is that in the adoption of the above procurement process, a client can only be absorbed off the vagaries of this challenge through the incorporation of higher design contingencies and allowances [22].

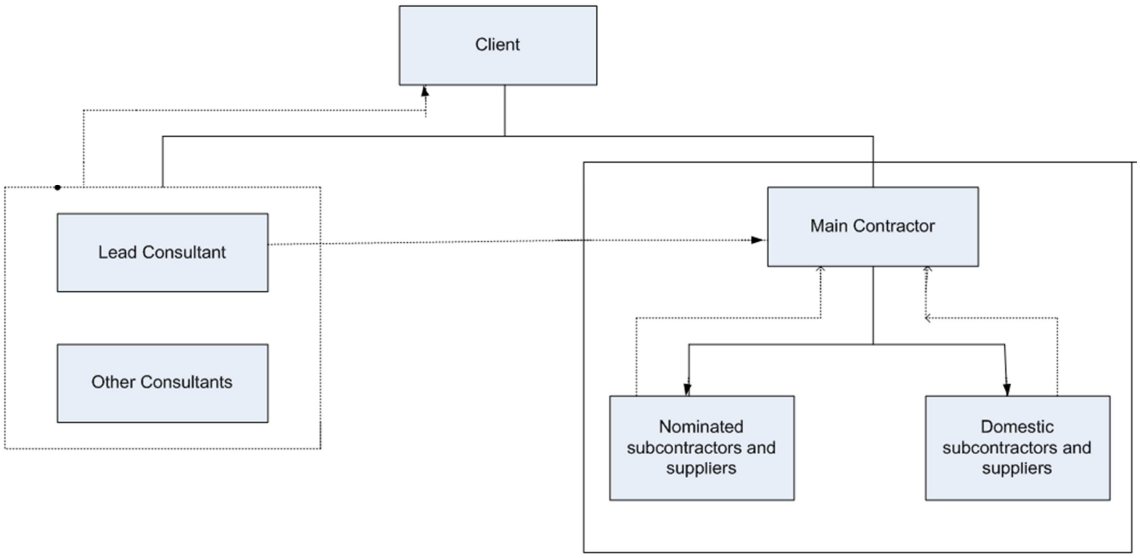

Fig. 9. *Traditional Procurement System Source: [22].*

8. Factors Promoting the Use of DBB in Ghana

As stated in [9], a number of factors tend to encourage the continuous use of the traditional system of procurement even when it has become clear that the increasing complexities of today's construction industry requires the adoption and use of other contemporary methods as alternatives, or to be used alongside the DBB system.

8.1. Long Usage

Long usage of the design-bid-build (DBB) system of procurement has made it become more of an in-house kind of practice and the players of the industry have accustomed themselves to its procedures. [23] noticed that the system dominates the Ghanaian building industry largely because it is well established with wide applicability and simple procedures. [3] asserted that one of the advantages of DBB that accounted for its continuous use is the fact that its procedures are well known in the construction industry. This popularity and long-standing reputation of the procurement system in the Ghanaian construction sector makes it difficult to introduce new and contemporary procurement systems.

8.2. Government as Major Employer

DBB system of procurement has been preferred to the more contemporary approaches especially in Southern Ghana as a result of the fact that for a very long time, central government, through its Ministries, Departments and Agencies including assemblies have been the major employer (client) in the construction industry [24]. Usually, the agency first award an architectural and/or engineering firm (consultant) a contract to design the project based on subjective criteria of qualifications and experience. This contract generally accounts for a relatively small portion of

total costs of the projects, between 5% and 10% [25].

After detailed project plans and drawings including estimates are completed, then funding/budgeting is sought and subsequently a contractor is selected to execute the project. In almost all cases, contracts for construction work are awarded on the basis of competitive bidding [2]. It is this process from single source clientele who basically uses the traditional method for all its procurements of construction projects, significantly accounted for enrooting the system in the construction industry. The effect is that the use of other contemporary systems of procurement is indirectly discouraged.

