MEASURING CORRUPTION IN PUBLIC WORKS PROJECTS: EVIDENCE FROM CONTRACTORS' INTERNAL RECORDS IN PUNJAB, PAKISTAN

A Dissertation

Submitted to the National Graduate Institute for Policy Studies (GRIPS)

in Partial Fulfillment of the Requirements for the Degree of

Ph.D. in Advanced Policy Studies

by

Aamer Shahid

September, 2018

ABSTRACT

This study provides both qualitative and quantitative evidence on the extent of corruption in public works projects contracted out by the Public Health Engineering Department (PHED) of the provincial government of Punjab in Pakistan. The quantitative evidence is based on internal records of bribe payment by 28 construction contractors, as well as an independent expert assessment of contract execution of 20 water supply projects. The qualitative evidence consists of interviews with NAB officers, contracting firms, end-users of the construction projects, and PHED engineers. Both quantitative and qualitative evidence suggest that the level of bribes depends heavily on whether the contract was awarded competitively or effectively by the engineer in charge of the project. Only about one-third of contracts in the sample were awarded competitively. Without competition, PHED contractors on average pay about 15% of the project budget in bribes. About 12% is paid to the engineering department and about 3% is paid to the politicians who sponsored the project. When there is competition for the contract, the average total bribe percentage is only about 10%, with 8.5% going to the department and 1.5% going to politicians on average. Contractors' profit margins are about 13% on average, irrespective of competition. Both the level and distribution of bribes as well as profit margins have been stable between 2007 and 2017.

KEY WORDS: corruption, bribes, construction projects

Dedication

To my parents Rao Wajid Ali Khan and Rafiqa Begum, my sister Zahida Parveen Rani Baji

my wife Benish Abdul Jabbar, my daughter the late Aima Wajid, my daughters

Hoorain Fatima and Raima Wajid, and my son Muhammad Abdul Ahad.

Acknowledgements

First of all, I express deep gratitude to the Almighty Allah who has given me the strength and opportunity to complete this noble task.

I am indebted to a number of people who have contributed to the completion of this dissertation with their encouragement, guidance, and constructive feedback. First and foremost, profound gratitude goes to Professor Litschig Stephan, my main advisor, who provided me valuable guidance, support, and motivation throughout my research work. His patience, encouragement, and active participation in my research on campus and during my field visit in Pakistan has enabled me to handle this empirical and practical nature of research. Without his keen interest and due diligence, it would not have been possible for me to complete this research so proficiently. His unique style and ability to keep me focused and polishing my skills has been a great learning.

I am highly grateful to Professor Tetsushi Sonobe, my co-advisor and Director GRIPS Global Governance Program (G-Cube), from whom I was able to learn a great deal about public policy, governance, and practical research approaches. He has very kindly provided his support, guidance, comments, and sharpened my research and analytical capabilities during my studies at GRIPS. I express my sincerest and deepest thanks to him for his encouragement, creative and comprehensive advice until this work came into existence.

I am especially grateful to Professor Anh Tran for his time to visit Japan as an external supervisor. His valuable comments and his work in the same filed have helped me a lot to

improve my understanding on this specialized study. Professor Khoo Boo Teik has also proved as a wonderful mentor. He helped me to develop a conceptual understanding of the political and social dimensions in the historical and contemporary arenas. Professor Kaoru Sugihara and Professor Yusuke Takagi have helped me to sharpen my understanding of political and economic issues. I would specially like to thank Professor Lawrie Hunter whose input has enriched the writing of this dissertation. I am obliged to my Masters supervisor Professor George Madine for his ideas, comments, and suggestions during my MSc. and PhD.

I would like to express my sincere gratitude to the National Graduate Institute for Policy Studies (GRIPS), Japan, for providing me the opportunity to complete a doctoral program from this esteemed institution. I wish to extend my sincere gratitude to the GRIPS Global Governance Program (G-Cube) core members who have always been there to help me going through this "G-cube leader of the leaders program". Particularly, sincerest gratitude to Ms. Megumi Maekawa, who has been actively involved in helping us settling down in a new environment. I also wish to extend my sincere gratitude to the GRIPS staff including the Student Office, the International Program Team, the Academic Support Team, and highly efficient the Information Technology Section who were very helpful and quick to provide the necessary support. Special thanks to the Government of Japan for financial support and providing me an opportunity for academic and cultural learning. I am grateful to the National Accountability Bureau (NAB), Pakistan and the Government of Pakistan for giving me permission to complete my PhD.

My research team in Pakistan deserves special appreciation and gratitude. Many thanks to Mr. Abid Javed, research coordinator, Mr. Qamar ul Zaman, expert engineer, and research members Mr. Kashif Aziz and Babar Rashid. Their patience, and expertise during the field work in Pakistan is highly recognized and much appreciated. I am also grateful to the executive engineers (XENs), superintending engineers (SEs), NAB officers, and members of the government machinery in Pakistan who helped me in the completion of this research. Conducting a field research of this nature which contains some sensitive issues would not have been possible without their support and help. I am grateful for their kindness and cooperation.

My peer group at GRIPS Sohail Babar Warraich, Benedict Makanga, Osei Oteng-Asante, Md. Rajibul Alam, Wahid Bux Mangrio, Mohammad Zeeshan Mangi, Ishtiaq Ahmed, Mohammad Azeem, Sajid Hussain, Amin Haider Shah, and Yasir Hussain, have always been there for moral, social, and academic support during my course of studies. I am grateful to all of them.

I owe a special debt to my parents who throughout my life have been great source of inspiration and motivation. Their dedication towards my studies and career building has made me what I am today. And finally, I owe special thanks to Benish Abdul Jabbar, my wife, who has been supporting me through my Masters and PhD studies. Her patience and support has been invaluable which helped me in successful completion of PhD studies and this dissertation. I am grateful to her compassionate, considerate, and lovable personality.

Table of Contents

Contents Page Nos.

List of illustrations

1. Introduction

1.1 Motivation

Corruption in low income countries has often been characterized as rampant with the potential to undermine their social and economic development.[1] Although corruption has many definitions; perhaps the most common one is given by Transparency International (TI) as *"corruption is the abuse of entrusted power for private gain"*. More explicitly, Philp (2016 p.45) defines corruption as *"a public official (A), acting for personal gain, violates the norms of public office and harms the interests of the public (B) to benefit a third party (C) who rewards A for access to goods or services which C would not otherwise obtain"*. A common distinction is between *"petty"* and *"grand"* corruption. Bribes to low or middle level officials in the delivery of routine services are termed as petty corruption, whereas grand corruption involves key players at the central level of decision making (Kenny & Søreide, 2008; Nystrand, 2014).

In this study, corruption takes the form of bribes paid for winning and executing public works contracts under the Public Health Engineering Department (PHED) in Punjab province in Pakistan. The public servants in this study are the executive engineers (XENs) and clerical staff of the (PHED), officials of the finance department, and officials of the office of the Accountant General Pakistan Revenue (AGPR), as well as politicians. The third party in Philp's (2016) definition of corruption are construction contractors who pay for winning and executing public works contracts. Contractors keep track of bribe payments since they represent a cost like wages

[1] Some debate revolves around the question of whether corruption is potentially supportive of development (Key, 1949; Merton, 1957; Leff, 1964; Beck and Maher, 1986; Bardhan, 1997; and Khan, 2000). The emphasis in previous literature was on speeding up the process due to corruption. However, the later literature refutes it and shows that corruption potentially undermines development (Rose-Ackerman, 1975; Shleifer and Vishny, 1994; Gray and Kaufman, 1998; and Seligson, 2002, 2006). There is now considerable agreement in the literature on the importance of combating and controlling corruption (Kaufman et al., 2000; Sousa, 2010; Quah, 2011; Graycar and Prenzler, 2013; Dixit, 2016).

or materials. This study examined the internal records[2] of bribe payments by 28 contractors in 237 PHED. Since XENs and politicians are key players in public works projects in Punjab, the type of bribery studied here should be considered *"grand corruption"*.

Measurement of the extent of corruption in any setting is notoriously challenging. Banerjee et al. (2012 p.2) find scant research on the measurement of corruption saying, *"Research on corruption faces two important obstacles—one empirical and one theoretical. On the empirical side, the primary challenge is measurement. Corruption, by its very nature, is illicit and secretive. How does one study something that is defined in part by the fact that individuals go to great lengths to hide it? How does one deal with the fact that attempts to measure corruption may cause the actors involved to either reduce their illicit behaviors during the periods of measurement or find new ways to obscure their behavior? If we cannot accurately measure corruption, how can we test among different theories, measure its impacts, or even produce suggestive correlations?"* Similarly, Olken and Pande (2012 p.4) find the literature on measuring corruption scant and heterogeneous, stating that *"there are remarkably few reliable estimates of the actual magnitude of corruption and those that exist reveal a high level of heterogeneity"*. This study is an attempt to address the issues raised by both Benerjee et al. (2012) and Olken and Pande (2012) by measuring the corruption from the insiders' account using their internal records of bribe payment. Since there may be different stakeholders or actors and the major problem is that who will cooperate to expose the illicit payments. Most likely, the bureaucrats i.e. the executive engineers (XENs) and politicians may not cooperate due to the several reasons, say for example, due to not being willing to lose their incentives through bribes or with the fear of prosecution. However, in this study the

[2] Internal records are the books where the CEOs of construction firms keep track of the amount paid in the construction work. CEOs also keep the record of the bribe payment as a cost of the project. On the top, horizontal heading contains the name of the project, whereas, the vertical lines contain date, items, name, and amount of expense.

CEOs of the firms, who pay bribes and consider it as a cost, became willing to show the internal records of bribe payment.

Previous efforts to objectively measure corruption include Reinikka and Svensson (2004) who estimated corruption by comparing the amount of funding schools actually received to the amount schools should have received from the central government. The main drawback of this measure is that missing grants could at least partly reflect reporting errors, not actual theft. Similarly, Olken (2007), measured corruption based on "missing expenditures", i.e. the difference between reported expenditures on road improvement projects in Indonesia and an independent engineer's estimate of what was actually spent on road improvement. Again, a drawback of this measure of corruption is that part of the missing expenditures might be due materials lost during the construction process, not theft. The most reliable estimate of corruption to date comes directly from the internal records of a bribe paying firm (Tran 2014). Tran's work is an important contribution to the objective measurement of bribery, but the findings are based on evidence provided by a single firm and thus are hard to generalize.

While corruption can occur in many settings, the construction industry is notorious for corrupt practices involving private individuals (i.e. CEOs of construction firms) and public officials with the authority to influence the receipts of contracts by private individuals or firms (Rose-Ackerman, 1997). Sohail and Cavill (2008) estimate that the value of funds lost to corruption in the construction industry is approximately $340 billion worldwide each year. In the case of Pakistan, Nawaz, Shareef, and Ikram (2013) argue that huge funds are involved in the construction industry of Pakistan and note that bribery and kickbacks are rampant. Referring to corruption more broadly, Pakistan supposedly loses up to 70 billion rupees (almost $70 million) daily to corruption (Daily Dawn, 2012). Moreover, in the 1990s both political parties in power (the

Pakistan Muslim League and the Pakistan People's Party) were thrown out of the government on charges of corruption (Pakistan Defence, 2013). And in 2018, the prime minister of the Pakistan Muslim League government was removed from office again on charges of corruption.

This study focuses on corruption in the form of bribes paid for winning and executing water supply projects under the Public Health Engineering Department (PHED) in Punjab province in Pakistan. Punjab, in terms of population, is the biggest province of Pakistan. As per the census (2017) the population of Punjab was 110 million out of total population of 207 million in Pakistan. The findings of a study in Punjab can fairly represent the whole Pakistan. Like other developing countries, Pakistan is also facing the problem of rampant corruption (the Transparency International Corruption Perception's Index ranked Pakistan on 116th position on a global scale in 2016). Expectedly, the findings of this study on corruption may help to control corruption in Pakistan and other developing countries.

The allocation of development budget to Punjab is Rs. 635 billion ($ 5.5 billion) against the total public sector development budget of Pakistan which is Rs. 1001 billion ($8.66 billion) for financial year 2017-18 (Daily Dawn, 2018). The focus on water supply projects is guided by two main considerations: First, such projects are very common not only in Punjab and Pakistan but in developing countries more generally. Second, corruption in water supply projects may adversely affect the quality of these projects and thus the quality of drinking water. In this respect Zia Ullah Khan (2017, p.276) states that *"non-implementation of laws, mismanagement, industrial and human waste and government corruption have actually caused a clean drinking water supply crunch and reduced the availability of water"*. At the provincial level in Pakistan, the Public Health Engineering Department (PHED) is the agency responsible for the construction and initial operation and maintenance of established public water supply systems. For financial year 2017-18

the budget of the PHED is set to be Rs. 57.477 billion ($500 million) which represents 9% of the total development budget of Punjab (Daily Dawn, 2018).

