



# Assessment on Contract Delivery Methods Adopted for Public Projects in Addis Ababa: Special Emphasis for Government Housing Projects

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**Abstract:** Public project nonperformance in many developing nations including Ethiopia from different dimensions is obvious these days. For these different economic constraints, different industry related complications and higher rate of population growth mentioned as a cause. Specifically the provision of affordable housing for all classes of the society is very difficult scenario that the government is facing right now. The integrated saving housing development project in different parts of Addis Ababa city faces many different challenges due to many reasons and among those reasons implementation and interpretation of the project delivery method has its own negative impact. Having this background the study sets a general objective to assess overall impacts of the contract delivery method adopted for those mass housing projects in Addis Ababa city. The general objective addressed through three specific objectives aimed at assessing the delivery method's; overall practice, advantages and disadvantages, its overall effectiveness and to specify the best delivery approach in the study area. Accordingly available literatures related with the topic were reviewed under the second chapter. A descriptive and exploratory research design preferred to address the different research objectives and a mixed research instrumentation and analysis technique implemented. Using those techniques the different findings from the questionnaire, interview and document analysis discussed accordingly. The finding from the analysis showed that Design-Bid-Build approach implemented in all sites housing projects for the different blocks characterized to be very customary, very fragmented and traditional which alters the ideal advantages of the system into disadvantages. Also the finding revealed that the Design-Bid-Build approach causes nonperformance of the project and affected the time constraints followed by risk and cost management of the project. Proper implementation and characterization and/or adaptation of the system will fits best the different policies and strategies by Minister of Urban Development and Housing. Finally significance of the study includes administrative, professional, academic and strategic assistance for the different concerned bodies in the construction industry.

**Keywords:** Government Housing Project, Performance, Project Delivery Method

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## 1. Introduction

### 1.1. General Background

Many developing countries around the globe, including Ethiopia and specifically the capital Addis Ababa city, public infrastructures and services crisis escalated unabated each year even though the government and some private investors tries to address the problems through new policies, programs and strategies like that of affordable housing and real states

development programs. Those Government housing projects in different parts of the country, especially in AA city, in addition to alleviating housing problems, due to inter-sectorial relation formed by the construction industry, different strategic goals towards economic, political and social objectives addressed in different degrees. In the process as of many different public projects and sometimes more severely a number of challenges are militating effective construction, sustainable and tangible housing supply by the different parties participated [6, 18].

Project delivery method implies the organization's structure defining the framework of contractual and communication links among project team members. Unlike corporate organization structures that define the main functional and administrative units of a firm, construction project delivery methods define the hierarchy of the key project team members and give the contractual and communication links between them. The selection and adoption of an appropriate PDM, the tool and system for responsibility allocation, risk transfer (sharing) activity sequencing, process, procedure and organizational structuring platform at the planning stage in the projects life cycle, is very critical for the overall project success [17, 21].

Until 1960s where the inadequacy of the traditional Design Bid Build approach surfaced it was the most common and widespread system in the industry throughout the world. As the name implies under the traditional (DBB) method the overall project follows traditional, fragmented, and customary practices in which the owner engages different trade service providers, suppliers and builders through a dispersed sequential and linear procurements. With time to improve and rectify the different drawbacks of the traditional PDM many new delivery methods were emerged including Design Build, Construction Management at Risk, Integrated Project Delivery Method, Build Operate Transfer, Build Own Operate Transfer, Public Private Partnership, Engineer Procure and Construction and force account are the major one other than DBB system which are known throughout the world [13].

In Ethiopia most public projects use the traditional DBB approach and by default the standard bidding documents, the procurement method and overall process and its organization for the different services and works complement and match with the PDM. In addition to these, the market structure, the knowledge, different service providers and workers organizational structure and their work permit, their capacity and capability including natures and many other constraints stress its. Under this traditional delivery system arrangement, risk allocation between the different stakeholders is not proper and sometimes a big risk allocated to weak party that is not qualified enough from different perspectives to deal with such risk and uncertainties.

Considering those backgrounds assessing the overall performance of those public mass housing projects by the government under the traditional system could be valuable for the government and different stakeholders in the market to take actions and achieve their strategic and ultimate goals. In this context the aim of this study is to assess the overall impacts of the construction PDM adopted in the city Addis Ababa, Ethiopia, on public housing projects performance.

## **1.2. Statement of the Problem**

Public construction projects are considered to be complex and fragmented with regard to the supply chain, products, process, the participants and market structure. Consequentially among the different nonperformance, cost and time overrun problems confronted the construction industry in the developing countries during construction

process and it's as a result of interplay of different factors and varies from one place to place. Despite the importance of understanding the different categories of project's performance metrics analyzing and/or assessing the factors that affected them specifically for the different sector public infrastructure development projects using an effective research technique is crucial [2, 4, 10, 20].

Ethiopia as a developing nation in Africa failed in achieving the different project performance objectives in different sector and environments due to lack of professional and industrial adherence regarding those project performance metrics. In addition to this the management of construction stakeholders and organizations in different hierarchies is the most difficult task for the effective accomplishments of different public projects.

Each public sector has different set of project strategies, objectives and final goals and based on those unique requirements a specific procedures and systems for managing stakeholders has to be developed. On the contrary many public projects in different sectors of the economy adopt the same type and traditional procurement mechanisms which is failed many times for ensuring their effective implementation. Totally the construction industry as of many industries requires continuous development. And the principles behind the adoption of modern and innovative project delivery methods compatible with the projects requirements has to be the primary concern of the principal involved in.