8.3. Form of Contract

It is also reckoned that the DBB system of procurement will continue to dominate the Ghanaian construction industry largely because of the statutory backing that it receives as against other alternative procurement approaches. The standard 'form of contract' that is used for building contracts is the Ghana government's Articles of Agreement and Conditions of Contract for Building Works *(The Pink Form),* Edition 7 being the latest [23]. There is also the Conditions of Contract for Works of Civil Engineering Constructions (FIDIC) [26], 4th Edition (1992). These documents have been the main forms establishing the responsibilities of the parties to a building and civil projects respectively, and are used for general contracting. Despite several amendments to the *Pink Form* up to the current edition (7th Edition), the document did not state clearly the specific roles of the employer and the other members of the project team especially where alternative methods of procurement is used. Therefore, the players in the construction industry 'stayed' with the traditional form of procurement. Notwithstanding this, a limited number of projects have been delivered in Ghana using contemporary procurement arrangements such as design and build (D&B), management contracting and construction management [24]. Other legislation, like the Public Procurement Act (Act 663) of 2003 [27], which seeks to guide public procurement procedures in public entities in particular, is however mute on any other form of procurement apart from the common practice of activities that are explained under the traditional procurement approach.

8.4. Kind and Magnitude of Projects Involved

[28] Identified the size and/or magnitude of construction contracts in Ghana as a significant factor promoting the continuous use of DBB system of procurement. Until quite recently, the kind of designs and structures put up were so simple, ranging from single to a few storey heights buildings such as school buildings, residencies like Social Security and National Insurance Trust (SSNIT) Housing Schemes, Low Cost Housing Schemes, office accommodations etc. [24]. With particular reference to Southern Ghana, most projects are single storey with straight and simple geometry that do not require extensive engineering or multi-faceted technical applications. This therefore does not encourage the use of newer/alternative procurement options such as D&B which is said to perform well on complicated and hi-tech projects [17], and which is the focus of this research. It is recognised that the traditional system of procurement (DBB) works best where the kind of projects involved are simple, and size or magnitude smaller. Complex and hi-tech projects will definitely require greater integration and co-ordination of all facets of the project to which modern procurement systems such as D&B is best at delivering.

8.5. Size and Nature of Firms in the Construction Market

Furthermore, the sizes of the firms in Ghana's construction business contribute significantly to the reliance on DBB system of procurement. Most of the registered construction organisations (firms) in Ghana are relatively small in size with single proprietorship [2]. Most of these firms are registered with the registrar general as limited companies and hence have the legal mandate to operate as construction firms in the sector. However, the fact that they are sole proprietorships imposes a limitation on their capital base [3]. The limitation in size of the construction firms hampers their ability to employ professionals either as in-house members or on fee basis to constitute one organisation for purposes of undertaking projects on D&B basis. It must be mentioned however, that there are a few well established construction firms dotted around the country, especially in Southern Ghana, which are well resourced and have the experience and capability to deliver projects as D&B companies. [24] identified a number of projects that has been delivered by some of these firms using D&B approach. What is yet to be established is the *"form of contract"* under which these arrangements, or the terms of engagement were.

9. Advantages of the DBB Procurement System

The traditional procurement system (DBB), which is the dominant method of procurement in Ghana's construction industry, possesses a number of advantages or benefits. Perhaps these are the reasons for which it dominates other procurement methods in the market. These advantages, as identified by various practitioners, researchers and stakeholders in the construction businesses, included the following.

9.1. Wide Applicability

The system is said to be widely applicable, well understood and with well-established and clearly defined roles for the parties involved [23]. It is the most common approach for public projects and government contracts where there is the need to comply with state procurement statutes [2]. According to [3], the traditional system of procurement is one whose procedures are well known, largely due to its use over a long period of time.

9.2. Fully Defined and Detailed Project Designs

DBB system of procurement makes for fully defined and detailed project designs. Under this approach, the facility that the client or employer wants, is completely defined by detailed working drawings and specifications before bids are solicited [9]. This means there is little uncertainty about what is desired and what the contractor is required to deliver. DBB thus ensures that there is certainty in the projects' design. The processes under the procurement system are a series of end-on activities and each activity/phase must be completed before the subsequent one is undertaken [1]. The sequence of these phases which include brief, design, tendering and construction is illustrated in the diagram (figure 10) below.

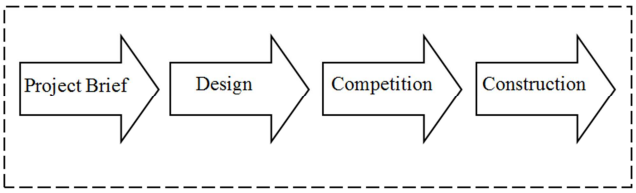

Fig. 10. *Sequence of Project Delivery under DBB Source: [3].*

9.3. Objectivity of Award

One of the greatest advantages of the traditional system of procurement is its objectivity in the award of contracts. Unlike D&B and others, DBB procurement method gives tenderers an opportunity to price their tenders on a common basis. In Ghana, the contract is mostly awarded to the bidder who offers to construct the building for the *lowest evaluated price*. It must be said that the bids are usually subjected to detailed scrutiny and proper evaluation by contract administrators and quantity surveyors (these consultants acting on behalf of the client). The winner most often than not emerges from an objective process. Furthermore, the competition motivates bidders to offer the lowest but economically viable price possible since most contracts are awarded on the criteria of lowest price amongst other factors. The detailing of the working drawings and specifications eliminates the need for high contingencies which most often than not culminate to increase bids/tenders.

