EVALUATING THE PRACTICE OF THE DESIGN-BUILD PROCUREMENT METHOD IN SOUTH AFRICA

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ABSTRACT

A well implemented good practice of Design-Build procurement method brings different disciplines and aspects of construction process together, which in turn minimizes the incidents of constructors having to repeat work, and thus, result in cost and time savings. This type of procurement method increases the probability of a successful project that meets the expectations of all stakeholders. A bad practice of Design–Build procurement method increases the probability that the project's performance will be compromised and that some or all of the stakeholders disappointed. The aim of this research is to determine whether Design-build procurement method is rightly practiced in South Africa. Data were collected from consultants and contractors using a structured questionnaire via personal contact and email. The collected data were subjected to descriptive statistical analyses. This paper argues that design-build procurement is not correctly practiced in South Africa. This may be due to the late introduction and the level of understanding of the procurement method.

KEYWORDS: Construction procurement, Design-Build practices, Design-Build projects.

INTRODUCTION

The design-build system is probably the oldest in the world. Master builders were providing buildings to meet the client's individual needs long before architecture became separated from the building process (traditional procurement method). Design-build is, therefore, a return to a former system which re-emerged in the post-war USA mainly for industrial and commercial projects, when architects tended to ignore their code of practice which precluded them from becoming contractors. This statement above was further explained by Watson (2009), that the design-build project delivery method is a return to some of the fundamentals of the Master Builder approach where the architect is the central figure responsible for total project accountability from inception to completion, and strictly liable to the owner for defects, delays, and losses. By the 1970s many American architects were involved in design-build to the point where their institute was virtually forced to acknowledge the trend and approve it (Masterman, 1996).

Design-build started being used in America during the early 1900s (Greenfield, 1982). In the 1970s and 1980s, design-build was used extensively, especially in major power and industrial projects (Poirot *et al*., 1994). In 1991, about 5% of all construction in the USA was based on design-build (Setza, 1991). In the mid-1990s, more than one-third of construction projects were using the design-build approach. This assertion was supported by Gose (2003) that the attraction of guaranteed prices and substantial cost and time savings, commercial construction clients are using design-build to develop more than a third of all buildings today, up from less

than 10% a decade ago. Figure 1 shows the result of the survey from Design – Build Institute of America (2005) that the percentage of non-residential construction projects being delivered by Design-Build has increased steadily in the past twenty years from an estimated $18 billion in 1986 to over $250 billion in 2006.

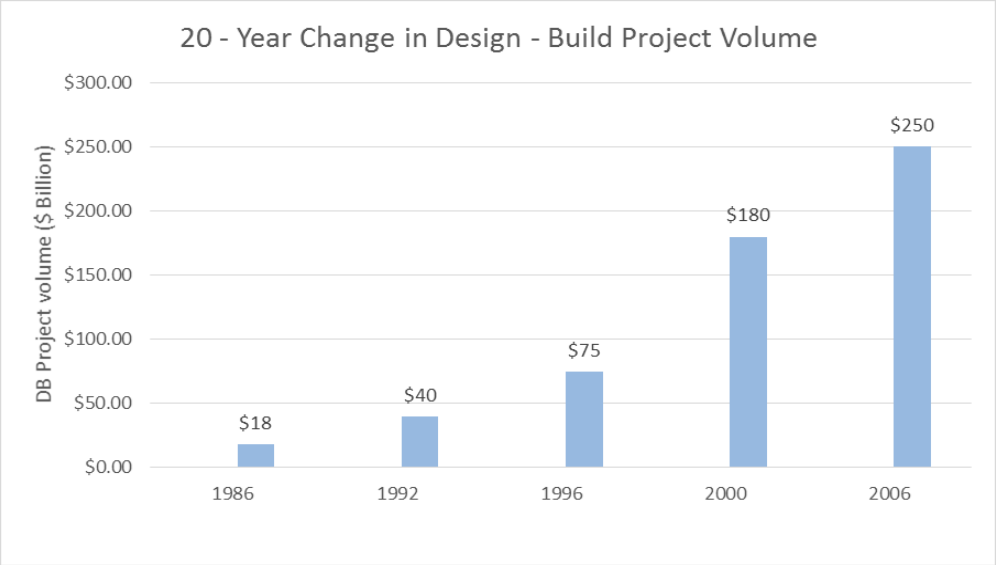

Figure 1: Design-Build growth in the United States (DBIA, 2005)

The client's knowledge and understanding of the construction and project implementation have been regarded by many researchers such as Morledge (1987) as critical characteristics in terms of client behaviour when dealing with the construction industry. An empirical survey conducted by Mbanjwa and Basson (2003) indicates on a scale of 1 to 5, with 1 indicating no knowledge and 5 indicating excellent knowledge, that the traditional procurement system was rated the most favoured form of procurement systems, followed by construction management (ranked 2nd), management contracting ranked 3rd; design and build (turnkey) ranked 4th; and design and manage including (build, operate and transfer) ranked 5th. This shows that design-build is still not well understood in South Africa thereby affecting the way design - build is practiced and implemented.