There are many different researches conducted on the problems of the government infrastructure development projects towards quality deviation, time slippage, cost overrun, corruptions, etc. which are all clearly observed in many saving house projects in Addis Ababa, Ethiopia [5, 7, 12, 20-22]. Here even if some of the studies tried to mention the delivery method among the different causes for public projects non-performance, it was not discussed separately as a principal issue and this is the gap to be addressed through the study by the researcher. The problem and/or lack of comprehensive exploration of Government mass housing projects failure and nonperformance with respect to the PDM implemented widen the gap in order to come up with genuine and sustainable solutions.

## **1.3. Objectives**

### **1.3.1. General Objective**

The General Objective is to assess the overall impacts of the construction contract delivery method adopted in Addis Ababa city on public projects performance with special emphasis on government housing projects.

### **1.3.2. Specific Objectives**

Specific Objectives of the study are:

- 1) To assess the practice of different types of construction project delivery methods adopted for Integrated Saving House Development Projects in Addis Ababa;
- 2) To study the advantages and disadvantages of the delivery method adopted on the projects from different

perspectives;

- 3) To evaluate the effectiveness of the delivery method adopted on the overall performance of the government housing projects;

## 2. Literature Review

Many different terms including procurement approaches/method/system, contractual or delivery methods/system, contractual arrangements, or options of project delivery used to refer project delivery method (PDM). So in many different studies and in the construction industry all the above terms are used interchangeably which all speculate the project delivery method (PDM) even though in some areas there are contextual differences specifically with the term procurement system which is an inclusive term bounding other processes under it. Project delivery method implies the organization's structure defining the framework of contractual and communication links among project team members. Unlike corporate organization structures that define the main functional and administrative units of a firm, construction project delivery methods define the hierarchy of the key project team members and give the contractual and communication links between them. The project owner is typically at the head of the organization structure and is contractually linked with one or more key team members. These in turn may be contractually linked with other team members. A certain kind of PDM provides a clear picture of how a project will be delivered by the selected team members throughout its lifecycle [17, 21].

This chapter revises different previous studies, books, engineering and related journals from different sources under ten major titles and many other sub titles under each title as extracted from the objectives of the study and also the research problems considering the research methodology. Accordingly related works regarding the PDM and its practice and overall impact assessed for constructions projects in different degrees of scope from different perspectives in different parts of the world. This used to develop an effective methodology that will fill the gap from the previous works and all relevant constraints related with the issue under consideration.

Specific to the researches objectives the literature reviews revealed that the different types of construction project delivery methods adopted for different public infrastructure development projects in different parts of the world and accordingly most of them adopted the traditional DBB approach considering the advantages related with the projects specific characteristics. Here the adoption and/or implementation practice, especially in developed nations, pass through scientific and sequential process and tries to extract the best out of the systems. Through structured and modern research and development activities those traditional approaches are amended gradually to innovative and integrated systems. And these was carried out through analysis of the advantages and disadvantages of the delivery method towards the different project constraints related with

time, cost, quality and projects risk and the booming of different technological and artificial intelligences in the industries.

Accordingly as of the different previous studies findings and different books the traditional PDM failed to achieve the time and cost related project constraints. On the contrary DB, CMR, IPDM and many other derivatives of those three project delivery methods which are all mentioned as the better version of DBB as a whole and respectively, one for the next on, tries to overcome those shortcomings related with cost and time and risk transfer. In our country most public agencies adopted the traditional DBB approach and in recent years ERA, EEPCC, IPDP and water and energy minister including many other public financial institutions are using DB, and BOT types of project delivery methods.

Different local scholars try to assess the different PDMs' and their effects on different public projects performance and tried to show it had both direct and indirect impacts on the overall project progresses and final outcomes. Before adopting a certain kind of PDM it is vital to articulate the main features, the effectiveness, and the distinguishing characteristics of various contract procurement approaches in contrast with project's objective. Here in addition to this the different dimensions to measure the effectiveness of a certain PDM including owner's commitment, project team selection, contracting process, level of integration, project team characteristics, completeness contract documents, cost certainty, schedule certainty, degree of variation and change orders listed. With consideration of those dimensions the effectiveness of different PDM adopted for a certain project could be measured.

Finally, many of previous studies conducted in different parts of the world, specifically of the developed nations, recommended the implementations of modern and innovative project delivery methods for the different sector public infrastructure development projects. This was due to the advantages related with the project performance constraints administration and the ease and feasibility for the adoption of advanced construction technology and management concepts in the industry. In some countries including the practice in South Africa, Nigerian and UAE prefers effective adoption of DBB. This was also holds true for some developed nations selected public projects which could fit to the system and in all case the system had to go through some phases for its selection and adaptations.

According to office document reviews and international publications by Frew, and Wubishet, the practice of construction project management in mass housing rife with many administrative and technological challenges. Some of the challenges are generally related to capacity and some to sheer lack of professionalism in construction of civil works. The set up in terms of programming of schedules, information systems, construction sector professionals, accountable and transparent project governance is not apart with complexity of the project resulted many problems regarding the public infrastructural development programs in many developing nations. Specifically the ISHDP of Ethiopia

in different parts of the country including the capital AA faces many contract administration challenges which are all directly or indirectly in different degrees related with the structuring of the different participants through the PDM adopted for the work [11, 21].

The different stakeholders in different levels of the program biased by the attitude that the condominium saving housing construction projects don't deserve care and diligence like that of many other public projects and also many other private real state building projects. This was resulted from the practical situations regarding the structuring of the workers in the project and lack of effective supervisions and nature of the project which, as of the projects since the final user did not involve in the different implementations control and checking there were negligence and also the name at the beginning that cost efficient understood wrongly by different participants resulted for the negligence [19].

In addition to this there were a very complicated, informal and blurred chain of accountability which causes parties to be embarrassed from whom to seek solutions in the process and

consequently the project overall performance affected severely. Also the different parties have overlapping responsibilities. And this in turn resulted with the claims and disputes with the owner. For example the supervising consultant claimed that he is not responsible for the different design problems from the designer. Also the contractor held accountable for the different nonperformance of the MSEs and the MSEs and in turn complain the agency didn't supply them the required resources. The ISHDP Existing Complicated relationship with blurred accountability as resulted from the PDM applied can be presented diagrammatically as follows as adapted from MUDH office report [6, 16].