9.4. Competitive Fairness and Satisfactory Public Accountability

In addition to the above, the DBB procurement system offers competitive fairness and satisfactory public accountability [3]. Ghana in particular, the Public Procurement Act of 2003 (Act 663) [24], which is the blueprint for procurement procedures in all public entities, categorically requires that procurement activities be carried out in a competition [24]. The procedure as described has the tendency to reduce the opportunity for bias and inappropriate influence in awarding the contract, though this does not necessarily mean that it eliminates completely potential abuses and improprieties. The contracts for the consultancy practices themselves are awarded based on competitive criteria of experience, qualifications and competencies, though this is often subjective under certain circumstances. The traditional system therefore is practiced in line with required public procedures and supported by statute.

9.5. Better Assurance on Quality Control

[24] indicated that DBB system of procurement provide relatively better assurance on quality control. The detail working drawings and specifications provide the basis for controlling quality. Since the drawings and specifications are the basis of the contract, they form the yardstick for comparing quality standards such as workmanship, materials and technology. In Ghana's construction industry, the use of a traditional bill of quantities (BoQ) is an integral part of the contract. The BoQ makes it relatively easy to arrange and value changes as the system is characterized by unlimited variations. In support of this feature of DBB, [3] observed that the traditional system makes the valuation of variations relatively easy to calculate.

9.6. Access for Small/New Contractors

Furthermore, DBB system of procurement to some extend provides good access for small contractors. Perhaps, the factor that proliferate a lot of small construction firms in the Ghanaian construction industry especially in Northern Ghana. [2] suggests that by awarding contracts based on price, the traditional process provides the best opportunity for qualified small and new contractors to obtain contracts which otherwise would have been difficult under arrangements such as Design and Build. Small and newly established contractors may be able to carry out certain types of work at a lower cost than large competitors because of lower overhead and less mechanisation.

10. Problems Associated With DBB in Ghana

The use of the traditional system of procurement in Ghana is not without difficulties. A number of researchers and practitioners do reckon that notwithstanding the benefits enumerated, the system is characterised by the following disadvantages.

10.1. Lack of Inherent Buildability

According to [23], under the DBB system of procurement, there is absence of input into the project design by the contractor, and that this may limit the constructability of the project delivery. The builder is not usually known until after the design work has been completed, tendered for, and a contract awarded. This means the design rightly does not incorporate inputs from the contractor on materials and methods (constructability) that could improve the building's design, functionality, and cost. [7] observed that, during the design process, the designers work in isolation, far removed from the contractor who will carry out the project construction. This makes for limited opportunities for

ensuring better co-operation and buildability.

10.2. Adversarial Relations

Design-Bid-Build (DBB) procurement system as practiced in Ghana tends to promote adversarial relationships among the project team rather than co-operation and co-ordination [2]. Errors and omissions in the working drawings and specifications prepared by the consultants, constitutes a major source of conflict in a DBB procurement system. [23], observed that under the traditional system in Ghana, the owner is generally exposed to contractor claims, over-design and constructability issues since he (the employer) accepts liability for design in the contract with the contractor. Under the system, the client hires the consultants directly, whilst the law holds the employer to be the guarantor of the completeness and accuracy of the consultant's work. This often draws the client into disputes between the designer and the builder. [1] reckoned that one of the major disadvantages of DBB system of procurement has been the attitude of "them and us" that tend to develop between consultants and contractors. This often results in rigid lines of communication and creates a low level of flexibility in the relationships [1]

10.3. Requires Increased Oversight

Under DBB, it is claimed that the contractors usually pursue a least-cost approach to completing projects. According to [23], this requires increased oversight and quality review by the employer. To this extent, most employers are 'compelled' to engage additional technical staff (Site Agent, Supervisors) on the project to ensure that the construction and project delivery is in line with agreed standards.