According to some authors, corruption is a complex and multidimensional phenomenon, and thus needs to be tackled by effective institutions backed by political will (e.g. Dixit, 2016; Quah, 2011). Anti-corruption agencies (ACAs) are a form of institutional innovation in the fight against corruption. Examples include Singapore's Corrupt Practices Investigation Bureau (CPIB) and Hong Kong's Independent Commission Against Corruption (ICAC) which have set an example for other countries to combat corruption (e.g. Sousa, 2010; Kim, 2003, 2010; Quah, 2007, 2011). Nevertheless, it is often argued that ACAs alone cannot be successful to control corruption and that state-society collaboration is necessary (Mungiu-Pippidi, 2013). Similarly Persson et al. (2013) refer to Larry Diamond (2007) and emphasize that endemic corruption cannot be corrected with a 'technical fix' alone, rather, it requires an effort to change the corrupt norms which are embedded in society. On the other hand, according to Becker's theory of crime, the presence of an ACA makes it more likely that corruption is detected and punished, which raises the expected cost of corruption and may deter corruption from happening in the first place.

In Pakistan, the primary responsibility for fighting corruption rests with the National Accountability Bureau (NAB). Its mission is to ensure that funds for public goods (e.g. provision of safe drinking water through PHED) are utilized for the given purposes and better services are provided to general public. NAB established a new office in district Multan of Punjab which started its operations in January 2015 (NAB Annual Report, 2016). Multan district is situated in the southern part of Punjab and is home to about 2 million inhabitants, most of whom work in agriculture. The new NAB office in district Mulan provides the basis for the evaluation of its impact on bribe payment before and after its establishment. In addition to NAB, there are also

provincial anti-corruption establishments that are independent from NAB. NAB's jurisdiction overrides that of the local anti-corruption agencies.

1.2 Research questions and methodology

The present study aims to quantify corruption in public works projects commissioned by the Public Health Engineering Department (PHED) of Punjab, Pakistan. Moreover, it also aims to test whether the presence of a new regional office of the National Accountability Bureau (NAB) reduced bribes and improved the quality of public works projects. More specifically, the research questions are as follows:

Question 1: What is the extent of corruption in public works projects of the PHED?

Question 2: Who takes bribes and how much?

Question 3: Does the establishment of a new NAB office affect the level of bribery?

The measure of corruption in this study is based on project-level internal records of 28 water and sanitation contractors executing work for the Public Health Engineering Department (PHED) of Punjab. In addition to quantitative data on project cost, bribes, and profits, this study also analyzes qualitative data based on interviews with NAB officers, contracting firms' CEOs, PHED engineers, and beneficiaries of water supply projects. Moreover, the study also measures the quality of contract execution in 20 water supply projects based on an independent engineer's assessment of the extent to which project specifications were followed.

In order to determine whether or not the new NAB office reduced corruption, this study uses a mixed methodology combining interviewees' perceptions and quantitative evidence on bribe payment before and after the establishment of new NAB office in Multan. Specifically, Multan is considered the treatment district with the post-treatment period starting in January 2015

when NAB Multan became functional (NAB Annual Report, 2016). In order to assess the change in corruption (bribe payment), this study compares the trend of corruption in Multan to that in other districts of Punjab prior to and after 2015.

1.3 Summary of study findings and contribution to the literature

Our original study was on the measurement of corruption. However, during the research it turned out that competition effects the extent of corruption. Both quantitative and qualitative evidence indicate that the level of bribes depends heavily on whether the contract was awarded competitively or through collusion orchestrated by the PHED executive engineer. Only about one-third of contracts in the sample were awarded competitively. Without competition, PHED contractors on average pay about 15% of the project budget in bribes. On average, 12% is paid to the department, the bulk going to the executive engineer, and about 3% is paid to the politicians who sponsored the project. When there is competition for the contract, the average total bribe percentage is only about 10%, with 8.5% going to the department and 1.5% going to politicians on average. Contractors' profit margins are about 13% on average, irrespective of competition. Both the level and distribution of bribes as well as profit margins were stable between 2007 and 2017.

Results of interviews with CEOs suggest that in the government construction business under PHED, bribe payment is extensive and grounded in the culture. 100% of the CEOs reveal that it is necessary to pay a bride in order to execute the contract under PHED and the project quality may increase with citizen vigilance. Interviews with the executive engineers (XENs) suggest that there are no need-based projects but rather that projects are constructed for political point scoring. Moreover, politicians also take bribes from the construction projects which appears to have a negative effect on the project quality. XENs claim that they have low salaries which

motivates them for bribes. The interviews with NAB officers reveal that there was no political will to strengthen the accountability mechanism in Pakistan. NAB officers have concerns on the insufficient facilities to efficiently combat corruption, however, they were satisfied on the effectiveness of the new NAB office in Multan.

The results of the study with respect to the deterrent effect of NAB Multan on bribes are inconclusive. The main reason is the presence of an increasing trend in bribery prior to the establishment of NAB Multan and no trend in bribery in other districts. This makes it difficult to attribute any differential change in Multan compared to other districts post-2015 to the new NAB office. Another reason is that the sample size and thus statistical power are limited. Moreover, even if there had been common trends in bribery in Multan and other districts prior to NAB Multan, more time may be required for the intervention of NAB to take effect because corruption norms change slowly if at all (e.g. Sonobe, 2014). At the same time, if the theory of Becker (1968) holds true, the data for the period of two years after the establishment of the new NAB office in Multan (i.e. January 2015 – March 2017) should be sufficient to detect evidence of a change in bribery practices. Another possibility is that stakeholders were simply not aware of the new NAB office. But the qualitative evidence is mixed in this respect. While few CEOs or project beneficiaries were aware of the new NAB office (18 and 36% respectively), most PHED engineers (60%) were aware of new NAB office in Multan.

This study makes five main contributions. First, it directly measures bribes based on contractors' internal records. This is the second study, following Tran (2014), using such an insider measure of corruption. Second, this study provides not only quantitative measures but also qualitative evidence based on the interviews with CEOs, XENs, NAB officers, and focus group interviews with users of water supply projects. Third, the study also checks quality and cross

verifies the project cost through the physical audit of water supply projects by an expert engineer. Fourth, this is the first study to quantify the impact of competition on bribe payment and contract execution. And fifth, this study demonstrates that politicians are systematic partners in crime in the construction business.

1.5 Organization of the dissertation

The dissertation proceeds as follows: Chapter 2 describes the institutional background in Punjab. Chapter 3 describes the qualitative and quantitative data. Chapter 4 discusses the qualitative evidence on bribes and quality of public works projects in Punjab. Chapter 5 discusses the quantitative evidence on bribes and contract execution. Chapter 6 analyzes the impact of NAB Multan on bribes and project quality, as well as related qualitative evidence. Chapter 7 concludes with a summary and a preliminary reform proposal.

2. Institutional background in Punjab

This chapter presents background on the institutions under study. Section 2.1 describes the role and organization of the Public Health Engineering Department (PHED) of Punjab and Section 2.2 provides background on the National Accountability Bureau (NAB) of Pakistan.

2.1 Public Health Engineering Department (PHED)

The Public Health Engineering Department (PHED) is the department responsible for development work in Punjab province of Pakistan. The PHED works under the main department of Housing, Urban Development & Public Health Engineering Department (HUD&PHED), exercising its powers under the Punjab Development of Cities Act, 1976 and through Punjab Housing and Town Planning Agency (PHATA) under the PHATA Ordinance, 2002. The PHED works in close partnership with the United Nations Children's Fund (UNICEF), Japan International Cooperation Agency (JICA), and Korea International Cooperation Agency (KOICA). The mission of HUD&PHED entails provision of low cost housing, with the particular objective under PHED of ensuring provision of water supply and sanitation coverage across the province of Punjab.

The PHED in Punjab is divided into two zones, North and South, and each zone is headed by a chief engineer. Each chief engineer has 4 Superintending Engineers (SEs) each for one division. In a division there are four to five districts and Punjab has 36 districts in total. The PHED has one office for development work in each district, which is headed by the executive engineer (XEN). The XENs fall under the superintending engineer (SE) in the hierarchy. The office of the executive engineer (XEN) has 2-4 sub divisional officers (SDOs). Each SDO has a support staff of 3 sub engineers, 1 sub divisional clerk (SDC or senior clerk), 1 assistant sub divisional clerk (ASDC or junior clerk), 1 data entry operator, along with surveyor, watchman, gardener, peon, and technician (Figure A provides the complete hierarchy of PHED in Punjab).

The main functions of PHED include development work for the provision of safe drinking water and a pollution free environment in Punjab through the construction of projects related to sewerage / drainage and sewerage treatment plants to meet the Sustainable Development Goals (SDGs). There has been a rapid increase in the budget of the PHED, from US$ 80 Million in 2008-09 to US$ 500 Million in FY 2017-18. (PHED, 2017; Daily Dawn, 2018).

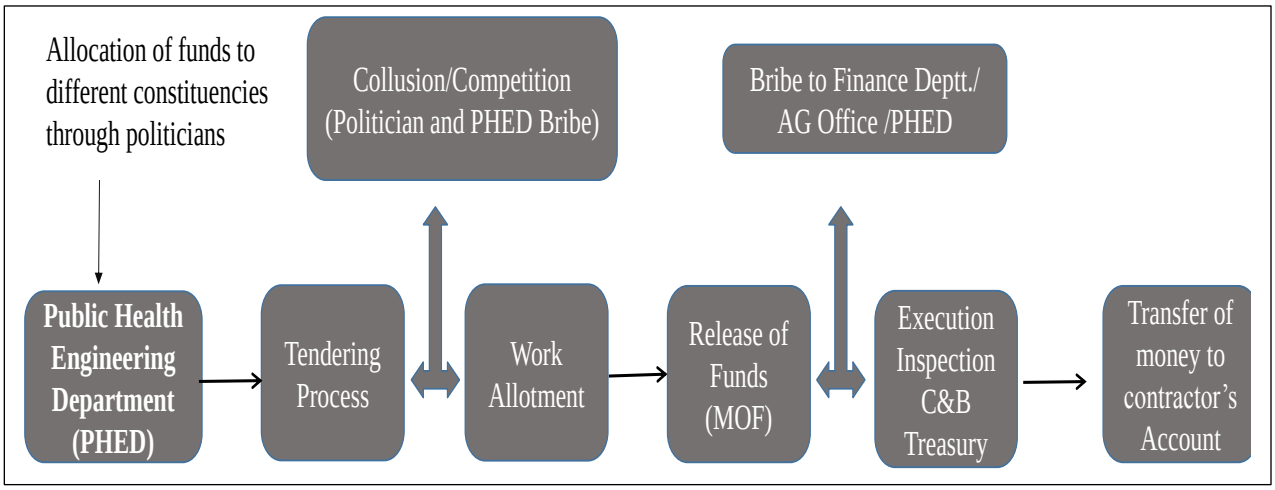
The projects under PHED are constructed by registered firms awarded through open auctions. There are different categories of the firms classified as category A, B, C, and D, while category D being the lowest and A being the highest category firm. D category can take part in the contracts up to worth Rs. 10 million, C category up to Rs. 30 million, B category up to 50 million, and A category can take part in the tendering of unlimited amount of work. This research has taken 28 volunteer firms out of 500 A category active firms in Punjab. Those firms, being the highest category firms, are financially more stable and have a long standing history of construction work under PHED. These firms have come up voluntarily and became part of this research because they want a smooth, and hassle- and corruption-free business working environment in PHED.

2.1.1 Typical project flow

A typical PHED public works project is implemented as follows. In the annual budget the funds are allocated to each province for development. National and provincial members of parliament negotiate funding with the provincial government for the projects in their constituencies to be completed through PHED. The provincial government allocates funds for project execution. The PHED, after getting budget approval, obtains technical sanction of the estimate for each project to be completed. Technical sanction is the approval for conducting a project from the competent authority viz a viz the estimated cost. For small projects (up to Rs. 15 million) the executive engineer has the delegated authority of technical sanction, and for projects up to Rs. 50 million the

superintending engineer has the authority of technical sanction of the projects, whereas chief engineers have full powers for technical sanction of the projects. The PHED provides Rs. 300,000 annually for the maintenance of each water supply project. The village committee i.e. water and sanitation committee (WASCO) is responsible for the utilization of this money in a year to ensure maintenance of water supply projects on self-help basis.