Here the MSE stands for Micro and Small Enterprises for different items of works including Roofing, Gutter & down pipe, Electrical installation, Door & windows, Precast beam, Sanitary installation, Slab HCB, Agro stone internal partition wall, and Wall HCB works. As the Figure 1 below clearly shows, it's totally a very fragmented organization of project stakeholders.

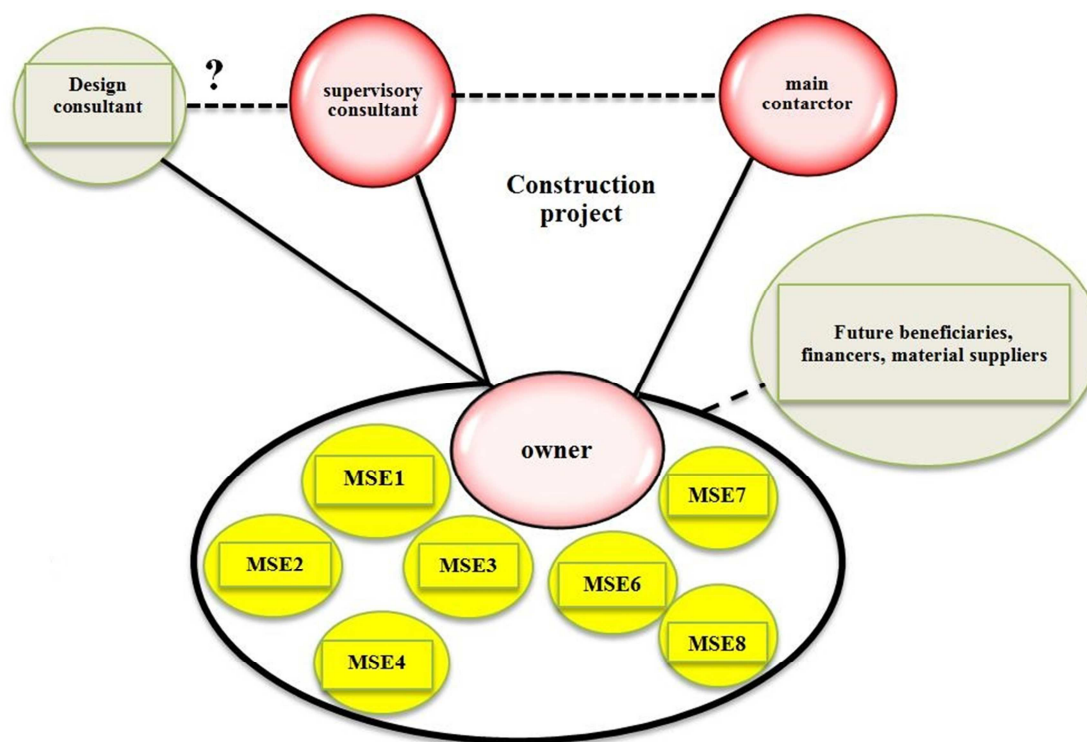


Figure 1. ISHDP-Existing contractual relationship as adapted from the office.

### 3. Research Methodology

Geographically, the study takes place in the capital Addis Ababa, Ethiopia. A descriptive and exploratory survey design attempted to collect data from the relevant population (public agencies, consulting firms, contractors, and experts) to determine the effectiveness of the PDM adopted on the overall performance as a major variable under consideration.

Three research instruments are used to collect relevant

information. One of the instruments includes Close-ended Questionnaire which was used to cover the wide variety of samples within the study population mentioned. The questionnaire for the study was designed based on the information derived from reviewed literatures in correlation with objectives of the study and overall content divided major five parts. All of questionnaires distributed for different participants were hand-delivered in their respective locations (offices and site). The study employs both primary and secondary data sources at different stages and mixed approach

of data analysis. Those primary data sources are collected through questionnaires, contract and other documents analysis and interviews of main stakeholders involved in government housing projects of the study area. Then all quantitative data obtained from the structured questionnaire were analyzed using Statistical Package for the Social Sciences (SPSS) 22 software and descriptive statistics, while the qualitative data gathered from interviewees were analyzed using qualitative content analysis method. Reliability of the data used from the questioner survey checked on the SPSS using the Cronbach's alpha ( $\alpha$ ) coefficient which ranges from 0 to 1.0 and indicates the extent to which the respondents rate the same question. Cronbach's alpha is the most commonly used measure for internal consistency i.e. reliability. Accordingly a value  $> 0.7$  speculates consistency and reliability of the responses from the participants on the questioner survey [14].

## 4. Discussion

Every project has its own objective, goals, and accordingly certain kind of PDM has to be selected for its effective accomplishment. Based on different pre-considerations from different perspectives the PDM selected and majorly regulatory restrictions and administrative codes, policies, etc. considered for its adoption. Considering those points this part tries to assess the different reasons for adopting DBB project delivery method among the different kinds of PDM by the agency.

*Table 1. Summary of reasons of preference the PDM.*

Reasons	Frequency	Valid (%)	Cumulative (%)
Legal and regulatory restrictions	31	38.3	38.3
As a default system	19	23.5	61.8
Due to its advantages	10	12.3	74.1
Through selection procedures	9	11.1	85.2
Administrative Policy	12	14.8	100.0
Total	81	100.0	

The major reason for the adoption of the DBB project delivery method was due to the legal and regulatory restrictions as 31 respondents or 38.3% of the participants agreed. Its adoption as a default system for the public projects, due to administrative policy with in the entity, due to its advantage and after different analysis and selection procedures of the system also pointed as reasons by the participants covering in percentage 23.5%, 14.8%, 12.3% and 11.1% respectively for each reasons. The legal and regulatory restrictions regarding public projects procurement and contract administration practice was the governing cause for the adoption of the prevailing DBB project delivery system and due to these many public agencies in different sectors takes it as a default system for its adoption without any further selection processes. Nearly all of the legal frameworks existed in our country, Ethiopia, fits with the traditional DBB project delivery method.