The following factors impact design-build practice in South Africa. Firstly, the late introduction of this procurement system into the South African construction industry compared to other countries, especially in Europe. The Construction Industry Development Board cidb (2008) stated that the design-build construction procurement emerged in South Africa in 1994; one should compare this to a country like the United Kingdom in which different procurement systems were very much in use as early as 1950 (Masterman, 1996). The second is that of perception; South Africa being a developing country where information about this new procurement method is still lacking, clients view design-build projects in a certain way influenced by their level of understanding of the method. Galbraith (1995) suggested that all clients will be influenced more by experience when choosing their procurement strategy than by project-specific factors.

This paper argues from stakeholders' opinion that design-build is not well practiced in South Africa due to a lack of understanding of the design-build procurement method. According to Tyler (2010), there is little doubt that the design/build method is more cost-effective and

time-efficient than other methods the only obstacle that it currently faces is education about its processes. Many owners are unfamiliar with the design/build delivery system and its benefits. A better understanding of the practices of design-build procurement method will allow more clients to use this procurement route which has been proven to demonstrate superior performance in some types of projects. Studies have shown that its use results in improved time performance (Ling, 2004).

LITERATURE REVIEW

Design-Build Procurement Method

Hale & Shrestha (2009) described design and build as a project delivery method in which the owner provides requirements for the specified project and awards a contract to one company who will be responsible for both the design and building of the project. According to Balogun (1992), design-build is a contract in which a building contractor does some or all of the design work and produces the building very quickly, particularly if the contract is a negotiated one. The design-build team is responsible for providing the owner with all aspects required to deliver the facility, starting from design services to construction, and including equipment selection and procurement (Beard et al. 2001). All these definitions can be summarized thus: Design-build system is when both design and construction are included in a single contract between the owner and the contractor either on a lump-sum or cost-plus basis e.g. housing and industrial constructions or an arrangement where one contracting organization takes sole responsibility, normally on a lump sum fixed price basis, for the bespoke design and construction of a client's project.

The fundamentals of this procurement method are that the responsibility for design and construction lies with one organization and project carried out to meet the needs of the client. Ellis (1990) pointed out that with design and construction work under one roof, the contractor's knowledge of the building process is incorporated in the design process. Forms of suspicion are eliminated because those responsible for design-build are able to perceive themselves as members of the same team, unlike in the traditional method. These forms of suspicion were noted by Tyler (2010) describing relationships among architects, engineers, contractors and subcontractors within the design and construction industry as highly contentious in the past but in recent years, collaboration, alternative delivery systems and more enlightened owner-designer-contractor relationships – such as design-build have improved these adversarial relationships. In addition, the line of communication becomes short and relatively informal. Arguing the case for design-build, Titmus (1982) remarked that the traditional competitive tender process is increasingly losing favour, especially as competitors are often unequal in standing and ability, which causes the project to be eventually executed in an atmosphere of "them and us".

According to Finlay (1983), this form of project procurement may be on a fixed price or cost reimbursement basis. It may also be competitive or negotiated. Examples of such projects include factory buildings, medical clinics, and schools using a proprietary system, where benefits can be obtained. This is evident from the 2004 and 2005 Design/Build Survey of Design and Construction Firms by ZweigWhite which indicated that firms most likely to employ design-build in the market includes industrial plants, refineries, and warehouses (48 percent of this work was reported to be done via design-build). But this is followed closely by commercial (46%), parking garages (44%), recreation (39%), and medical facilities (38%). The list goes on to include hotels/multifamily residential (34%); schools, libraries, and

museums (26%); and other public buildings (34%). Also, where a contractor's proprietary system can be used without detriment to the client's requirements, economic advantages stem from a modified form of design-build.

Construction Procurement in South Africa

According to cidb (2008), construction procurement in South Africa evolved in 1994 when the South African Ministry of Public Works identified an urgent need for public sector procurement reform as regards construction projects. After an initial review of the regulatory environment that impacted upon procurement, it was concluded that such reform could not be undertaken on a sector by sector basis since a fundamental review of the entire public sector procurement system was required.

As a result, a joint initiative was embarked upon by both the Ministries of Public Works and Finance, the outcome of which was the release of the Green Paper on Public Sector Reform in 1997. A Procurement Focus Group was established by the Inter-ministerial Task Team for Construction Industry Development in 1999, at the request of the construction industry stakeholders, in order to examine aspects of construction procurement and delivery management. In 2000, this Group recommended that a uniform and standardized procurement system be established for the construction industry. In the process of doing so, the cidb was faced with a major challenge to develop a procurement system that would firstly be compatible with the supply chain management framework that was being established by the National Treasury in terms of the Public Finance Management Act, 1999 and the Municipal Finance Management Act, 2003. Secondly, serve the needs of a decentralized public procurement system in terms of which the accounting officers or accounting authorities in organs of state would be responsible for their own procurement processes, and thirdly be attractive to and serve the needs of the private sector.