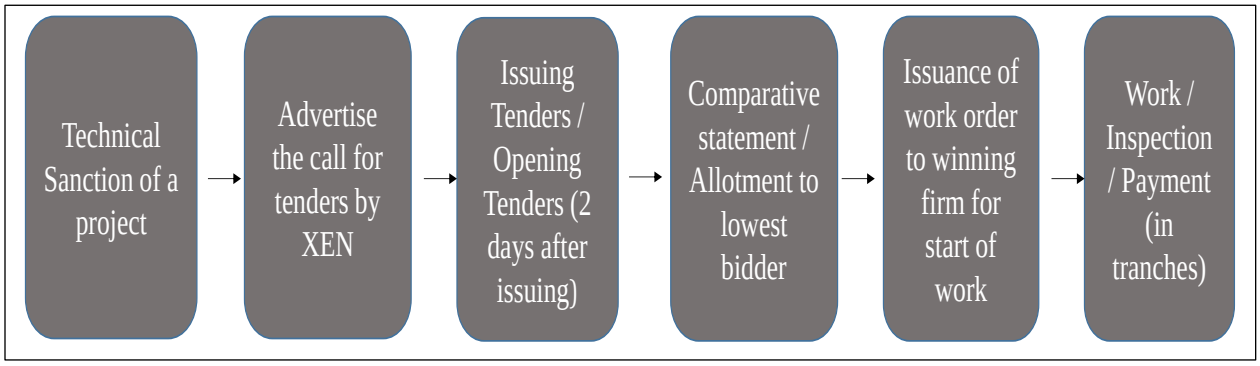
Diagram 2.1 – Project Flow



Once the project is sanctioned, a contract for project execution is put out to tender by the office of the respective XEN in a given district. The XEN writes a letter to the Directorate General Public Relations (DGPR) to initiate advertisement of the tenders. The advertisement contains information about the issuance and opening dates of the tender documents as well as the "full-rate" (i.e. the maximum the PHED is willing to pay) for each item of the project. Only registered firms can get tender documents issued in their names by the office of the executive engineer. They must submit a call deposit (i.e. a demand draft of 2-5% of project value in favor of the XEN, which will be forfeited in case of non-completion of the work after winning the tender). On the tender opening date, firms put their sealed bids in the tender documents and drop the tender documents in a locked tender box placed in the office of the respective executive engineer of the district. On the same

day at a pre-specified time, tender documents are opened in front of all the contracting firms and the head clerk is asked to make a comparative statement of the rates quoted by each contractor. The head clerk announces the rates and the contract is awarded to the lowest bidder.

Diagram 2.2 – Tendering Process



Source: Author's own illustration

The executive engineer (XEN) supervises the whole process of project execution. Contractors are paid in tranches according to the portion of work completed. The overseer and the sub divisional officer (SDO) assess work completion and record progress in the measurement book. The bill for completed work is processed by the office of the Accountant General Pakistan Revenues (AGPR) which issues a check in favor of the firm.

2.1.2 Practice of Collusion (Non-Competition)

Typical project flow shows that principally the project should be awarded on competition and to the lowest bidder. This helps in savings money to national exchequer. However, in practice, the process of competition is violated amid the personal gains of different stakeholders.

In this case the department (i.e. PHED through the office of the executive engineer) colludes with the contractors and awards the contracts to their favorite contractors on full-rates. Full-rates are the item wise specified rates by the PHED and the contract cannot be awarded to the

contractors on more than full-rates. The contractors are asked to divide the contracts among themselves on full-rates in return of maximum bribes. The tender forms are taken from those contractors who collude and quotation is made above the full-rates in their tender forms. Whereas, the rates of the contractor, who is pre-decided to be give the contract, are kept at full-rates and in this way in the comparative statements the pre-decided contractor's rates become lowest even quoting on the full rates. Consequently, the contract is awarded to the favorite contractors on full-rates with collusion.

In this type of award of the contract with collusion, contracts are divided amongst the contractors and the contractors who do not get the contracts in this turn are promised to be accommodated in the next tendering. Some of the contractors who insist for competition are paid some money out of the pocket of the contractor who is promised to be given that contract. Thus, the contractors give the signed tender forms and become the part of the collusion. Every effort is made to award the contracts with collusion because the earning of contractors and bribe rate in the contracts awarded on full-rates with collusion is considered to be high. The bribe is paid at the time of award of the contract and at the time of the inspection and billing for payment.

2.2 National Accountability Bureau (NAB)

NAB is the overarching anti-corruption agency of Pakistan and came into being on 16 November, 1999. The agency derives its powers from the provisions of the National Accountability Ordinance (NAO, 1999). The law gives the mandate to NAB to operate country wide in Pakistan and it applies to "any person" in Pakistan. The Supreme Court of Pakistan, in its judgment dated 07.06.2013 in criminal appeal no. 140 of 2005, has stipulated that NAB has the mandate to inquire into, investigate, and prosecute holders of public office and all other persons in Pakistan (Supreme Court

of Pakistan, 2013). *"NAB is the focal institution of Pakistan under the United Nations Convention Against Corruption (UNCAC)"* (NAB Annual Report, 2015, p. 23).

NAB has its headquarters in Islamabad with seven regional offices in four provinces, located in the cities of Lahore, Multan, Rawalpindi, Karachi, Sukkur, Quetta, and Peshawar, and one sub-regional office in Gilgit-Baltistan. The province of Punjab initially had two offices, one each in Rawalpindi and Lahore. However, in view of the population of the province of Punjab (110 million) and its area (205,300 sq. KM), a new regional office was established in Multan in March 2014. It became fully functional by January 2015. NAB Lahore and NAB Rawalpindi were established in 1999. The map of Punjab (see Figure-B) shows the districts of the province of Punjab, the location of regional NAB offices, and the timing of their establishment. Before the establishment of NAB Multan, the jurisdiction of that area fell to NAB Lahore. Before the establishment of the new office in Multan it was problematic to investigate cases in far flung areas due to long distances. Further the quality of evidence was poor due to problems of collecting proof to support allegations in those remote locations. During 2016, NAB received a total of 33,245 complaints, of which 2523 were received at the newly established region of NAB in Multan (NAB Annual Report, 2016).

3. Data

This section describes the qualitative and quantitative data on bribes in water and sanitation projects. Section 3.1 presents details of the internal records of bribe payments obtained from CEOs who executed work for the Public Health Engineering Department (PHED). Section 3.2 discusses the qualitative evidence on bribery, collected through interviews with different stakeholders, and section 3.3 provides details of the inspection of 20 water supply projects by an expert engineer.

3.1 Internal records of bribe payment

This study contacted 48 CEOs out of a total of 500 'A category firms' active in PHED construction projects in Punjab (PEC, 2018; Chief Engineer, PHED). This initial selection was designed to cover projects from all districts of Punjab. CEOs were told that the data were for research purposes only and were promised anonymity. Moreover, although both paying and receiving bribes is illegal in Pakistan, CEOs tend to view themselves as victims and prosecutions focus almost exclusively on public servants, not on contractors. Out of the 48 contacted CEOs, 28 agreed to give access to their internal records of 237 water and sanitation projects. To the extent that CEOs who pay more bribes are less likely to reveal their records, bribes in the sample of 28 participating CEOs will represent a lower bound on bribery in PHED projects. The records contain the project budget and contract value (winning bid), dates of awarding and completion of the project, profits earned, and the total amount of bribes paid to the PHED and to politicians involved in the project. The 237 contracts investigated in this study cover 28 of the 36 districts of the province of Punjab. Out of the 237 projects, 110 projects were for water supply and the remaining 127 projects were for purposes including sewerage, sanitation, and small road construction. Further, out of 237 projects, 137 were executed in the period prior to the establishment of the NAB Multan office and 100

projects were executed in the period after the establishment of the NAB Multan office in 2015. There were a total of 21 projects from Multan; 13 were completed before the establishment of NAB (Pre-2015) and 08 after the new NAB office in Multan. Out of those 21 projects in Multan, 17 were for water supply, and only 4 were for other purposes.

The total value of the 237 projects is Rs. 10,998 Million ($ 98.542 Million).[3] The value of the water supply projects is Rs. 5,959 Million ($ 53.393 Million) whereas the value of other projects is Rs. 5,039 Million ($ 45.275 Million). The total budget of PHED for the year 2017-18 is Rs. 57,466 Million ($ 514.895 Million). Some of the projects were completed in 2011-2012, and the total PHED budget from financial year 2011-12 to 2017-18 amounts to Rs. 174,349 Million ($ 1562.176 Million). Thus, the data in this study in terms of value represent 19% of the PHED budget of financial year 2017-18 and 6.3% of the total budget of PHED from financial year 2011-12 to 2017-18.

3.1.1 Project budget decomposition

The total budget allocated to a given project can be decomposed as follows:

Project budget - Winning discount = Cost (Materials, Labor) + Taxes + Total bribe + Profit

The following is a brief description of each component.

The winning discount represents how far below budget the contracting firm was willing to bid in order to win the contract. Contractors also refer to the offer rate, defined as their bid (budget – discount) expressed as a percentage of the project budget, e.g. the contractor offered to do the job at a 90% rate. A firm is bound to complete the contract at the agreed price and meeting the

[3] On 19 February 2018 the exchange rate was 1 USD = 111.6 Pak Rupees.

agreed terms, conditions and project specifications. Ex-post adjustments due to weather events or input price changes for example are not allowed.

Cost are the material and labor expenses incurred by the contracting firm for the completion of the contract. Taxes represent income and sales taxes on the project. Profit is after cost, taxes and bribes.

Total bribe is the sum of all the bribes given to the engineering department and politicians during the tendering and completion stages of the project. More specifically, CEOs of contracting firms give bribes to PHED officials, finance department officials, and Accountant General Pakistan Revenues (AGPR) officials. The sum of all these bribes is termed "bribes to department" and the money given to the politicians is "politicians' bribes". Total bribe is the sum of bribes to department and politicians' bribes.

In order to compare the magnitudes of the various budget components across contracts of varying size and levels of competition, we scale each component by the project budget.

3.2 Interviews with CEOs, PHED and NAB officers, and with project beneficiaries

The qualitative data consist of interviews with CEOs of contracting firms, PHED officers, NAB officers; and focus group interviews with beneficiaries of the water and sanitation projects. I have conducted interviews with 28 CEOs, 10 PHED officers, and 15 NAB officers. Moreover, 11 focus group interviews (with 10-15 participants per focus group) were also conducted. It took about three months to plan and coordinate these interviews and another two months to conduct them in the field. The interviews with CEOs, PHED officers and NAB officers were conducted in their offices. Whereas, the focus group interviews with users of water supply projects were conducted at the

project site by gathering the users at one convenient place. All the interviews were conducted in summer of 2017. The following describes each interviews' setting and main lines of inquiry.

3.2.1 Interviews with CEOs

CEOs of construction firms have described their views about the practice of construction work for the PHED. The questionnaire was designed to gather views of the respondents on the tendering process, bribes, project quality, and the role of NAB. Specifically, the interview elicited CEOs views on the following topics:

1 How much bribe they pay, to whom, and whether project quality suffers as a result

2 Quality of projects in urban areas

3 Quality of projects with citizen vigilance

4 Information about the new NAB office in Multan

5 Whether bribe decreased after the opening of the new NAB office in Multan

6 Whether quality of projects increased after new NAB office in Multan

The full questionnaire is placed as Appendix-A.

3.2.2 Interviews with executive engineers

Executive engineers are the key officers who interact with contractors, politicians, and accountability bodies on all matters related to construction work. Interviews with XENs have focused on their working environment, and corrupt practices in government construction work in general. The following is a list of the areas covered in the interviews with XENs:

1 Satisfaction of XENs with their work environment

2 Satisfaction of XENs with their salary structure

3 Whether or not politicians take bribes

4 Whether politicians put unnecessary pressure on XENs

5 XENs awareness of the new NAB office in Multan

6 Whether quality increased after opening of the new NAB office in Multan

7 Whether NAB takes bribes

8 Whether provincial anti-corruption takes bribes

The full questionnaire of the interviews with XENs is in Appendix-B.