10.4. Multiple Contractual Relations

According to [7], the traditional system "involves the client in a number of differing relationships with several organisations, and many inexperienced customers are dismayed at the complexity of the process and at the size and cost of employing the design team itself". [2] recognizes that the traditional systems 'pushes' the client into several contractual relations, which are illustrated in figure 7 above. This tends to be a disadvantage in the sense that in the event of problems, the architect accuses the contractor of faulty construction, and the contractor blames the architect for faulty design and so on, resulting in "finger pointing".

10.5. Slow in Starting on Site

DBB system of procurement is also criticized for being generally slower compared to others such as design-build and management contracting. This is attributed to the separated and sequential nature of the processes involved. [2] asserted that DBB is time-consuming since all design work must be completed before contracts are solicited. According to [3] the traditional procurement method is slow to start on site and hence does not allow for parallel working. The fact that the process of designing, tendering/bidding and building is far removed and separated (illustrated in fig. 2 and fig. 3 above), gives room for delays that otherwise could have been avoided. This weakness, however, may not necessarily be a disadvantage in the case of larger projects because procurement extreme care and professionalism needs to be exercised in such projects to ensure minimal errors.

10.6. Proliferation of Miniature Construction Firms

The traditional procurement system's advantage of creating opportunities for small contractors is nulled with the proliferation of miniature and small size construction firms. This is particularly so in the case of Southern Ghana where most contractors lack the necessary experience and capacity to execute construction contracts to the exactness of standards and specifications. This might be the reason for abandoned and uncompleted building projects all over the country, as many contractors lack the resources, both finances and professionals, to apply appropriate techniques to specific contracts.

10.7. Unwieldy Variations

DBB system is also characterized by huge and unwieldy variations especially in the case of public clients. The introduction of changes tends to throw construction programs over-board, compelling protracted extensions and associated problems. This also acts as a disincentive to contractors to save cost, and adopt best management practice, thereby exposing clients to avoidable claims and controllable cost and time overruns.

11. Future of DBB System of Procurement in Ghana

In the wake of continuous changes in clients' demands and characteristics, some of which are given below, the Ghanaian construction industry may have to review the use of the traditional system as the main route for the procurement and/or delivery of construction contracts.

- Movement of corporate businesses and clients into the construction market
- Clients becoming increasingly aware of alternative procurement options and are now demanding better value for money
- Early knowledge of project cost and its certainty for planning purposes
- Increased interest in collaborative working and joint ventures
- Risk avoidance and/or transfer
- Early start and completion of projects
- Better co-ordination of the construction delivery process

There is evidence that major projects have been delivered using other procurement routes [24]. 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 a more collaborative, and co-ordinated procurement arrangement rather than the mundane conventional procurement system (traditional). 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 are located in Northern Ghana suggest that these firms may be able to undertake projects on D&B bases. The challenge however is that, most of these contractors are foreign-based contractors. These construction firms are so developed that they established branches in other regions of the country, with in-house professionals 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. With the recent discovery of oil, there exists a host of opportunities in several sectors including the construction sector in Ghana. The construction industry in particular will soon be tasked to supply physical infrastructure to meet the growing/development needs of the country. There is also the Northern (Savannah) Accelerated Development Programme which seeks to inject massive capital investment in the Northern regions in order to bridge the development gap between the North and the South of Ghana. This obviously will include the construction of ultra-modern facilities and edifices and hence place a huge responsibility on the construction industry to deliver all this within the near future.

12. Conclusions and Recommendations

Based on the discussions above, it is clear the future of designer led procurement system has a daunting future since by its very nature; it may not be able to respond adequately to address the future demands of the industry. There is therefore the need for the construction industry in Ghana to brace itself in readiness to vigorously adopt modern contemporary procurement systems. It was revealed in the study by [5] that on the average 91% of projects procured in Ghana used the traditional procurement method with 2% using design and build and the remaining 7% for the other finance based procurement routes. In a related study by [5], 92% of professionals in Ghana hold the opinion that less than 10% of the local contractor is ready for a switch to emerging producer-led procurement routes. This finding supports the assertion by [3] that, very few construction firms have the expertise to embark on design and build. The observation that many Ghanaian contractors lack the expertise to undertake design at the same time the construction meant that on the basis of contractors' capacity and capabilities alone, the adoption and use of D&B on a large scale at present may not be feasible.

By implication, though the design and build strategy may be adopted for isolated projects, it can be concluded that Ghana may not be ready as a nation to fully embrace the producer-led design and build for majority of its projects. Thus we risk switching to design and build procurement system to favour the foreign-based contractors at a disadvantage of the local contractor. It is thus recommended that the Ghanaian origin local contractor must position himself strategically through capacity building by developing their technical, professional, financial and human capacity base to position them for the future in order to be found competitive when such procurement strategies are to be adopted.