Design-build contracting is still new in South Africa compared to other developed countries like United States and United Kingdom. According to Masterman (1996), the term design-build was little known in the British building industry until the 1970s. Songer and Molenaar (1996) stated that inflationary 1970's and the litigious 1980's encouraged owners to reconsider the traditional procurement method and that the desire for time and cost efficiency paved way for the other methods such as design-build, management contracting, and construction management as viable method. A research paper by Ndekugri and Turner (1994) shows that design-build experiences fast growth in the United Kingdom, having a percentage share of the United Kingdom construction industry between 15% and 25%. An increase was also experienced in the United States of America in the use of Design-build as shown from the survey by Design Build Institute of America (2005).

According to Mfongeh (2010) design and build has been used to procure range of projects in South Africa from various sectors and the project sizes have also varied from huge projects to very small ones. It also shows that design and build has been used more to procure private sector projects. Mfongeh (2010) identified major projects that have been procured using design-build as follows:

1. Saldanha Steel Plant valued at R800 million – private sector
2. The Techno Centre for Vodacom in Bellville valued at R116 million – private sector
3. The Prison at Louis Trichard valued at R300 million – public sector
4. The Nelson Mandela Bridge in Johannesburg valued at R81 million – public sector

5. Samlam office spaces in Sandton valued at R40 million – private sector

The increasing use of design-build underscore the importance of using the best practice of design-build contracting in achieving the best performance at the end of a project.

Characteristics of the design-build procurement method

The design-build procurement method is different from other forms of procurement because the system is being used increasingly for non-prestigious buildings: industrial, commercial and "repetitive" buildings are frequently built using package deals. It provides single point responsibility so that in the event of a building failure the contractor is solely responsible. There can be no question of trading blames between the architect and builder as has so often been the case with the traditional method. The client's interest is safeguarded in this respect; the client knows his/her total financial commitment early in the project's life; the client enjoys direct contact with the contractor. This improves lines of communication, and enables the contractor to respond and adapt more promptly to the client's needs; the contractor is responsible for design, construction, planning, organization and control and these activities can proceed concurrently to a greater extent than is generally possible using the traditional system; and the relaxation of the architects' code of practice referred to above made it possible for them to become full partners in design and build firms; the above relaxation lead to the construction of buildings which reflect the senior status of the designer in the team, as in some instances in the past; and the nature of the system promotes the creation of an integrated design and construction team. Figure 2 illustrates both traditional and design-build contracts relationships in line with Turner (2014)

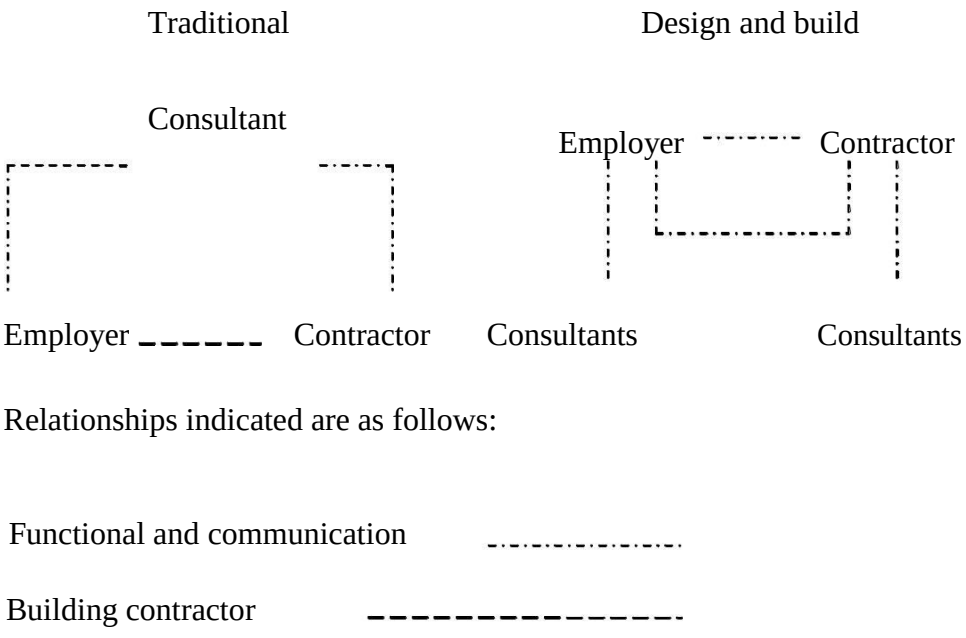

Figure 2: Building contracts relationship (Turner, 2014)