3.2.3 Interviews with NAB Officers

National Accountability Bureau (NAB) is the premier anti-corruption agency in Pakistan. The analysis and discussion below will be primarily on the issues related to working environment of NAB in line with the responses of the NAB officers in the interview. As described in the research methodology that this study has chosen 15 NAB officers from NAB Islamabad / Rawalpindi, NAB Lahore, and NAB Multan representing the both prosecution and investigation cadres. Further the respondents represent junior officers, mid-career officers, and the senior officers in the hierarchy. Questionnaire with NAB officers are placed as Appendix - C. The interviews of NAB officers covers the responses as follows:

1 Satisfaction of officers over the working environment

2 Perception of officers about the work load

3 Whether staff is sufficient

4 Whether NAB Multan is effective

5 Whether the coordination with other department is satisfactory

6 Perception of officers about political will to combat corruption

3.2.4 Interviews with users of water supply projects

Azizullah, Khattak, Richter, and Häder (2011) find that in Pakistan drinking water quality is poorly managed and monitored which causes a high incidence of water borne diseases. The major source of contaminated water is ascribed to be from human actions like *"indiscriminate disposal of industrial, municipal, and domestic waters in water channels, rivers, streams, and lakes etc."* (p. 491). Water supply projects are constructed to ensure the supply of clean drinking water to the citizens. The interviews with users of water supply projects are aimed to evaluate the perception of users about the quality of projects and the change in their lives after the functioning of those projects. Specifically, the interview covered the following areas:

1 Whether users are satisfied with the quality of the projects

2 Whether incidence of water borne diseases decreased

3 Perception of bribes in the projects

4 Evidence of bribes in the projects

5 Whether local politicians were helpful in enhancing the quality of projects

6 Information about the new NAB office in Multan

The questionnaire of interviews with users of water supply projects is placed as Appendix-D.

3.3 Physical inspection of 20 water supply projects by an expert engineer

In order to evaluate the quality of contract execution, this study also conducted field visits at 20 water supply project sites and commissioned corresponding assessments by an independent expert

engineer. After physical inspection of project specifications, the engineer has given his report of the percentage of specifications executed as required in each water supply project. A typical water supply project includes the following:

3.3.1 Pump house and tube well

The pump house is the structure covering the tube well from where water is pumped into the rising main and flow towards the storage ranks or directly supplies to the homes. Pump house consists of a room, bore whole and pumping machinery. The expert engineer has checked the quality of the bricks, white wash, sand-cement ratio, and electric wiring of the pump house to measure the quality of the project. For tube well the engineer checked the machinery, pipes, and tube well wiring for giving his report of the specification followed.

3.3.2 Rising main

Rising main is the pipe line which carries water from the pump house to the storage tanks. In the rising main different types of pipes are used like AC (Asbestos cement), PVC (Polyvinyl Chloride) and HDPE (High Density Poly Ethylene) pipe. The engineer has checked the overall quality of the rising main as well as the type of material used. Inspected specifications include the laying, cutting, and jointing of pipes, restoration of trenches and brick pavement, along with ascertaining whether the pipes are from an approved manufacturer or not.

3.3.3 Storage tanks

Storage tanks are the civil structures where water is stored and then supplied to the homes. Storage tanks consist of ground storage tanks and overhead reservoirs. Ground storage tanks are sub structures while overhead reservoirs are super structures. Inspected specifications include the foundation depth, bearing capacity, minimum cover for steel, usage of iron rods, sand-cement ratio, and provision of red warning lights.

3.3.4 Distribution system

The distribution system is the network of pipes through which the water flows to individual homes from storage tanks. The distribution system consists of a network of PVC pipes. The engineer checked the quality of the sub items, for example, construction of brick masonry chambers, quality of bend, tee, cross collar, tail piece, flanged socket, flanged spigot, cap, taper, angle branch, plug for asbestos cement pipe line, with comet joint and rubber ring specified, and restoration of trenches, brick pavement and metaled road. The engineer also checked whether the pipes installed are from the approved manufacturer or not. After checking these items and comparing it with the estimates, the engineer has given his report of the specifications followed in each water supply contract.

3.3.5 Missing value percentage

In order to quantify in money terms how much the contractor saved by deviating from project specifications, I calculate a missing value based on the percentage of specifications followed for each inspected item and its contracted cost. If the engineer has not physically inspected an item, I calculate the missing value as the average percentage of specifications followed for the whole project, multiplied by the contracted cost of that item. Finally, after going through this exercise of computing the missing value of each item, I sum them up and divide by the project budget. The missing value should roughly equal the sum of taxes, profits and total bribes. Appendix- E gives details on how missing value is measured in one of the projects.

4. Qualitative evidence on bribes and quality of public works projects in Punjab

This chapter reports the results of interviews with the different stakeholders of water and sanitation projects under PHED in Punjab. The interviews were conducted with the CEOs of construction firms, executive engineers of PHED, and NAB officers. Focus group interviews were conducted with users of water supply projects to map the issues related to construction work. Section 4.1 summarizes interviews with the CEOs of contracting firms. Section 4.2 provides details on interviews with the executive engineers. Section 4.3 is about the focus groups with water supply project users. Finally, section 4.4 summarizes the interviews with NAB officers.

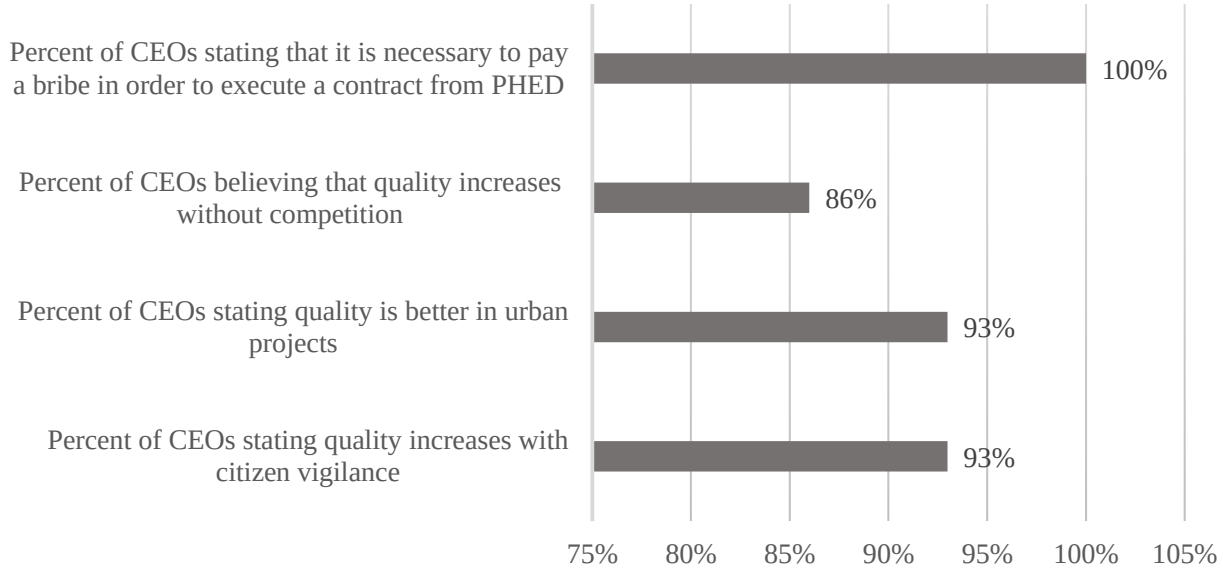
4.1 Interviews with CEOs of contracting construction firms

4.1.1 Whether bribe is necessary to execute a contract

As shown in bar chart 4.1 below, all 28 CEOs of contracting firms revealed that in the construction contracts for the PHED they have to pay bribes. The magnitude depends on whether the contract was won under competition or awarded through collusion. Procurement regulation in Pakistan requires that projects be awarded on competition and to the lowest bidder. In practice however, executive engineers and contractors typically attempt to divide the contracts among themselves on full-rates, which allows the engineer to extract maximum bribes. Under collusion, the engineer receives the signed but blank tender forms from colluding contractors and quotes above full-rates. The rates of the designated winning contractor are kept at 100%, thus ensuring that in the comparative statements the designated contractor's rates are the lowest even though the winning quote is at full rates. The other contractors are promised to be accommodated in the next tendering. Contractors who insist on competition are paid some money by the designated winner. If potential

competitors are not satisfied with the pay-off, collusion breaks down and each contractor submits a real quote. Even under competition however, the engineer extracts bribes from the contractor in exchange for slack on project execution.

BAR CHART 4.1 INTERVIEWS WITH CEOs OF CONTRACTING FIRMS



4.1.2 Project quality under competition and collusion

On the question whether project quality is affected by competition, 86% of CEOs responded that the quality of work is better if the contract was awarded without competition. Under collusion, contractors get the contract at full-rates and thus have more money to construct the project according to contracted specifications. However, the empirical evidence of our study shows that in both the types of the contracts, i.e. under collusion and competition, the cost of the project is about 66%. Similarly, contractors earn a profit of 13% on average irrespective of whether they competed or colluded. During the interviews it also transpired that at full-rates, the department (i.e. PHED through the executive engineer) requests higher bribes because the contractor has more public money for construction of the project.

4.1.3 Quality of projects in the urban areas

The CEOs of the contracting firms reveal that the quality of projects in urban areas is better than those in rural areas. Among the interviewees 93% of CEOs endorse the notion that urban projects' quality is better than the quality of rural projects. Analysis of this outcome reveals that main reason of urban project quality being better than rural is seemingly vigilance and assertiveness of urban citizens. Urban citizens are often seen to raise their voice at forums if they feel quality is being compromised.

93% of the CEOs interviewed also stated that in rural areas people have difficulty in accessing appropriate forums for raising their voice and complaining about poor quality work. Moreover, rural politicians ask contractors to work according to their will. Since the rural politicians force the contractors to do the construction work in communities of their supporters and voters, and since the PHED also abides by the instructions of the politicians, the contractors feel free to compromise work quality. Most CEOs have also revealed during discussion that since politicians take their part of commission (bribes), their firms normally don't care about the quality of the work. The situation in the villages like uneducated communities, and lack of knowledge about the rights to speak against wrongdoing, goes in favor of the partners in bribe (i.e. engineers, contractors, and politicians).

4.1.4 Quality of projects with the citizen vigilance

93% of the CEOs interviewed expressed the view that citizen vigilance impacts positively on quality. Only 7% of the CEOs said that there is no relation between the vigilance and project quality. That 7% based their view on the notion that they have to follow set patterns of working on projects, which has nothing to do with citizen vigilance. 93% of the CEOs expressed a fear of initiation of complaints against them. They stated that if the citizens start complaining about the

quality of project work, it not only hampers the work on site but also creates other problems such as facing inquiries, which involves an additional cost in terms of time and money. If the work on site is stopped due to the citizen intervention as a result of complaints or use of personal influence and pressure, it increases the transaction cost due to wastage of material and extra payments to labor.

During the course of our research, when we were conducting an interview with the executive engineer (XEN) Multan in his office, some citizens came along with their political representative. They started complaining about the delays and the poor quality of the ongoing construction project. Due to the citizens' pressure, the XEN immediately called the contractor on telephone and asked about the ongoing work situation. The contractor promised to expedite the work and meet the required quality. Citizen' vigilance helps to ensure the quality of the projects.