The third part of the questioner under the heading effectiveness of the PDM on performance tries to investigate

the possible impacts of the PDM on the different project performance metrics from different perspectives i.e. aimed at achieving the third specific objective which is evaluation of the effectiveness of the delivery method adopted on the overall performance of the government housing projects. From the literature part we have seen that the PDM adopted as a tool for formulating the interdisciplinary interactions at different project phases and balancing project constraints with the integrative nature of the process, people, and system it will contributes for an effective project performance. The different types of PDMs' have different effect on the cost, time and quality performances of a project.

The project delivery method adopted and the resulting structuring of the project implementation may cause some challenges on its proper management. As of all instruments adopted here the project under this traditional DBB approach failed to achieve its budget related objectives by all participants of the project in different degrees of severity. The PDM alone may not be the cause here and it has a cumulative negative impact directly and/or consequentially on the cost related performance metrics. The greatest flexibility, power to interfere to incorporate changes during the design and construction stages of the housing projects and variation orders by the owner, AACASHDP, resulted for investing higher cost even though the competitive procurement proven to award the least competitive bidder. This affects the total cost performances of the project. And also in the economy exposed to a risk of inflation the preferred traditional DBB delivery options couldn't permit fast-tracking of the design and construction costs efficiently and effectively. Due to this and many other factors the costs of different resources increased including the saving on the residents registered. From previous studies the cost increment for different public projects constructed under the traditional DBB system assessed both quantitatively and qualitatively and the final result shows that there were higher cost increments in all case. The same was true from papers in different parts of the world which are both developed and developing nations as presented on the literature part in detail [9, 12].

Understanding of the definition and key characteristics of project is of significant importance for many reasons including success of the project and selection of the convenient project delivery method that is feasible and convenient for the respective project. Among the many different characteristics of a project from literatures and books those with significant impacts on the overall project performance and those primarily affect the project delivery method selection process selected as given below on Table 2. Those factors were categorized under major four groups and the remaining are included separately with in the title others and totally revised under five categories. The first category is scope related factors and has major six project characteristics under it that could be affected by the probable project delivery method adopted, in this case the traditional design bid build approach. The next category was project's cost related and has six major constraints as solicited from the literature part. The third and fourth categories were time and

risk related factors and each have three constraints.

*Table 2. Project performance metrics and characteristics affected by the PDM adopted.*

S/N	Project performance metrics and characteristics	Mean	SD	Rank
SCOPE RELATED				
1	There is high level of scope definition at the beginning of contract award.	1.88	1.198	20
2	Roles and responsibilities are clearly defined for all parties.	2.37	1.145	6
3	The owner manages the project with support from designer.	1.93	1.138	19
4	Level and No. of changes at project execution stage is low.	1.69	1.147	22
5	The PDM is flexible, allowing owner to make changes.	2.35	1.074	8
6	The owner, contractor and designer on the project have differing and conflicting objectives.	2.19	1.141	11
COST RELATED				
1	Owner knows the total financial commitments early in the project life cycle.	1.58	1.203	23
2	The project owner benefited from open price competition.	2.09	1.098	14
3	Inaccurate cost estimation prepared at the design phase.	2.56	1.076	2
4	The design is not within the construction budget allocated.	2.56	.966	3
5	The project characterized by experience in cost certainties.	2.06	1.111	16
6	The designer, contractor, owner & all participants want to minimize the cost.	1.98	1.323	18
TIME RELATED				
1	The project delivery method adopted on the project is time consuming.	2.36	1.238	7
2	Time related problems in the project affect the quality and cost related constraints.	2.90	.995	1
3	The pre-contract stage of the PDM adopted is very longer.	2.11	.975	13
RISK AND UNCERTAINTIES RELATED				
1	The projects under this delivery system disrupted by uncontrolled risk and uncertainties.	2.44	.935	4
2	Contractors claim over design errors and omissions many times.	2.37	.980	5
3	The project related risks allocated to parties best able to control it under the DM.	2.07	2.323	15
OTHER FACTORS				
1	The project faces different corrupt act between the different parties.	2.20	1.130	10
2	There is an open communication channel b/n all participants of the project.	1.98	1.084	17
3	Constructability is presumably is a major problem in the implementation of the housing projects.	2.21	1.021	9
4	There is an inherent checks and balance b/n the different participants.	1.86	1.022	21
5	All infrastructure development projects under the agency have the same objectives.	2.19	1.026	12

The last/fifth category includes constraints different from the above four and includes five categories of project related characteristics. Here all the 23 project characteristics under five basic categories which speculates directly and/or indirectly advantages and disadvantages of the PDM adopted; performance of the project and the relevancy of the PDM as a whole. With these considerations basically the second specific objective of the study addressed directly and indirectly the rest three specific objectives complemented in different degrees. Likert scale for measuring statements of agreement other than many other variations was preferred and used with values ranging from 1 to 5 representing Strongly disagree, Disagree, Neutral, Agree and Strongly agree respectively to calculate the Mean Score allowing responses to be categorized in terms of the response option most favored by respondents. This is further ranked in terms of the mean score as exported from the SPSS directly under Table 2 below. Considering this the result for this part of the questioner summarized above using table 2 presenting interaction of project characteristics with the PDM adopted for those ISHDPs'.