Merits and demerits of design-build contracts

Tulacz (2003) described design-build as a project delivery system where the owner relies on the design-build team for coordination, quality and cost control, in addition to schedule monitoring and also satisfy the owners' requirements to complete projects faster and at lower costs. The time savings result from designing the project in phases so that the contractor can begin work on the initial phase of the project while the later phases are being designed. A lower overall costs as a result of increased contractor's control over design/build project by ordering necessary materials for subsequent phases ahead of time at a reduced cost. Also, the contractor's control over design details allows the use of familiar construction methods and processes in executing the project resulting in a much more efficient construction. In this method, the risks associated with design management and control are transferred to the design-build entity. In design and construct forms of procurement the contractor predominately assumes the risk for design and construction of the project (Davies, 2008). Although this is dangerous as the contractor might use these risks to his own advantage affecting the overall performance of the project.

Anumba and Evbuomwa (2010) did identify some of the disadvantages of design and build method and they include a lower design quality because the client has a less control over the details of the plans and specifications, high cost of changes to project scope due to the difficulties in preparing an adequate comprehensive brief and a very costly tender process. Another demerit is the difficulty in comparing design and build bids since each design will be different, project programme will vary between bidders, and prices for the project will be different for each design. Schlesselman (2011), in his presentation stated that with design and build, there is a potential to under – design to satisfy low price thereby affecting performance and longevity of the project resulting in higher long-term maintenance and operation costs.

Anthonio (1992) had summarised the merits and demerits of design-build procurement method to include: The overlap between the design and construction process makes it possible for construction to commence long before design is completed; project execution time is shorter; One project team will produce the best solution to the owner's request; management and coordination of project execution are easier for the owner; the likelihood that the system may not offer sufficient value for money since the contractor is all in all; and the possibility that, in order to effect substantial overall savings, the design solution adopted by the contractor may not be the best.

Design-Build Process

In an increasingly competitive world, almost every product is being produced more efficiently. Global competition means that customers have to take all costs into account. Clients want better value from their buildings. Design-build has developed distinct strengths to make a product benefit from cost, schedule, quality and aesthetics and use proven accounting standards; in addition, innovative use is made of materials and system so as to satisfy clients' needs (Neo, 1997).

A design-build project result in lower production costs on site, a shorter design and construction period, an overall saving in price to the client and an implied warranty of suitability to the client. But a major disadvantage is the discouragement of possible variations by the client: where the client considers these changes to be necessary, he often has to pay an excessive sum of money for their incorporation within the finished building (Ashworth,

1986). Figure 3 illustrates the design-build process at various stages from inception to implementation.

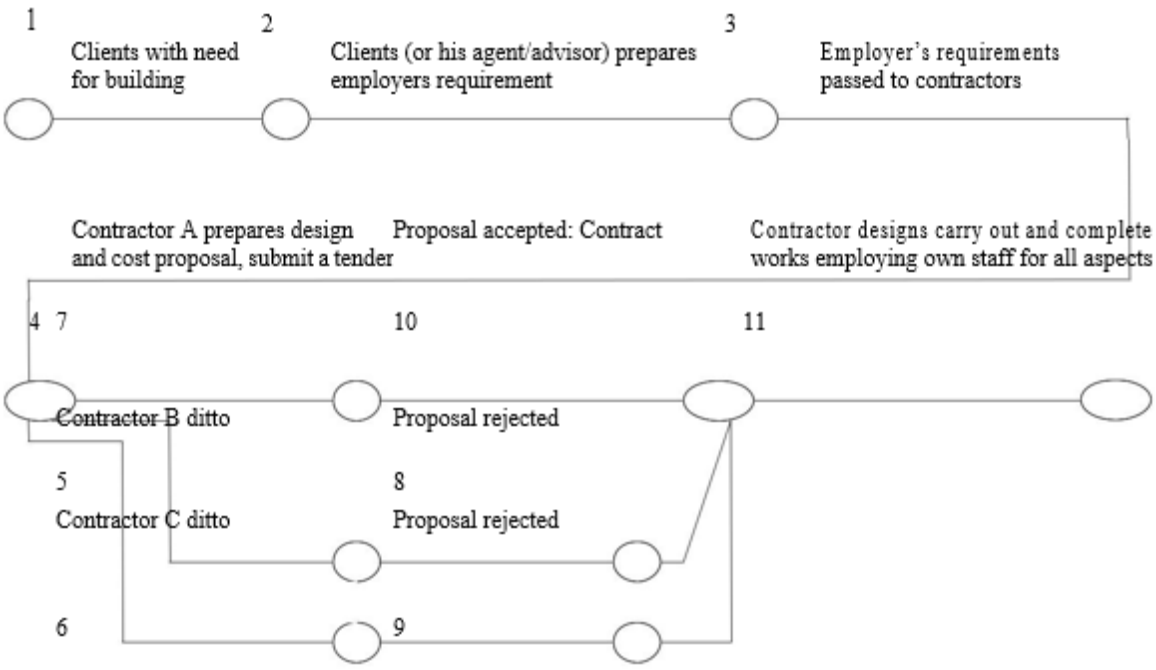

Figure 3: Design-Build (Franks, 1984)

Best Design-Build Practices

Design-Build Institute of America (DBIA) (2014) identified best practices of design – build that can be applied to any type of design-build project and can effect project performance as divided into three primary sections.