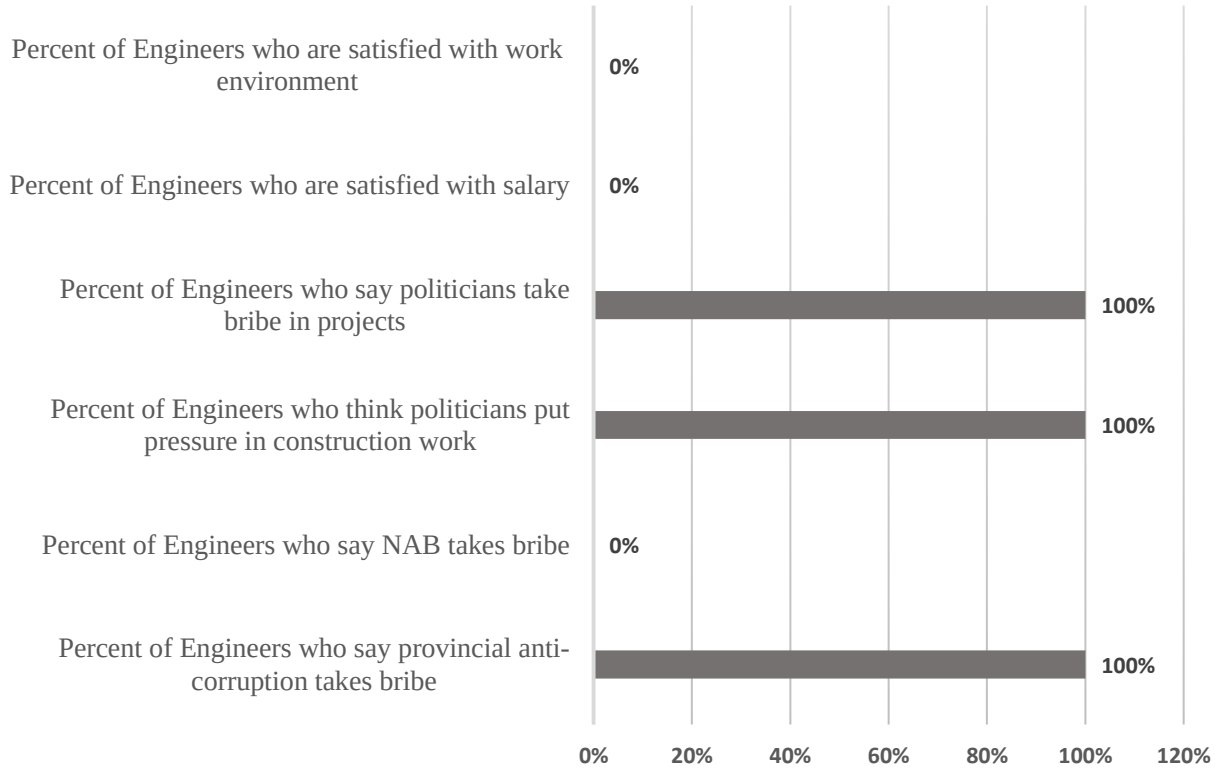
On the other hand, in far flung areas where the citizens lack education and are ignorant of their rights, there is less likelihood of voices being raised against violations of the terms of a contract. Moreover, it is time consuming and costly for people residing in remote areas to lodge complaints over poor project quality. Due to distance and lack of education and information, people are less likely to put pressure on the contractor or on the construction department (i.e. PHED).

4.2 Interview with executive engineers of PHED

Executive engineers (XENs) are the custodians of the Public Health Engineering Department in a district. XEN is the highest post in the district, and the whole procurement process is done under the supervision of the XEN. Since the XEN is responsible for a transparent, competitive, and smooth tendering process and for ensuring the execution of the contracts in compliance with specifications, it is important to hear their views. The interviews with XENs are intended to capture

their responses in terms of their level of satisfaction regarding working conditions and salary. Interviewing XENs has also helped in mapping the issues of construction industry related to political interference, and the role of accountability bodies. Responses of the 10 interviewed executive engineers are summarized in bar chart 4.2.

BAR CHART 4.2 INTERVIEWS WITH EXECUTIVE ENGINEERS (XENs) OF PHED



4.2.1 Satisfaction of the XENs with work environment

As shown in the bar chart above, executive engineers are not satisfied with their working environment. They have shown their serious concerns about transfers and promotions without merit. Frequent transfers, haphazard tendering processes under contractors and political pressure have made XENs' job highly tense. Not a single XEN has expressed satisfaction with the working conditions of the Public Health Engineering Department.

The dissatisfaction of the engineers in PHED is an alarming issue. The XENs statements that unnecessary interference by politicians, influences from different pressure groups such as contractors and media, and bureaucratic involvement in engineering work has made it cumbersome to perform well. Further, they remain uncertain about their transfer and posting. The struggle to get a lucrative post, and even after getting a post the fear of transfer as a punishment, is a constant source of dissatisfaction during the entire career of an XEN.

The work of engineers in the PHED does not seem to flow smoothly and it does not look easy to serve as an XEN. Since an XEN has to look after the interests of all the stakeholders, it creates a lot of pressure on a person in this post. It is a common practice for construction funds to be issued in the name of politicians. Therefore, the engineers have to follow the politicians' to make their voters happy by utilizing funds in the areas of their voters. Working to make politicians happy, drags XENs farther away from utilizing the funds on need basis and funds are utilized in an uneven manner and are mostly wasted. If engineers do not listen to politicians, they remain under threat of being transferred. Moreover, paying commissions (bribes) to politicians, and maintaining work quality after paying those commissions, makes the job of an XEN more challenging. If an inquiry were held on the poor quality, the XENs would have to take responsibility for ensuring the specified quality.

The tendering process is also a challenging task for the engineers. They not only have to make money as commission (bribe) form the tendering process in order to pay off politicians but also have to make sure the project is of acceptable quality. XENs have also to look after the interests of the contractors as they prefer avoiding competition for high bribes and also have to satisfy to those contractors who are not lucky to win contracts in ongoing tendering. XENs either have to ask the winning contractors to pay some money to those who could not win or have to

promise to award them the contract in the next tenders. This practice of facilitating some contractors, promising the non-winning contractors, and making the politicians happy takes the XENs far away from the set defined patterns and procedures of tendering and working process. Moreover, taking bribes makes the XEN vulnerable to black-mailing by pressure groups and to investigations by anti-corruption agencies.

Another concern reported by executive engineers is the non-availability of the funds. The projects are announced and tendering process is done accordingly but later due to non-availability of funds the projects get delayed. Moreover, during the tendering process, if a contractor quotes too below rates and it is obvious that the contractor cannot meet the specifications with these low rates, the XEN has no authority to cancel these contracts. It is pertinent to mention however that the XEN typically takes 2-5% of the project amount as "call deposit" with the tender documents. If the contractor does not fulfill the terms of the contract, this amount is forfeited.

4.2.2 Satisfaction of the XENs with the salary structure

Not only the working conditions but also the salaries play a vital role in motivating the employees to work hard and honestly for the organization. But 100% of XENs haves responded that they are dissatisfied with the salaries they are getting. At least salaries should commensurate with the skills and technical education. In an environment with bad working conditions and poor salary structure, XENs prefer to take bribes which seems to be the only reward for their highly skilled work and experience. Even if an honest and dedicated officer is willing to work without taking bribe, the culture would vomit him out of the system. This also seems to be a reason as to why the anti-corruption agencies are not successful in combating corruption in developing countries where it has become a way of life. These corruption norms are grounded in the culture and society which

seem to remain fixed without a big policy shift in terms of salaries, education and awareness, and effective anti-corruption strategies.

4.2.3 Whether politicians take bribe

In line with what transpired from the CEOs' responses, XENs report that a handsome share of bribe is given to the politicians. In fact, 100% of the XENs responded that politicians take bribes. The extent of direct bribes paid to politicians is calculated through the internal records of CEOs and will be described in detail in the next chapter. In addition, some of the bribes paid to the PHED may end up in politicians' pockets. Quah (2011) and Dixit (2016) referred to the anti-corruption agencies of Singapore (Corruption Practices Investigation Bureau - CPIB) and Hong Kong (Independent Commission against Corruption – ICAC) and have argue that political will is necessary for an anti-corruption agency to be effective. In the case of Pakistan, through the interviewees' perception in this study, it has become obvious that politicians are the partners in bribe and corruption. Since in Pakistan contesting elections is a costly activity, elected politicians not only need to recover the 'invested' money but also need to gather money to contest the upcoming election. As per the interviewees' perception, except few, all the politicians take bribes and this is a main cause of not having political will for a strong anti-corruption agency.

4.2.4 Whether politicians put unnecessary pressure

Executive engineers report that under ideal conditions, the engineers should make a survey of the areas under their jurisdiction and projects should be started in line of the surveys on a need basis. In this way the funds are utilized efficiently and engineers utilize their capabilities for efficient allocation of the resources. On one hand it would save money by efficiently allocating the resources on need basis, and on the other hand the good quality work would save money because the longer life of the project and lower cost of reconstruction within a short period of time.

However, XENs complain that they are not being given the opportunity to work efficiently. In practice the funds are most often issued in the name of politicians and the XENs have to work under the influence of politicians. XENs perceptions also reveal that politicians want to maximize their vote and support and for that they make sure that the funds are being utilized in a manner which pleases their voters even at the cost of other citizens and even if it results in wastage of resources. These responses of the XENs reveal that politicians not only take bribes but also put unnecessary pressure on the XENs to make their voter happy.

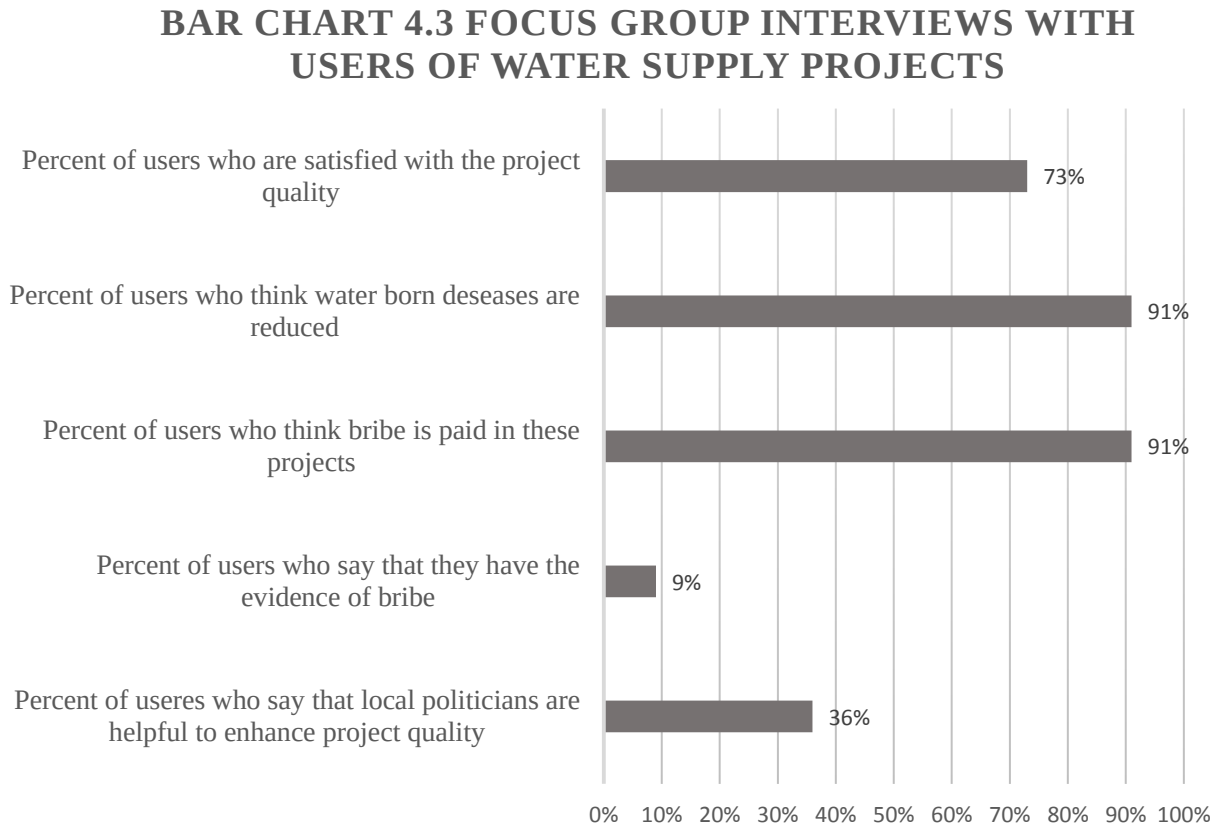
4.2.5 Whether anti-corruption agencies (NAB and local anti-corruption establishment) take bribes

Engineers were asked whether anti-corruption agencies are involved in taking bribes or not. None of the executive engineers responded that NAB takes bribes. Whereas it was astonishing that 100% of the respondents told that provincial anti-corruption establishments (ACE) take bribes. It transpired that provincial anti-corruption commission officials have their agents lodge complaints just to extort bribes and after the payment of bribe the cases are consigned to record. Reportedly, it has become a norm to pay off the provincial anti-corruption establishment. NAB being a federal agency has only seven centralized offices and one headquarter in Pakistan. Although, being the premier anti-corruption agency, NAB has the powers to investigate any case and overrides other agencies, but lack of resources and staff handicaps NAB to take only few cases. Therefore, NAB becomes selective in picking cases of mega corruption. Other cases are transferred for departmental inquiry or referred to ACE.