References

[1] Osei-Tutu, E. (1999) *Construction Procurement Decision in Ghana*. Unpublished MSc Thesis, Department of Building Technology, KNUST-Kumasi

[2] Kyei, K. A. (2009) *Procurement Systems and Project Success in Ghanaian construction industry.* Unpublished Masters Thesis, KNUST-Kumasi

[3] Coles, D. (2009) *Lecture Notes on Project Evaluation and Development*. HAN University

[4] Buertey, J. T. I., Asare S. K. (2014), Public Private Partnership in Ghana: A Panacea to the Infrastructural Deficit? International Journal of Construction Engineering and Management 2014, 3(5): 135-143

[5] Buertey, J. Dadadzogbor E. (2015). *The Design and build Procurement system: An elixir of Project failure?* (1st Edition) Lambert Publications.

[6] Murdoch, J., and Hughes, W. (2008) *Construction Contracts, Law and Management.* (4th Edition). London and NY: Taylor & Francis.

[7] Masterman, J. W. E. (2008) *Introduction to Building Procurement Systems*. (2nd Edition). London: Taylor & Francis

[8] Hackett, M., Robinson, I., and Statham, G. (2007) *Procurement, Tendering & Contract Administration.* Oxford: Blackwell Publishing

[9] Abudey, W. (2005) *The Use and Effectiveness of Construction Management as a Procurement System in the Delivery of Building Projects on Ghanaian Construction Industry.* Unpublished BSc. Thesis, Department of Building Technology. Kwame Nkrumah University of Science and Technology (KNUST)-Kumasi

[10] Rowlinson, S. (2006) *Procurement: Develop and Construct.* The Building, February 8, pg 68

[11] Hughes, W. P. (1992) *An Analysis of the JCT D&B Contracts.* Chartered Institute of Building (CIOB) Construction Paper, No. 6

[12] Murdoch, J., and Hughes, W. (2008) *Construction Contracts, Law and Management.* (4th Edition). London and NY: Taylor & Francis.

[13] Engineering and Construction Contracts, (2005) *The New Engineering Form of Contracts.* (3rd Edition) (NEC3). Office of Government Commerce, UK

[14] Kwakye, A. A. (1997) Construction Project Administration in Practice. Addison Wesley

[15] Hoggs, K. and Morledge, R. (1995) *Risks and Design & Build and build: keeping a meaningful perspective,* CSM, Monthly, May, 1995, Vol 14, No. 7. 32-33

[16] Chevin, D. (1996) *Keeping up Appearances.* The Building, June 14, page 38-41

[17] Rimmer, B. (1996) *Keeping up Appearances.* The Building, June 14, pg 38-41

[18] Siddiqui W. A. (1996) *Novation: and its comparison with common forms of procurement*. (CIOB) Construction Paper, issue Nº 60

[19] Minogue, A. (1999) *Clash Points*. The Building, (October, 29)

[20] Ashworth, A. (2008) *Pre-Contract Studies, Development Economics, Tendering and Estimating.* (3rd Edition). Oxford: Blackwell Publishing

[21] Winch, G. M. (2000). Institute reform in the British construction: Partnering and private finance *Building research and information*, 28, 141-155

[22] Winter, C. H. H. (2002). On the appropriateness of contractor-led procurement-an investigation of the circumstance and consequences. *Von der Fukult Fur Wirtschaftswissschaften der Technischen Universitat Bergakademic*

[23] Adu-Poku, P. O. (2006) *Project Management as an Alternative to the Traditional Procurement Method in Project Delivery in Ghana*. Unpublished BSc. Thesis, Kwame Nkrumah University of Science and Technology (KNUST) - Kumasi

[24] Ameyaw, C. (2009) *Design and Build verses Design-Bid-Build Method in Ghana.* Unpublished MSc. Thesis, Department of Building Technology. Kwame Nkrumah University of Science and Technology (KNUST) - Kumasi

[25] Articles of Agreement and Conditions of Contract for Building Works (2000). 7th Edition. (*The Pink Form)*

[26] Ghana Government's Public Procurement Act, Act 663 (2003)

[27] Kojo, M. A. (2005) *Procurement of Contracts in the Informal Sector of the Construction Industry of Ghana.* Unpublished BSc. Thesis, Department of Building Technology, (KNUST) - Kumasi