Procuring Design-Build services

DBIA (2014) identified the following three best practices for owners. Firstly project owners are to conduct a proactive and objective assessment of the unique characteristics of its program/project and its organization before deciding to use design-build. Secondly they would need to implement a procurement plan that enhances collaboration and other benefits of design-build and is in harmony with the reasons that the owner chose the design-build delivery system. Finally the project owner uses a competitive design-build procurement that seeks price and technical proposals that: (a) establishes clear evaluation and selection processes; (b) ensure that the process is fair, open and transparent; and (c) value both technical concepts and price in the selection process. According to Windapo (2013), clients who are not familiar with construction and wishes to reserve the rights to alter requirements during the construction process should not use Design and Build.

Contracting for Design-Build services

The most significant feature of design and build arrangements is the lack of an independent certification role in the contract - there is no architect or contract administrator to settle differences between the parties, and there is no independent quantity surveyor responsible for

preparing the basis upon which contractors' tender (Windapo, 2013). DBIA (2014) identified three (3) best practice use of Design-Build services. First in contracts that are fair, balanced and clear, and should promote the collaborative aspects inherent in the design-build process. Second, contracts between the owner and design-builder that address the unique aspects of the design-build process, including expected standards of care for design services. Third, contracts between the design-builder and its team members that address the unique aspects of the design-build process.

Executing the delivery of Design-Build projects

DBIA (2014) identified the following as four (4) best practices in the delivery of Design-Build projects. Firstly, education and training of all design-build team members in the design-build process, so that they know the differences between design-build and other delivery systems. Secondly is the provision by the project team of logistics and infrastructure that supports integrated project delivery. Thirdly is the use by the project team of processes that facilitate timely and effective communication, collaboration, and issue resolution. Finally the use by the project team of design management and commissioning/turnover processes and ensure that there is alignment among the team as to how to execute these processes. Windapo (2013) notes that the first action undertaken by the design and build company's internal team is to ensure there is a complete brief which the customer understands and agrees to. Thereafter, designs and plans are produced, which meets all the client's requirements, which the customer accepts, and which takes account of subsequent production and commissioning implications of the design decisions.

RESEARCH METHODOLOGY

This study adopted a quantitative research approach in gathering useful information on the design-build method. The major study was carried out in Gauteng Province which includes both Pretoria and Johannesburg while the remaining study took place in KwaZulu Natal and Mpumalanga Provinces. This approach was taken because the majority of construction activities are concentrated in Gauteng Province both in terms of size and complexity.

65 questionnaires were distributed, 40 completed forms were received, representing a response rate of 62 percent. Fifteen (37.5%) respondents were construction managers, seven (17.5%) were engineers, 13 (32.5%) were quantity surveyors, one (2.5%) civil technicians, one (2.5%) town planner, one (2.5%) building surveyor and two (5.0%) academics. No response was obtained from architects which causes the results not to reflect their (architects') opinions/perspectives. The research was carried out through the use of questionnaires in two ways. Firstly structured interviews was arranged with managers and directors of companies who are known to be stakeholders in the South African construction industry being members of the Chartered Institute of Building (CIOB) using questionnaires. These included construction managers, quantity surveyors, project managers, engineers. Interviews were conducted by running through the questionnaire. Secondly questionnaires were emailed to managers and directors of companies who were known to be stakeholders in the South African construction industry being members of the Chartered Institute of Building (CIOB). The questionnaires were self-administered to the respondents and expected to be sent back via email.

The respondents were asked to rate the extent to which they agreed that design-build is not correctly practiced in South Africa, where 1 = strongly agree/always/very good; 2 =

agree/often/good; 3 = undecided/regularly/average; 4 = disagree/rarely/bad; 5 = strongly disagree/never/very bad depending on the type of question. Respondents were also invited to provide their comments, state other design-build related problems and rate them.

Data from the survey were first entered manually on a data sheet with coded variables. Data from the 40 questionnaires were then analysed and evaluated using the Statistical Package for Social Sciences software (SPSS). A chi-square test of the mean and Spearman's rank correlation were carried out with the help of SPSS to find out whether the stakeholders' opinions agree with the statements or not. In addition, the frequency tables were computed using the SPSS and results presented with the aid of bar charts.