4.3 Focus group interviews with users of water supply projects

The users of water supply projects are important stakeholders in the construction work. They are the main beneficiaries of successful operations of the water supply projects. If the projects are not

constructed as per specifications or the outcome is far less than the expectations then the users suffer the most. This study has managed to conduct 11 focus group interviews with 10 to 15 users of water supply projects each from different areas of Punjab. The interviewees' responses are summarized in bar chart-4.3 below.



4.3.1 Whether users are satisfied with the quality of the projects

8 out 11 or 73% of the focus groups interviewed reported to be satisfied with the quality of the water supply projects. The respondents particularly form rural areas are of the view that previously they were using the water from canals and wells and now at least they have the access to the safe drinking water by virtue of the water supply project. Surprisingly, despite the fact that they know the projects are not constructed up to the mark, they are happy with the quality of the projects. Presumably, on the basis of the interview form the users of water supply projects, one cannot really

say that the quality of these water supply projects is very high. Instead, previously those users of water supply were living in the miserable conditions and they had to do a lot of struggle to fetch water from the canals or wells. Now they perceive that at least the water is available at their door steps and their labor to access water has reduces considerably.

4.3.2 Whether water borne diseases are reduced

In rural areas the users of water supply projects used to drink water from sources like rivers and canals. The interviews suggest that there had been high rate of water borne diseases before the construction of water supply projects. 91% of the focus groups report that water borne diseases are reduced after the availability of water through those water supply projects in their areas. It is an important factor to consider that despite the fact the quality of the projects is not up to the mark and neither those projects are being maintained regularly, the people seem satisfied due the reason that after the provision of water through water supply the diseases have reduced considerably.

4.3.3 Users' bribe perceptions

Users from 91% of the water supply projects perceive that there is corruption in the construction of the projects. When inquired about how they know that there is corruption in the water supply projects, they responded that one the quality of the project is not as good as it should be and second they perceived that the corruption is the culture in Pakistan. Particularly in the construction projects, they believed, it is culturally requisite to complete the projects involving bribe.

From the focus group interviewees' perception it is obvious that majority of the people believe that construction projects involve corruption and corrupt practices. This also leads to a point that users of water supply projects seem to believe that the quality cannot be up to the mark due to the presence of corruption and corrupt practices. This might be one of the reasons that they

seem to be happy of the presence of the water supply projects even if its quality is not up to the mark.

Another important point is that those people also seem to believe that the culture of corruption cannot be changed. They don't raise their voice and do not complaint and initiate against the corrupt practices due to the reason that PHED offices and anti-corruption offices are too far from them. The outcome of the focus group interviews also transpire that, even if they initiate against the culprits while being from the poor class of the society, they have little hope of action against the culprits.

4.3.4 Users' evidence of bribes

The most difficult thing in the corruption matters is to trace the evidence. Form the interviewees' perception in our focus group interviews, users of only 9% of water supply projects responded that they have evidence of bribery in the construction project. Out of those 9% most were of the view that if an inquiry is opened they will prove it from the site of the project that the specifications are not met and the work is of substandard quality.

4.3.5 Whether local politicians are helpful to enhance the quality of projects

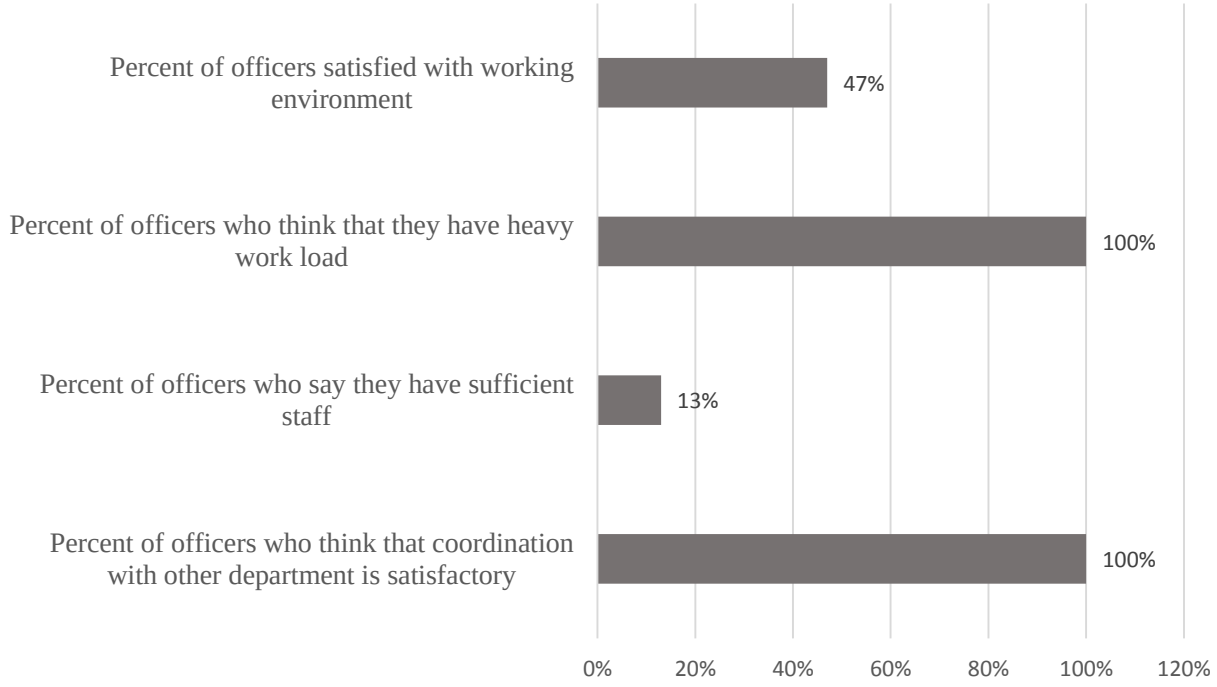
The users from 36% of water supply projects believe that local politicians are helpful in enhancing the quality of the project. Local Politicians are the lowest tier of politicians who are not members of parliament but are either members of the union councils or are actively involved in local politics.

4.4 Interviews with NAB Officers

National Accountability Bureau (NAB), being the apex anti-corruption agency in Pakistan, is responsible for dealing with matters of corruption and corrupt practices. 15 NAB officers from

three different regions i.e. NAB Lahore, Islamabad, and Multan were interviewed for this study. The interviewees' responses are summarized in bar chart 4.4.

BAR CHART 4.4 INTERVIEWS WITH NAB OFFICERS



4.4.1 Satisfaction of officers with the working environment

The working environment directly affects the performance of the employees. The interviewees' responses reveal that only 47% of the officers are satisfied with the working environment. It is pertinent to mention here that mostly the junior officers seem dissatisfied with the working environment and most of the senior officers seem satisfied. When inquired from the officers that what elements of working environments make them unhappy, it is revealed that the main issues are related to provision of transportation, lack of staff, heavy work load, and uneven policy of transfer and posting. The young officers and mid-career officers of NAB seemingly feel dissatisfaction over the official infrastructure facilities. Due to the lack of staff, the smooth operations of official working are also said to be hampered. Since most of the young officers are

involved in the inquiry and investigation of white collar crimes, which is a tedious job, they feel that they should be provided with all the facilities to make them relaxed and satisfied. Moreover, the accused criminals belong to high class society and have a lot of financial resources, therefore, the officers are of the view that to investigate them they should be provided with all the facilities to take them to the task. The matching facilities and resources with the task of investigating white collar crimes is necessary, they added in their responses. However, most of the senior officers seem satisfied with the working environment and facilities provided to NAB officers.

4.4.2 Perception of officers about the work load

Investigation of white collar crimes requires a lot of expertise and skill. If the work load is heavy it may affect the quality of the investigation which may result in derogatory output in the field of anti-corruption. The perception of the officers about the work load reveals that 100% of the officers think that they are overburdened with work load. Although, as per their response, there has been the introduction of CIT (Combined Investigation Team) in which a team of the officers including investigator and prosecutor works together on a case. However, virtually the main burden of investigating the case is on investigator who at a time deals with many cases. In the absence of required facilities and infrastructure, the overburdened employees of NAB seem not be satisfied and efficient in the work of anti-corruption.

Heavy workload undermines efficiency. The investigation of the white collar crimes being a specialized work needs the attention in terms of facilities and justified work load. If the work of anti-corruption is hampered due to non-provision of facilities and inappropriate work load, it is likely to directly affect the justice system. NAB Annual Report (2016, p. 34) reveals that in 2016 NAB received total 33,245 complaints in seven regional NABs across Pakistan. Out of these 33,245 complaints 32,744 were decided. In 2016, 914 new inquiries were authorized having the

backlog of 674 inquiries making a total of 1588 inquiries. Similarly 389 new investigations were authorized with backlog of 329 making a total of 718 investigations. NAB has 792 officers and almost 2000 officials. Out of these 792 officers 214 are engaged with administrative work, and 43 officers are engaged with Awareness and Prevention Wing. Whereas 104 officers are in Prosecution Wing and 13 in Training and Research Wing, leaving only 418 officers to deal with investigation of white collar crimes. The interviewees' perception reveals that these 418 officers are the main core of dealing with total burden of investigation of white collar crimes in Pakistan.

4.4.3 Whether staff is sufficient

The responses of the NAB officers reveal that only 13% of the officers think that they have sufficient staff. As described above, for 792 officers there are 2000 officials. The junior and mid-career officers transpire that most of the officials are performing their duties with the administrative work and with high ups and few officials are left in the pool to work with the investigation officers. Lack of staff creates hurdles in the operation of the work. There should be a specific policy and set defined hierarchy where it should be mentioned that an officer should have what staff.

4.4.4 Whether coordination with other departments is satisfactory

Accountability is a process which can only succeed if all bureaucratic departments are willing to cooperate and work in coordination. If some departments are not willing to cooperate and coordinate with the accountability body, it may hamper the work to control corruption. The reported perceptions of NAB officers suggest that 100% of NAB officers are satisfied with the level of coordination between NAB and other bureaucratic departments in Pakistan.

5. Quantitative evidence on bribes and contract execution under competition and collusion

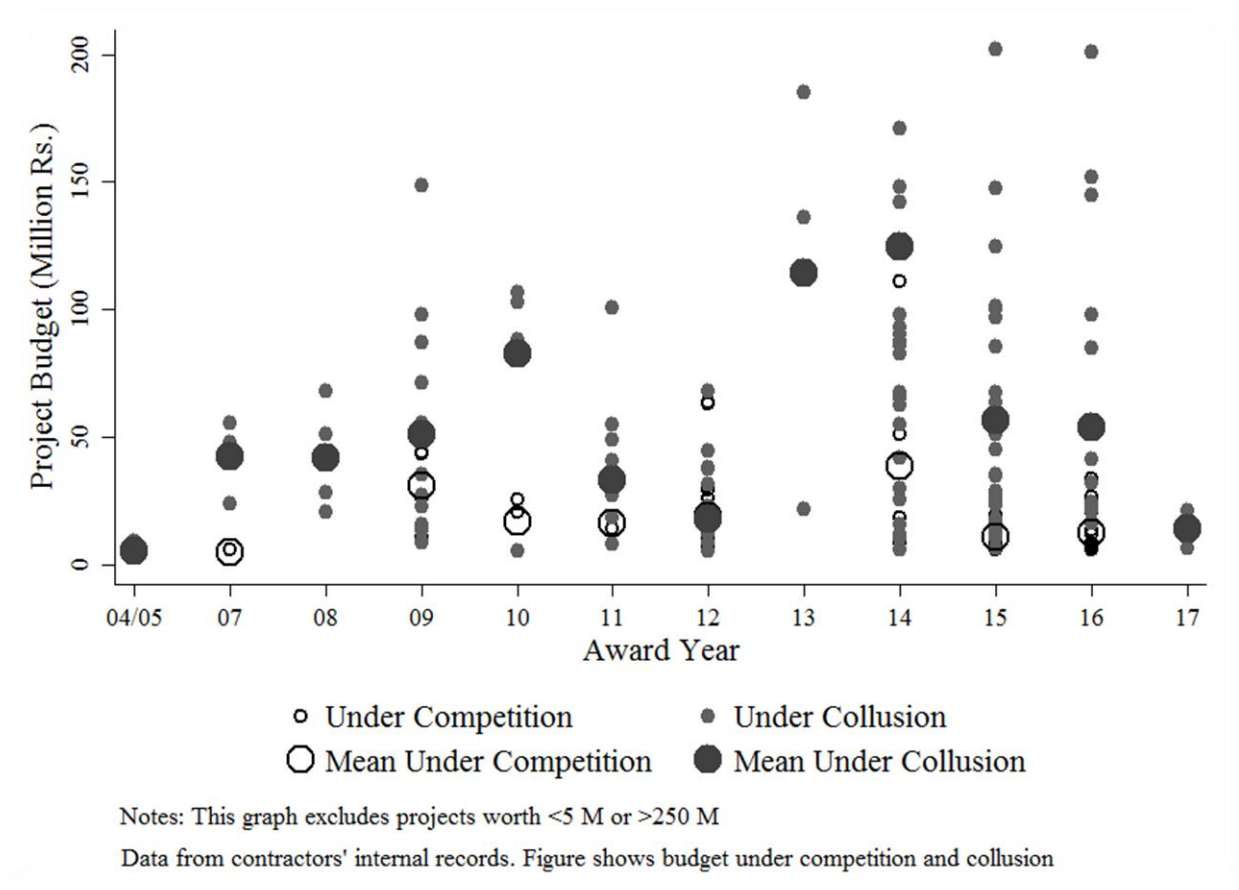
This chapter presents quantitative evidence on bribes and contract execution under competition and collusion. Section 5.1 discusses the evidence of bribes paid to the PHED and to politicians based on internal records of contracting firms. Section 5.1 also compares firm profits and costs under competition and collusion. Section 5.2 provides quantitative evidence on the quality of contract execution based on field visits and engineer's assessment.