As we have seen above from table 2 and also Figure 2, the different project characteristics that affected by the PDM ranked using the result from the SPSS and from those ranked

factors time related problems in the project affect the quality and cost related constraints with mean score of 2.90 took the first rank. Inaccurate cost estimations prepared at the design phase, the design is not within the construction budget allocated and Disruption of projects under this delivery system by uncontrolled risk and uncertainties ranked second up to fourth with mean scores of 2.56, 2.56 and 2.44 respectively. Contractors claim over design errors and omissions many times (MS=2.37), Roles and responsibilities are clearly defined for all parties involved (MS=2.37) and the project delivery method adopted on the project is time consuming (MS=2.36) took the fifth, sixth, and seventh ranks over the different 23 project characteristics respectively.

The project delivery system is flexible in allowing the owner to make changes as needed, constructability is presumably is a major problem in the implementation of the ISHDP and the project faces different corrupt act between the different parties with mean scores of 2.35, 2.21 and 2.20 ranked eighth up to tenth respectively among the 23 project characteristics listed under different five categories. The top ten project characteristics from all five categories that are highly affected by PDM adopted on the ISHDP can be summarized using Figure 2 below.



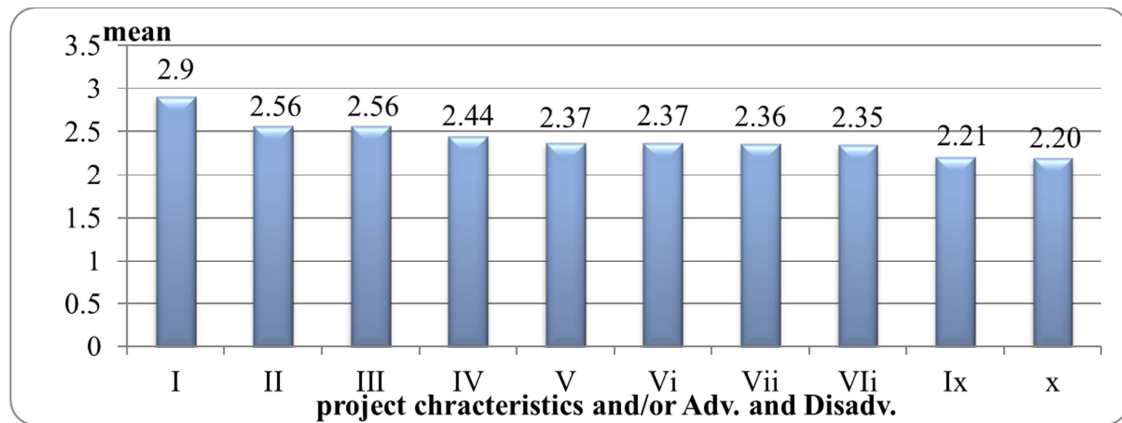


Figure 2. Mean values of project characteristics affected by the PDM.

Where the roman numbers on the horizontal axis (I-X) represents the different project characteristics i.e.

- i. Time related problems in the project affect the quality and cost related constraints.
- ii. Inaccurate cost estimation prepared at the design phase.
- iii. The design is not within the construction budget allocated.
- iv. The projects under this delivery system disrupted by uncontrolled risk and uncertainties.
- v. Roles and responsibilities are clearly defined for all parties involved.
- vi. Contractors claim over design errors and omissions many times.
- vii. The project delivery method adopted on the project is time consuming.
- viii. The project delivery system is flexible in allowing the owner to make changes as needed.
- ix. Constructability is presumably is a major problem in the implementation of the HP.
- x. The project faces different corrupt act between the different parties.

When we see the ranks under each category Roles and responsibilities are clearly defined for all parties involved and the project delivery system is flexible in allowing the owner as needed took the first and second ranks under the scope related project characteristics with mean score of 2.37 and 2.35 respectively. Under cost related characteristics inaccurate cost estimation prepared at the design phase and the design is not within the construction budget allocated took the first and second ranks with mean score of 2.56 in both cases.

In case of time related factors time related problems in the project affect the quality and cost related constraints and the project delivery method adopted on the project is time consuming ranked first and second with mean scores of 2.90 and 2.36 respectively. For the fourth factor on risk and uncertainties the projects under this delivery system disrupted by uncontrolled risk and uncertainties and contractors claim over design errors and omissions many times took the first and second ranks. The last category ranked constructability is presumably is a major problem in

the implementation of the ISHDP first and the project faces different corrupt act between the different parties took the second rank.

When we compare the five categories using their average mean score, time related factors have the highest average mean score of 2.46 [= (2.36+2.90+2.11)/3] followed by risk and uncertainty related factors (AMS=2.3), cost related factors (AMS=2.14), other factors (AMS=2.09) and scope related factors (AMS=2.07) took second up to fifth ranks respectively. This shows that the traditional DBB delivery method implemented on ISHDP had major impact on the time related performance metrics followed by risk and uncertainties considerations of the project.

According to the reviewed literature different advantages of the traditional DBB method includes its cost benefit through an open market competition, a complete design and scope definition before awarding the project, increased certainty about cost estimates, clear distinct roles, easiness to tender, owner's flexibility, owners control on complex issues and check and balance between the different parties are the major one. And among all of those mentioned eight advantages and also many other from the literature review, practically on those ISHDPs' the cost benefits from market competition, owner's flexibility, owners control on complex issues and clearly defined roles and responsibilities for all parties involved are the only one observed let alone the final outcomes and indirect consequences of each as an advantages. The rest advantages aren't practical at all in all sites of mass housing development project from the questioner survey results and also the rest two instruments (document review and interview) finding.