FINDINGS AND DISCSSION

The chi-square test results show that a significant number of the respondents agree with the statement that design-build contracting is not correctly practiced in South Africa (X2 = 11.4000, $P \leq 0.05$). The results also show there is a significant level of undecided respondents that design-build contracting is not correctly practiced in South Africa.

Table 1: Design-Build procurement method practiced in South Africa

Q2.3 (v8) Rating	Frequency (N)	Percentage (%)	Cumulative Percentage	Cumulative Frequency
Strongly agree (1)	3	7.5	7.5	3
Agree (2)	10	25	32.5	13
Undecided (3)	18	45	77.5	31
Disagree (4)	9	22.5	100	40
Chi-square test (X^2) = 11.4000		P. value = 0.0097 ≤ 0.05		

Source: Field Data

Explaining the problem further as reflected in the frequency table (Table 1, column 2), most respondents are undecided whether design-build is correctly practiced in South Africa. This can be attributed to the discussion above that the design-build method is not well understood due to the late introduction of the method in South Africa and wrong perception about how its processes are carried out, see figure 4 below illustrating the frequency. A total of 18 (45%) were undecided, followed by ten (25%) in agreement, while only nine (22.5 %) disagreed and the remaining three (7.5%) strongly agreed.

There were divergent comments (nine different comments from the respondents representing rating 1-9) on the possible problems with regards to the use of design-build contracting. The most comment by respondents (three) was that design-build contracting is still growing, especially in the mining industry and it is still not well understood in the South African construction industry and some have never used it before. In addition, most comments suggested that design-build is appropriate for industrial projects and for fast-tracking projects, especially the emergency ones (see Figure 5).

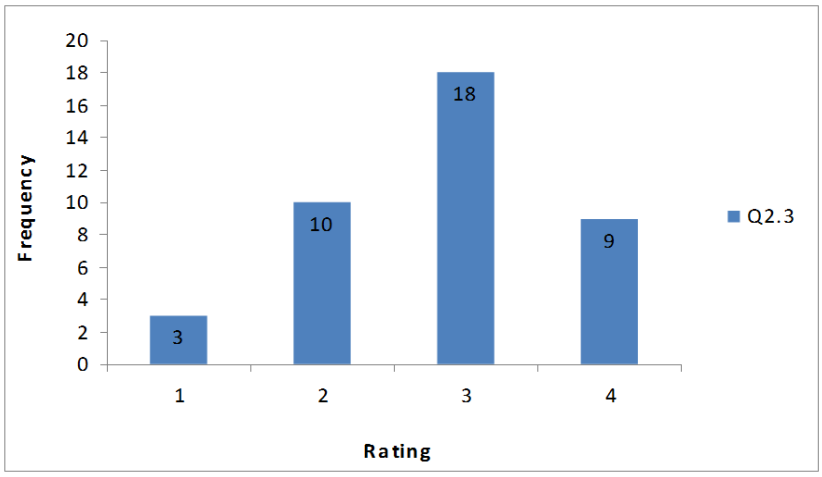

Figure 4: Frequency of responses on practice of design-build procurement method in South Africa