5.1 Quantitative evidence on bribes under competition and collusion

5.1.1 Project budget over time

Figure 5.1 below shows the project budget depending on the year the contract was awarded broken down by competition or collusion. As discussed in Section 4, contracts can either be awarded competitively or on full rates due to collusion between the XEN and contractors. In our data there are total of 237 projects, out of which 70 were awarded under competition. Each small dot represents a contract and the larger dots represent conditional means. The figure shows that between 2004/05 and 2017, the project budget of contracts awarded under collusion is higher than the budget of contracts that were awarded competitively.

Figure 5.1 Project budget over time



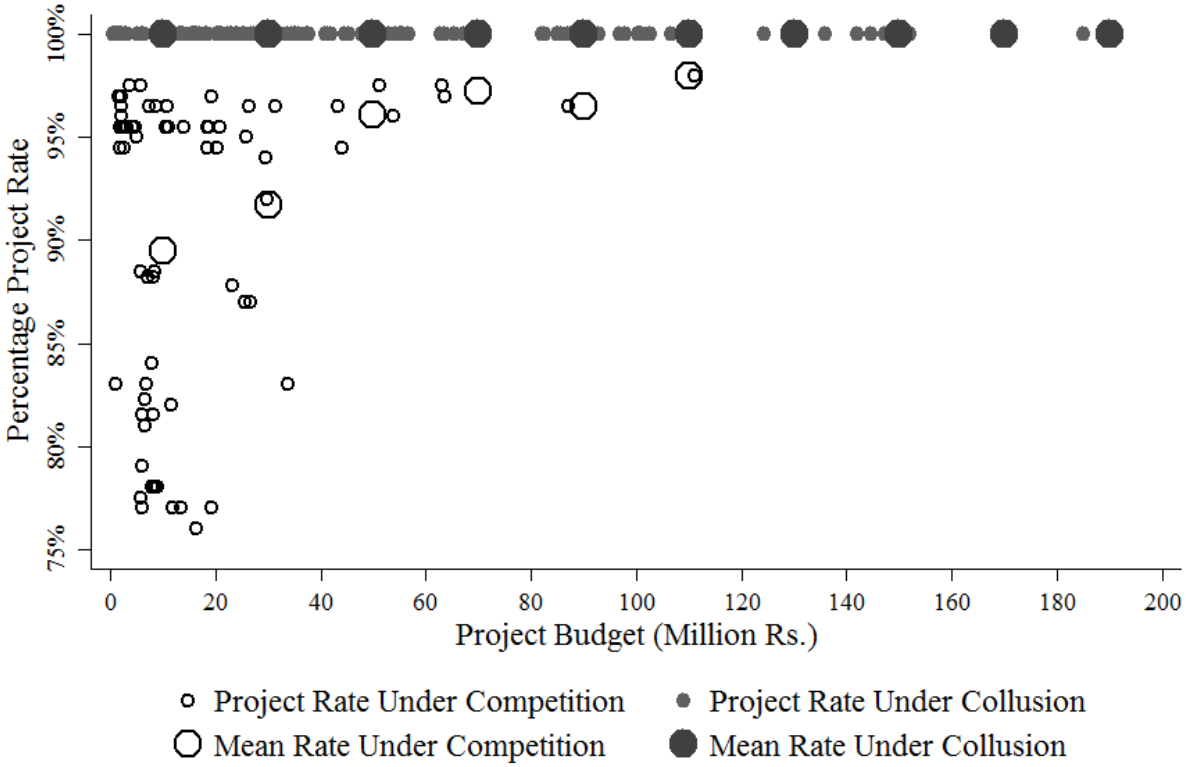
The confidence interval (CI) for the difference in mean budget between the projects under collusion and competition runs from -41.4 to -21.5. So we reject the null hypothesis that mean budgets for the contracts under collusion and competition are the same.

5.1.2 Winning rate percentage

Figure 5.2 plots the winning rate percentage against the project budget, again broken down by whether the contract was awarded under collusion or competition. The figure shows that small projects (i.e. up to the value of Rs. 40 million) are awarded with a discount of about 10 percent on average. Projects valued more than Rs. 40 million are awarded with less of a discount as compared to low value projects. For example, the winning discount is less than 5% for the project budget

between Rs. 40 million and Rs. 100 million. The discount further decreases for the contracts of project budget between Rs. 100 and 120 million. Moreover, the projects with the project budget more than Rs. 120 million are always awarded without discount i.e. on full-rates.

Figure 5.2 Winning rate percentage



Source: Contractors' internal records

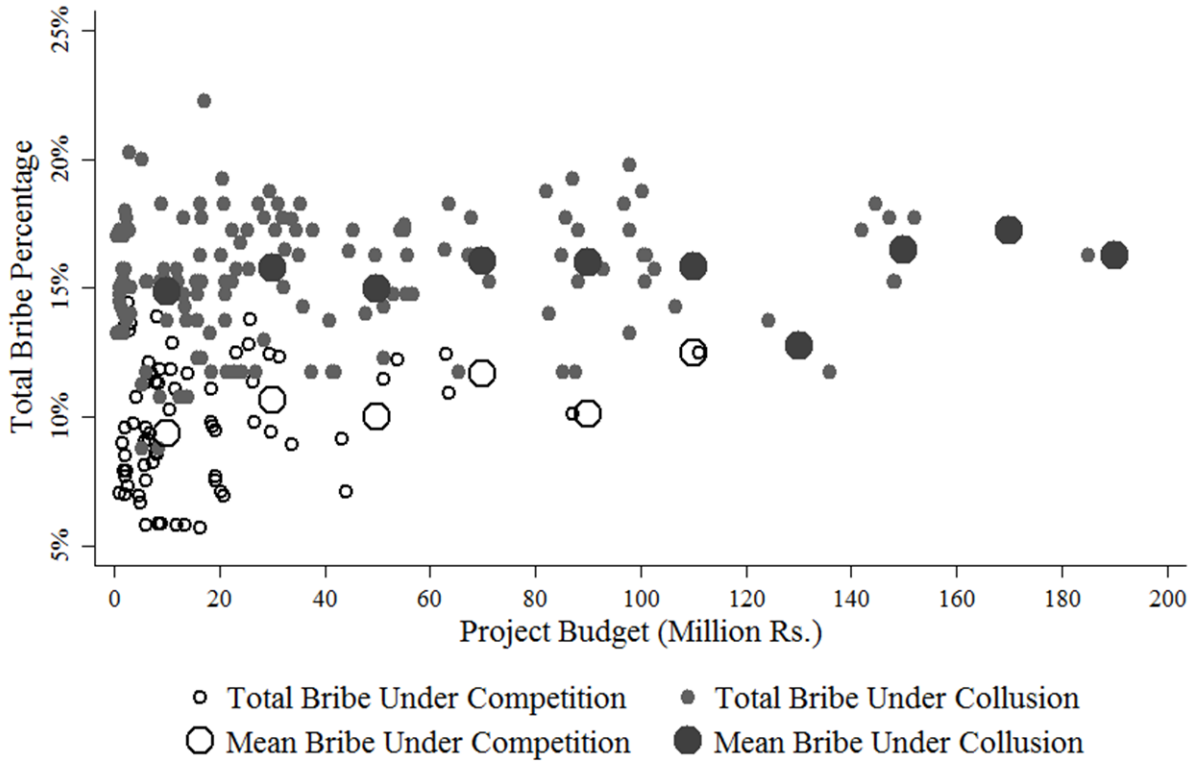
Figure shows awarded contracts' quotation rates over budget size under competition and collusion

5.1.3 Total bribe percentage

Figure 5.3 shows total bribe percentage against project budget with and without competition. The most striking feature is that the total bribe percentage in contracts awarded under collusion is about 5 percentage points higher compared to projects are awarded with competition and this holds irrespective of project size. On average the total bribe percentage under competition is around 10%

while under collusion the mean total bribe percentage is around 15%. Virtually all contracts paid kickbacks, the minimum being about 6% of project budget.

Figure 5.3 Total bribe percentage

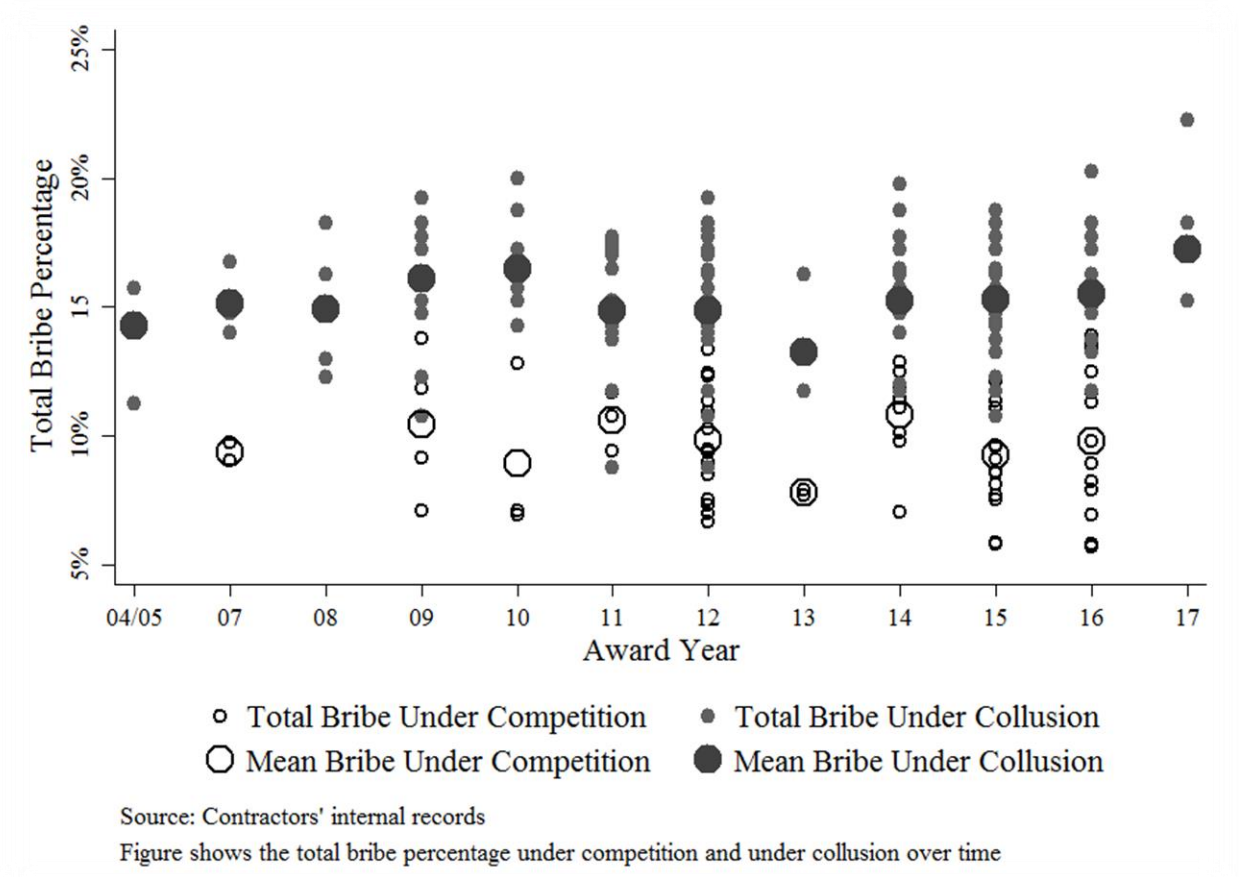


Source: Contractor's internal records

Figure shows total bribe percentage over project budget under competition and collusion

The confidence interval (CI) for difference in mean total bribe between the contracts under collusion and competition runs from -6.3 percentage points to -5 percentage points. So we reject the null hypothesis that the mean total bribes for contracts under collusion and competition are the same.