Even though the cost benefit expected under DBB project arrangement, adversarial project relationships due to the limited or no previously established working relationships between project owner, designers, supervisors and the contractors be formed which consequentially affected the budget. And also since the contractors' in all site selected based on lowest-bidder approach, there was a tendency for the selected contractor to solicit potential claim opportunities over design errors or omissions to recover costs during construction every time throughout the PLC. The building

owner i.e. AACAIHDE exposed to potential construction disputes that further disrupt the total project progress as it was evidenced in all projects under taken in different sites.

Also as the results of the different documents and reports review from the head office evidenced and proves that the owner, AACAIHDE, get in to disputes in the fiscal year just only 2011 EC with the different contractors in different sites for 40/0 block types only 32 times. From this 25 of the claims are by the owner itself and the rest 7 are from the builders and the other participants on the projects. The 25 claims are financially covers around 224,921,531.10 ETB and the seven claims from the rest participants on the owner worth's around 44,793,574.19 ETB. From this the enterprise i.e. the owner wines only the seven claims among the 25 which worth 24,933,366.44ETB only and lose five claims among the seven expected to be 13,863,202.13 ETB. Only six cases in the fiscal year 2011EC solved through negotiations and from this the enterprise gets 40,808,194.54 ETB. There are also other six cases handled by the court not solved yet. And this was all just from one year report and 40/60 block types only. This in turn has consequential effect on the final planned project outcome in different degrees and even though the claims had many different causes from different stakeholders the PDM has its own impact.

The disadvantages of the system as revised on the literature part includes, usually cost overruns, client retains most risks, usually low bid incentive for change orders by the contractor and MSEs', owner responsible for errors & omissions, linear process, innovation not optimized, fragmented structuring of the different stakeholders, longer time for design and procurement, no contractor input into the design process and does not necessarily include innovative concepts and opportunities are the major one. All these observed on those ISHDP in different degrees of severity affecting the total progress of the project. Correlating the ideal case with practical situation for each project performance characteristics mentioned from survey results all the disadvantages are there affecting the total project performance. Also in addition to these some of the advantages due to wrong interpretations and and/or implementations of the PDM itself changed too disadvantages of the PDM and affect total progress of the projects.

Owner of the ISHDPs' active involvement in the design process and the higher flexibility for different design changes are among long term advantages for the city administration and user of ISHDP practically. But due to the gaps and recurrent changes on the design documents and specifications by the owner initiated by many external and internal factors, it was a potential causes for delays, cost overrun and quality deviations. The fact that pre-contract stage on the mass housing projects was longer and adversarial nature of contract management leads to a longer project delivery time. Consequently those time dependent specific project objectives and constraints affected the rest of ISHDP's constraints.

As the survey result shows practically from those ISHDPs'

and also as of C. K. Fong et al. and Addis M. the traditional DBB approach disrupted by different uncontrolled risk and uncertainties due to the ever changing market conditions in the industry. All top management level interviewees participated for seventh interview question (Refer Appendences B: question-7) and said that, there is no a risk management practice at the office and it's just reactive approaches towards the different issues in the program and also the PDM did not consider this at all. The office tries to address the different project related risk and uncertainty through allocation of responsibilities for the different stakeholders in the program at different levels. This by default seems more of a risk transferring mechanism through contract agreements to the different possible participants who could have a capability and capacity to fulfill it accordingly. The different stakeholders here include designers, supervisors, main contractor, different trade subcontractors, MSE, suppliers, financiers, etc. Lack of an independent RM department leads to transfer of risks which are beyond the capability of the stakeholders.

There are various types of risk in the construction project environment there has to be a risk management practice that requires input from all stakeholders of the project and, if not managed properly, can result in unnecessary cost or time overruns. This has been clearly seen at the agency even if the respondents said that there is a plan for the future under the newly structuring there is going to be made by the minister to consider it as a separately independent department. Project risk management as the most crucial key factor for the success of engineering and construction projects specifically such complex public mass housing projects the agency has to reconsider it in different levels. The questioner survey result also proofed that the issues of risk and uncertainty affected the project negatively. The practice at the agency clearly shows that adoption of the PDM was not under consideration of the different possible risks that should have to be determined through risk management process and this consequently affected the project.

With limited funding and complex procurement procedures, some public building owners are more vulnerable to the process disruption and bid cost overruns. The absence of qualified general contractor's input early at the design phase also limit the completeness and/or constructability of the design and specification documents as the results from the above two instruments also evidenced above. Due to all these factors all ISHDP's had estimates at the design stage that were inaccurate and also it wasn't with in the budget as the questioner survey result, document review, interviews and previous study reports evidenced. Discussing the issue from the five categories perspective mentioned under part-IV of the questioner the traditional DBB approach primarily affects time related project characteristics. Even if the time related objectives on the project were not given first priority for its accomplishment by the agency there was an exaggerated time delay, five up to fifteen years delay, on the projects as the results from all three instruments evidenced. There were no punishments for those delays since all



participants were responsible in different degrees and direct implementations of the contract clauses, like liquidated damage and delay compensation, will bankrupt the local firms. Only in very harsh and exaggerated cases the owner or the other service providers and builders implements the contract clauses for dispute resolution.

From previous studies and reports on related topics the traditional project delivery approach affects principally the project's schedule other than the rest project constraints as of this study finding [20, 9]. On the contrary from the works of Rahel the cost of the project affected the most by the PDM adopted in projects she preferred for the study i.e. selected ERA road projects in different parts of the country [15]. Risk and uncertainties related project characteristics of the project comes next to the time constraints affected by the PDM adopted. Disruption of the total progress due to uncontrolled risk and uncertainties, poor risk transfer to the wrong parties and consequential claims by different service providers, suppliers and builders referring different clauses from the contract agreement seen under the projects from the survey results. Cost related performance failures followed by other factors and scope takes the third, fourth and fifth ranks respectively as of the survey result which affected by the traditional PDM implemented.