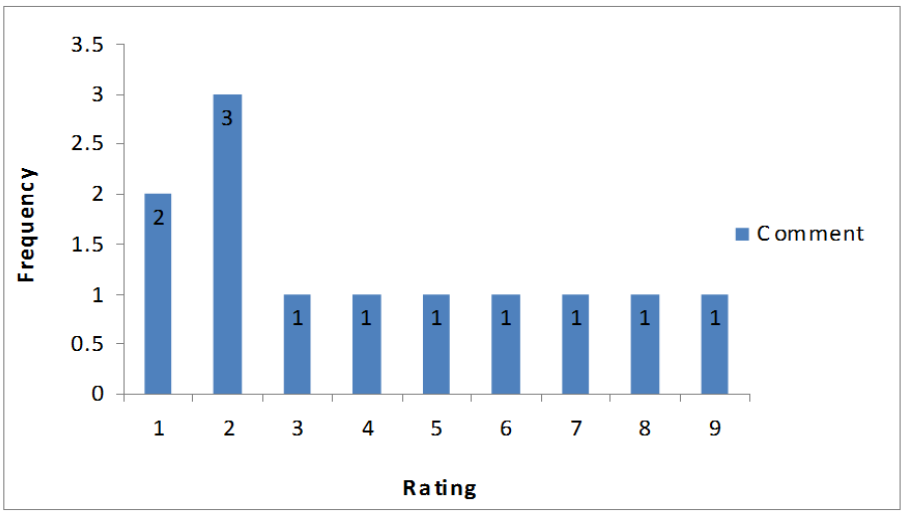

Figure 5: Level of use of design-build contracting in South Africa

Summary of Findings

The study shows that design-build is not correctly practiced in South Africa, according to the opinion of respondents who are representing the stakeholders. The general view also held that design-build contracting is still growing mostly in the mining sector. Despite the increasing usage of Design-Build method especially in the developed countries like United Kingdom and United State of America, South Africa is still having the problem of applying the best practice in Design - Build projects. The growing importance of Design-Build procurement method should not be overlooked in South Africa. In the word of Tyler (2010), from the great pyramids of Egypt to the theater of Dionysius to the Parthenon and the Brooklyn Bridge, design/build as played a role in some of the world's most outstanding structures. There is growing believe among the Architects of the effectiveness of design/build method. According to Nancy (2005), there is growing use of design-build among architects and also service can be provided by a project-specific joint venture between an architectural firm and a contracting company. Songer and Molenaar (1997), identified five (5) critical project characteristics for a successful design-build projects in the public sector. They include: well defined scope; shared understanding of scope; owner's construction sophistication; adequate

owner staffing; establish budget. Also, Marshall (1999) summarised the right underlying conditions under which design-build contracting will be the most appropriate method. These are enumerated as follows:

1. Design complexity and scope for method innovation: Projects containing both of these factors are particularly suitable for design-build, as this combination maximizes the scope for a designer/contractor team to benefit by matching design and method for the best possible results. Where neither condition pertains, the benefits of design-build diminish considerably.

2. The promoter's approach to procurement: One of the commonest weaknesses in design-build contract documentation is over-specification. To achieve the benefits from this form of procurement, the promoter must be prepared to relinquish some control over the detailed design of the works. Thus a good design-build contract should focus on objectives. It should express unambiguously the essential characteristics which the completed works must possess, and should say as little as possible about how they are to be achieved.

3. Risks relating to third party actions: Projects which contain many and/or major third party interfaces, and in which the consequential risks can be better quantified by designing the works in detail, may be ill-suited to design-build contracting. Whilst advancing the design ahead of awarding a construction contract is one solution to this problem, others - for example, entering into partnerships with the third parties to share risk - may yield better results overall.

4. The contractor's approach to design. Successful design-build contracting is an art in which the relationship with the designer is central to success. Starting the relationship late, keeping it at arm's length, or attempting to minimise the designer's input will all lead to a disappointing outcome. For best results, an integrated team is needed, with both parties recognising that an effective partnership will yield more and better solutions than either can deliver alone.

CONCLUSION AND FURTHER RESEARCH

The findings reveal that design-build procurement method is perceived as not being well practiced in South Africa. Design-build procurement method is a new concept in South African construction industry and will take some time before it can be well practiced in comparison with that of United Kingdom and the United States of America. A good practice of design-build will help improve project performance in terms of costs and time, this will results in better service delivery which has been a problem in South Africa being a developing country.

In order to effectively improve the practice of design-build projects in South Africa, it is recommended that during implementation the government should use a procurement process that: (a) focuses heavily on the qualifications of the design-builder and its key team members rather than price; and (b) rewards design-build teams that have a demonstrated history of successfully collaborating on design-build projects. Also, the government must identify and involve key project stakeholders at the early stages of a project. All design-build team members should be educated and trained in the design-build process, and be knowledgeable of the differences between design-build and other delivery systems. And finally, a committee

of expert should be set-up by the government to develop a code of good practice for design-build procurement method.

This study contains several limitations. Firstly, the responses gathered from stakeholders were based on their perceptions, which are subjective. Secondly, different respondents may hold different views on the points of the rating scale. While two respondents may have rated an answer as 3 (undecided), they may nevertheless not encounter the same level of difficulty as regards the issue identified. Lastly, the composition of the respondents did not include any architect because no responses from the questionnaire sent out stemmed from these professionals. Thus, there may be biases in the results against the architects' perception. In future studies, more data should be collected involving the architects and the public sector so that a more balanced comparison and conclusion can be made.

Note: An earlier version of this paper was presented and published in the proceedings at the 9th cidb PG Conference, Cape Town, South Africa.

REFERENCES

Anthonio, J.B. (1992). Design and build ventures problems and solutions. Paper delivered at a workshop organized by the Nigerian Institute of Architecture, April 9.

Anumba, C.J. & Evbuomwan, F.O. (2010). Concurrent in design-build projects. *Journal of Construction Management and Economics, 15*(3), 271-281.

Ashworth, A. (1986). Contractual Procedure in the Construction Industry, England: Longman Group Limited;

Balogun, L. (1992). The search for alternatives construction system in Nigeria. Paper delivered at a workshop organized by the Nigerian Institute of Architecture, April 10.

Beard, J., Loukakis, M.C. & Wundram, E.C. (2001). Design-Build: Planning Through Development. McGraw Hill, New York.

Construction Industry Development Board Discussion Paper (2008). Developing the capacity and capability of those procuring engineering and construction works. cidb South Africa.