Here even if the cost related factors ranked third based on the average mean value for comparison, overall impacts of the rest four factors consequentially affected the cost constraints of the project leading to cost overrun. It has to be noted that among the 23 project performance factors those cost related ranked second and third in their impacts in relation to the PDM. From the document analysis of the fiscal year's (2011EC) report review the office allocated a total of 10 billion and only 2.398 billion is used which was 23.98% of the planned performance financially for all site 40/60 block type projects. This was due to delay of the projects from the planned progress by the corporation.

The delay for those active sites under package two and three of 40/60 block types were; for package two projects the office planned to complete the projects 100% and 86.98% achieved and in case of package three projects again 100% planned and only 69.84% achieved. This in turn resulted for increase in final cost, disputes, litigations, termination of the contractors, wastage and under-utilization of man-power and resources and finally as presented above tying down of owner's capital resulted on the projects due to the delay. And this all can be correlated with the DBB approach by its nature of linear, sequential and fragmented approach, the platform it creates between the different stakeholders which is more of false telling and controlling rather than working in an integrated form are the major one which was observed practically on the projects.

From question asked on interviewees about the different project nonperformance and their consequential problems on the different stakeholders of the project and said that, non-performances of the projects occurs due to the different parties default and/or breach of contract in different ways, all stakeholders affected consequentially in different levels of

severity. Actual damages flowing from the breach of contract are either direct or consequential in affecting the overall project objectives and stakeholders.

Project's timeline, quality, and budget are threatened due to those project non-performances. And this was also evidenced from previous works by Endale, (2016), Guesh, (2017) and Melaku, (2017). Delayed monthly and interim payments for completed work, owner's and contractor's cash-flow problems, Scope changes from owner, delays in decision-making, poor site management and supervision, poor design capacity and design changes, poor constructability, incomplete and erroneous designs by architect and engineering disciplines, are the different non-performances and their main causes observed at the project of the ISHDP.

Those attributes in turn associated with project outcomes like claims, disputes, litigation, terminations, poor health and safety performance, and inferior quality, cost overrun, time slippage, corruptions, and affects all the major stakeholders directly and indirectly. All these affect the government, the contractor, consultants, financiers, suppliers, MSEs' and the final users who save money for the homeownership.

And all these factors one way or another related with the projects delivery approach which is the traditional DBB approach. The works of different local researcher such as Lema and Rahel, also clearly showed that the traditional DBB arrangement resulted with a complicated and difficult administrative chain throughout the different management levels (both vertically and horizontally) and also both at office and project levels within the organizational structure of many public sector infrastructure development projects. And these had affected consequentially the different internal and external stakeholders of the project financially; their smooth and formal communications, organizational reputations, dissatisfactions, resource wastages, bankruptcy and disputes among them are the major one.

Every PDM adopted for certain project has to accomplish the goals to be delivered on time and within budget, with desired functionality and acceptable quality. For cost control on a project, the construction plan and the associated cash flow estimates from the contract document can provide the baseline reference for subsequent project monitoring and control. The same is true in case of schedules i.e. progress on individual activities and the achievement of milestone completions can be compared with the project schedule to monitor the progress of activities from the agreement. From previous studies the practice in different parts of the world and also locally in different sectors of the public projects there were a shift from the traditional project delivery method to innovative and modern approaches and in some cases there were an adaptation form of the Design Bid Build in to its best form. According to Melaku's analysis, as the block types vary and also the story increases cost concurrently increases because construction requirements increases differently due to complexity and many other issues. And for this the agency has to consider the different project structuring requirements differently for the success of the

project and practically the office failed to do so. Even if the organizational structure did not mentioned he identified different 21 cost overrun factors and all are directly and indirectly correlated project delivery method. Concluding that all site projects (100%) of the mass housing projects face cost overrun within the ranges from 13.5%-38% of the original contracted amount due to different reasons. The same history found from the questioner survey under the last three parts findings discussed above. On the other hand Endale mentioned the different major causes of delay project performance for the different mass housing projects i.e. late material supply, financial difficulties faced by the contractor, problem of electric supply, problem of water supply, equipment unavailability, delayed payments to contractors, poor site management, ineffective planning and scheduling, late design review and approval and slowness in decision making process. And all are directly or indirectly can be subsisted and resolved through the adoption of an effective

project delivery method and/or adaptation of the Design Bid Build approach in to its best forms again like that of the cost constraints.

Every PDM adopted for certain project has to accomplish the goals to be delivered on time and within budget, with desired functionality and acceptable quality. For cost control on a project, the construction plan and the associated cash flow estimates from the contract document can provide the baseline reference for subsequent project monitoring and control. The same is true in case of schedules i.e. progress on individual activities and the achievement of milestone completions can be compared with the project schedule to monitor the progress of activities from the agreement. And for this two 40/60 block types in different two project sites i.e. Sengatera and Crown site and 20/80 block types at Yeka Ayat-2 site reviewed in detail as the office allowed the researcher to review different documents at the main office.

*Table 3. Summary of document review for selected sites.*

Project site	Block type	No. of block	Typology	Amount (in ETB)		Cost Growth	Durations in Cal. days		
				Contract amount	Actual cost		Contract duration	Actual duration	variation
Crown site	40/60 type	14	B+G+9	342,062,460.63	424,314,458.26	24.05%	680 days (May/2013-mar/2015)	1,445 Days (may/2017)	52.9% (765 days)
Senga-tera site	40/60 type	5	2B+G+12	175,414,435.25	212,071,996.53	20.90%	803 days (Dec/29/12-march/12/15)	1,534 days (Mar- 2017)	47.85% (734 days)
Yeka Ayat-2	20/80 type	126	G+5	110,937,923.25	107,813,716.83	-2.80%	300 days	3,345 days	91.03% (3045 Days)