Davies, P. (2008). Report Building Procurement Methods. Research Project No: 2006-034-C-02. *CRC Construction Innovation.*

Design-Build Institute of America (2005). Non-Residential Construction in the United States. Unpublished presentation slides based on data from Lawson International Research and Engineering News Record.

Design-Build Institute of America (DBIA) (2014). Design-Build Done Right "Best Design-Build Practices". Available online http://www.dbia.org/resource-center/best-practices [accessed on 12/11/2015]

Ellis, M. (1990). Design and build survey. *Contract Journal*, June 14.

Finlay, J. (1983). Refurbishment on the grand scale. *Chartered Quantity Surveyor*, July 16.

Franks, J. (1984). Building Procurement Systems. A Guide to Building Project Management. Ascot: Chartered Institute of Building.

Galbraith, P.J. (1995). The Development of a Classification System for Construction Industry Customers. EPSRC research report, Department of Construction Management and Engineering, University of Reading.

Greenfield, S.S. (1982). Turnkey construction in the United States. *ASCE Journal of the construction Division*.

Hale, D.R. & Shrestha, P.P. (2009). Empirical comparison of Design/Build and Design/Bid/Build project delivery methods. *Journal of Construction Engineering and Management*, *135*(7): 578-87.

Ling, F.Y.Y. (2004). How project managers can better control the performance of design-build projects. *International Journal of Project Management*, *22*(6), 477-488.

Mashall, C. (1999). The Oresund tunnel - Making success of design and build: *Tunnelling and Underground Space Technology*, *14*(3), 355-365

Masterman, J.W.E. (1996). An Introduction to Building Procurement Systems, London, E & FN Spon.

Mbanjwa, S. & Basson, G. (2003). The use and effectiveness of construction management as a building procurement system in the South African construction industry. Pretoria: the University of Pretoria, Faculty of Engineering, Built Environment and Information Technology.

Mfongeh, N.G. (2010). The Constraints of using Design and Build for the procurement of Construction Projects in South Africa. Unpublished Doctoral Thesis.

Morledge, R. (1987). The effective choice of building procurement method. *Chartered Quantity Surveyor*, *9*(11), 26.

Nancy, B.S. (2005). The Hopes and Fears of Architectural Record. Architectural Technology. The McGraw- Hill companies Inc.1-2

Ndekugri, I. & Turner, A. (1994). Building procurement by design and build approach, *Journal of Construction Engineering and Management*, *120*(2), 243-256. https://doi.org/10.1061/(ASCE)0733-9364(1994)120:2(243)

Neo, R. (1997). Design & Build, the ultimate procurement concept. In Proceedings of the First International Conference on Construction Industry development. December.

Poirot, J.W., Kawaguchi, S.K., Carty, G.J. & Arens, M. (1994). More on Design-Build. *Engineering News Record*.

Rolls, E.T. (2007). Emotion Explained, Oxford, Oxford University Press.

Schlesselman, J. (2011). Design-build (Advantages & Disadvantages) presented on 4 October 2011. *Prezi.com*

Setzer, S.W. (1991). One-stop shopping has designers nervous. *Engineering News Record*.

Songer, A.D. & Molenaar, K.R. (1996). Selecting Design-Build: Public and private sector owner attitudes. *Journal of Management in Engineering*, *12*(6), 47-53.

Songer, A.D. & Molenaar, K.R. (1997). Project characteristics for successful public-sector design – build. *Journal of Construction Engineering and Management*, *123*(1), 34-40 https://doi.org/10.1061/(ASCE)0733-9364(1997)123:1(34)

Titmus, R. (1982). The effective choice of building procurement method. *Chartered Quantity Surveyor*, *9*(11), 26.

Tulacz, G.J. (2003). Project Delivery is Still Evolving. *Engineering News Record*, *250*(23), 38.

Turner, D.F. (1986). Design and Build Contract Practice. London: Longman Scientific and Technical;

Turner, D.F. (2014). Design and Build Contract Practice. Taylor and Francis Group, London and New York: Routledge.

Tyler, P. (2010). Benefits of Design/Build. Haskell.com. Spring; B& C Mid-south. 14-15

Walker, A. (1996). Project Management in Construction. 3rd Edition, Blackwell Science

Watson, K. (2009). The history of Design-Build. *Florida Water Resources Journal*, 50-52. October.

Windapo, A. (2013), Fundamentals of Construction Management, available at: www2.aku.edu.tr/~icaga/kitaplar/fundamentals-of-construction-management.pdf (accessed 07 February 2017).

Zweig-White Research, (2004). Is Design-Build Due for an Increase? The Zweig Letter, Issue 551, http://www.zweigwhite.com/trends/thezweigletter/index.asp (February 18, 2007).

Zweig-White Research, (2005). Design/Build Survey of Design and Construction Firms.