The rest 40/60 block in different sites of the city are on progress and the total duration and cost is not known so that make it hard analysis of the actual deviations from the contracted agreements and reach at conclusions. Instead those on progress project's document review emphasis on the different change and variation orders till their current stage, disputes over variations, changes to specification or renegotiation, different items and scopes works and activities under continuous change and variation orders and number of contractors terminated from the project and the reason of termination reviewed from the different reports, letters and documents from the office. The cost growth, project schedule growth and project intensity of each project was calculated using the equations given below (Noel and Dennis, 2016).

$$\text{Cost Growth} = (\text{Final Contract Cost} - \text{Contract Award Cost}) / (\text{Contract Award Cost}) * 100;$$

$$\text{Project Schedule Growth} = (\text{Actual Project Duration} - \text{Planned Project Duration}) / (\text{Actual Project Duration}) * 100.$$

As given above on Table 3 the results indicates the cost metrics under the two 40/60 type blocks deviate very match 24.05% and 20.90% respectively for Sengater and Crown site projects. When we see the case for the 20/80 type block type the actual cost shows some reduction from the contracted amount with 2.8% than that of the contracted amount. When we see the time metrics there were deviations more than two years for both 40/60 types of blocks and in case of 20/80

types of blocks there were more than eight years deviation. This indicates that the performance under this category of PDM together with many other causes fail to achieve objectives as planned.

The results from the document analysis complement the rest two instruments quantitatively i.e. there is a significant amount of variations in cost and schedule. The different studies conducted by different researchers including Yebichaye, (2016), Endale, (2016) and Melaku, (2017) in different blocks and sites of the ISHDP in AA also supports the findings by evidencing that there were time, cost and quality deviations. After a through literature review and different observations one clearly can reach that the different cause of project failure and/or non-performances can be categorized in to primary and consequential based on their nature that one can emanated from the other. Accordingly the PDM or the bigger gateway to project works given little or no consideration regarding its overall adoption and implementations in different public projects.

From the literature review we have seen that the practice in different parts of the world and also locally in different sectors of the public projects there were a shift from the traditional PDM to innovative and modern approaches and in some cases there were an adaptation form of the DBB in to its best form. According to Melaku's analysis, as the block types vary and also the story increases cost concurrently increases because of the construction requirements increases

differently due to complexity and many other issues. And for this the agency has to consider the different project structuring requirements differently for the success of the project and practically the office failed to do so. Even if the organizational structure did not mentioned he identified different 21 cost overrun factors and all are directly and indirectly correlated PDM. Concluding that all site projects (100%) of the mass housing projects face cost overrun within the ranges from 13.5%-38% of the original contracted amount due to different reasons. The same history found from the questioner survey under the last three parts findings discussed above.

On the other hand Endale, (2016) mentioned the different major causes of delay project performance for the different mass housing projects i.e. late material supply, financial difficulties faced by the contractor, problem of electric supply, problem of water supply, equipment unavailability, delayed payments to contractors, poor site management, ineffective planning and scheduling, late design review and approval and slowness in decision making process. And all are directly or indirectly can be subsisted and resolved through the adoption of an effective PDM and/or adaptation of the DBB approach in to its best forms again like that of the cost constraints.

## 5. Conclusion

The construction projects contract delivery methods adopted on mass housing development projects at Addis Ababa city in different sites categorized as the traditional Design Bid Build approach and it was characterized by its very fragmented and sequential characteristics. A very fragmented, traditional and/or customary adaptation of the system i.e. no project delivery method selection processes at all and also no convenient procedural adoption and implementation of the project delivery method observed. Due to its very fragmented and traditional adaptation nearly all advantages of the system turned to consequential and/or long term disadvantages specifically for the owner, the users, the contractors and financers respectively. And on the contrary all the disadvantages of the Design Bid Build approach known ideally affected the project. Problems of time constraints, inaccurate estimation, inaccurate design, uncontrolled risk and uncertainties and stakeholders claim and disputes over those shortcomings, specifically by the contractors, are the major disadvantages of the system. Clearly defined roles and responsibilities for stakeholders, flexibility of the owner and the benefit of open price competition are the major advantages of the system. Regarding effectiveness of the project delivery method, the system failed to achieve the time related objectives followed by the risk and cost related constraints. Effective adaption of the system i.e. minimizing the fragmentations between different service providers and workers, forming an integrated platform which is project wise than being stakeholders perspective are the two major points that would characterize the project delivery method for effective delivery of the projects.

## Abbreviations

AA	-Addis Ababa
AACASHDE	-Addis Ababa City Administration Saving House Development Enterprise
AIA	-American Institute of Architects
BIM	-Building Information Modeling
BOOT	-Build Owen Operate Transfer
BOT	-Build Operate Transfer
CBE	-Commercial Bank of Ethiopia
CMR	-Construction Management at Risk
DB	-Design Build
DBB	-Design Bid Build
EC	-Ethiopian Calendar
EEPCO	-Ethiopian Electric Power Corporation
EFDRE	-Ethiopian Federal Democratic Republic
EIA	-Environmental Impact Assessment
EPC	-Engineer Procure and Construction
ERA	-Ethiopian Road Authority
FIG	-Figure
GC	-Gregorian calendar
GMP	-Guaranteed Maximum Price
HCB	-Hallow Concrete Block
HVAC	-Heat, Ventilation and Air Conditioning
IPD	-Integrated Project Delivery
IPDM	-Integrated Project Delivery Method
ISHDP	-Integrated Saving Housing Development Program
MSE	-Micro and Small Enterprises
MUDH	-Minster of Urban Development and Housing
PDM	-Project Delivery Method
PLC	-Project Life Cycle
PM	-Project Manager
PPP	-Public Private Partnership
QBS	-Qualifications Based Selection
SD	-Standard Deviation
SPSS	-Statistical Package for Social Science
UCBP	-University Capacity Building Project
USA	-United State of America

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