Figure 5.4 Total bribe percentage over time



Source: Contractors' internal records

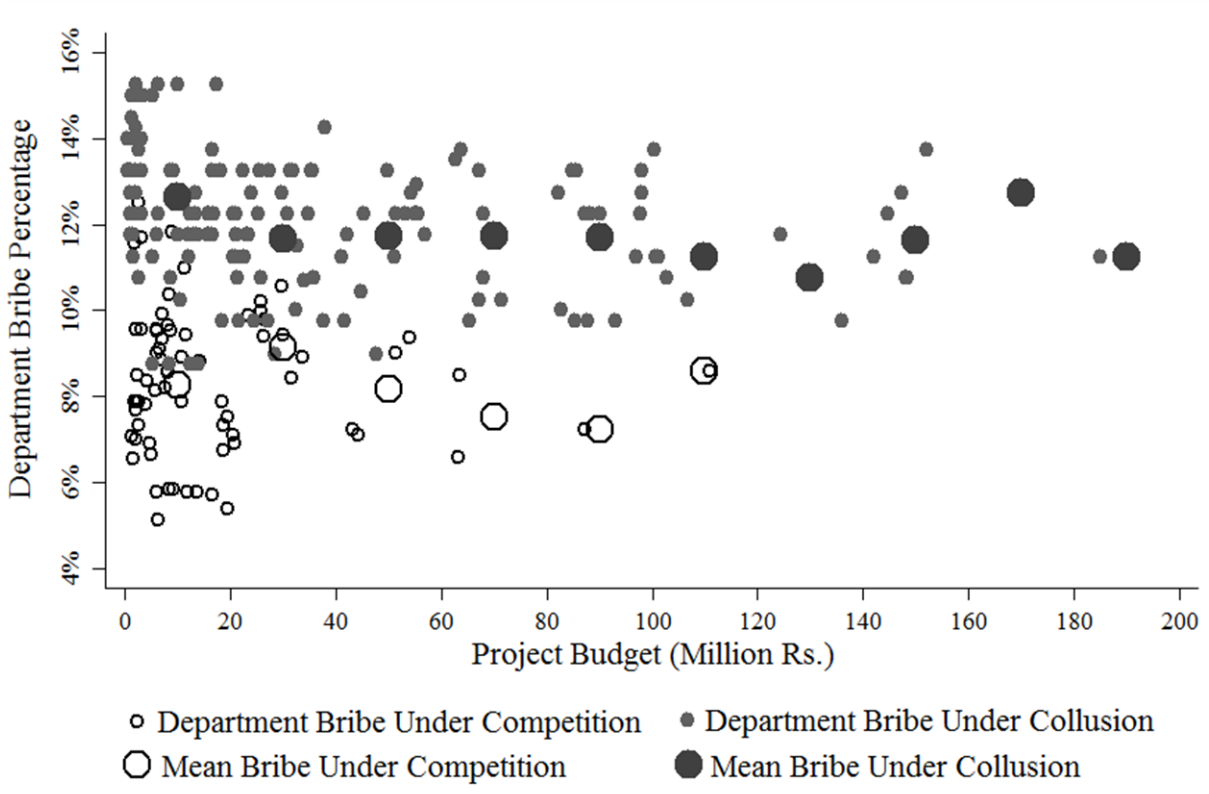
Figure shows the total bribe percentage under competition and under collusion over time

Figure 5.4 shows that the levels of bribery under competition and collusion have been stable over the last 10 years. The mean total bribe percentage for contracts awarded without competition remains at 15%. Whereas mean total bribe percentage under competition stood at about 10% on average. These results suggest that XENs and politicians have a clear incentive to orchestrate collusion between contractors since this allows them to extract an extra 5 percentage points of project budget on average. It is therefore not surprising that mega projects worth more that Rs. 120 million are never awarded competitively.

5.1.4 Department bribe percentage

During the course of interviews it transpired that PHED contractors need to bribe both the department (i.e. PHED) as well as politicians who sponsored the project. The bribe to the department is comprised of the bribe to PHED office in bidding and implementation process, bribe to finance department for release of funds for project, and bribe to Accountant General Pakistan Revenues (AGPR) office for processing of payment of the work done. Figure 5.5 shows that on average the department bribe percentage under collusion is around 12%, while the mean department bribe under competition comes out to around 8-9% of project budget.

Figure 5.5 Department bribe percentage

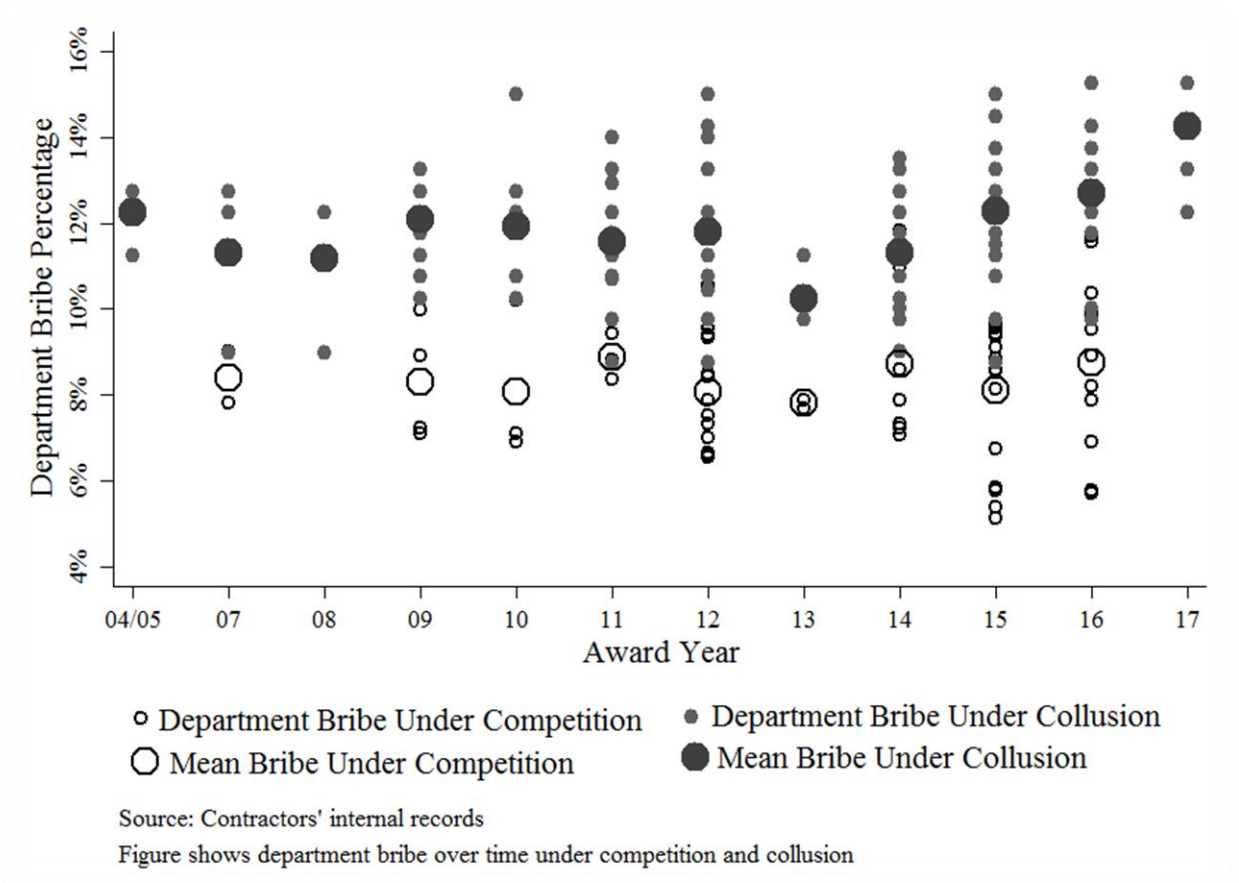


Source: Contractors' internal records

Figure shows department bribe over project budget under competition and collusion

The confidence interval (CI) for difference in mean department bribe between the contracts under collusion and competition runs from -4 percentage points to -3 percentage points. So we reject the null hypothesis that the mean department bribes for contracts under competition and collusion are the same.

Figure 5.6 Department bribe percentage over time



Source: Contractors' internal records

Figure shows department bribe over time under competition and collusion

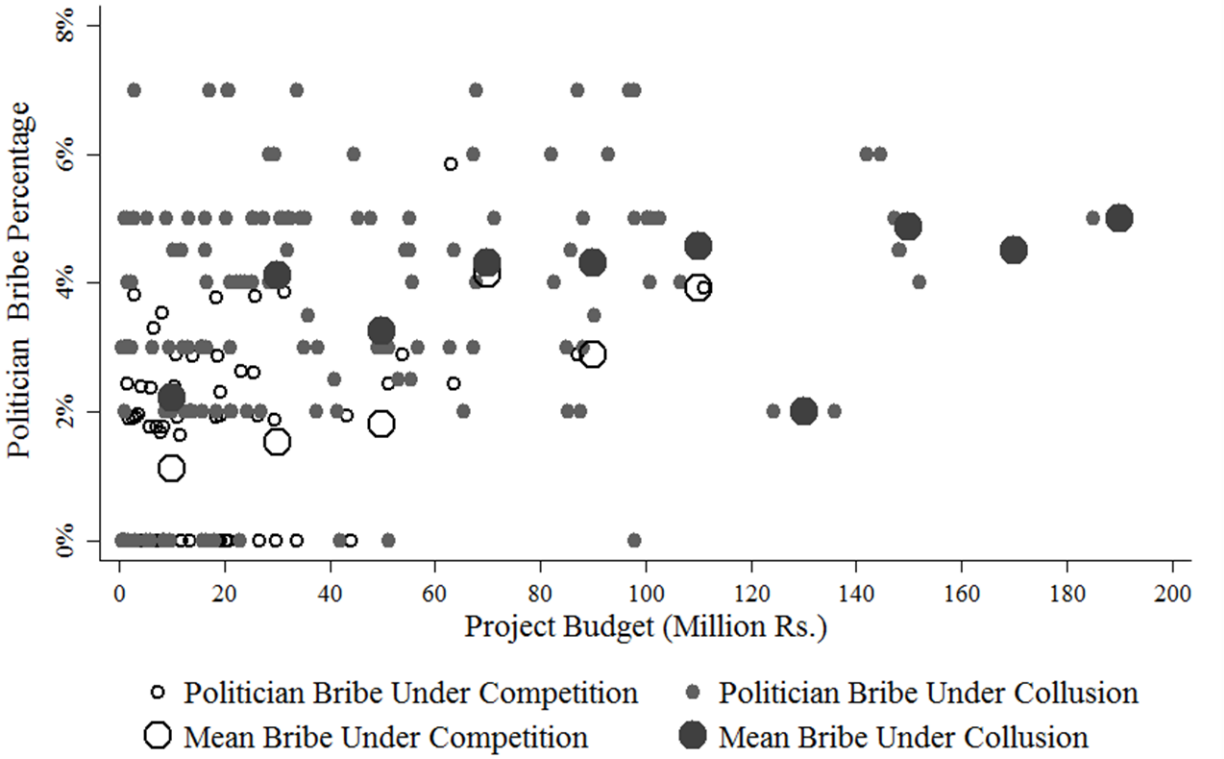
Figure 5.6 shows that the department bribe under competition and collusion is stable over the period from 2007 to 2017.

5.1.5 Politician bribe percentage

The politician bribe is the additional bribe the CEOs of contracting firms have to pay directly to politicians. The existence of politician bribes was confirmed separately during the course of

interviews with CEOs and executive engineers. The total amount of bribe is the sum of department bribe and politician bribe. Figure 5.7 below summarizes the amount of bribe paid to politicians under competition and collusion.

Figure 5.7 Politician bribe percentage



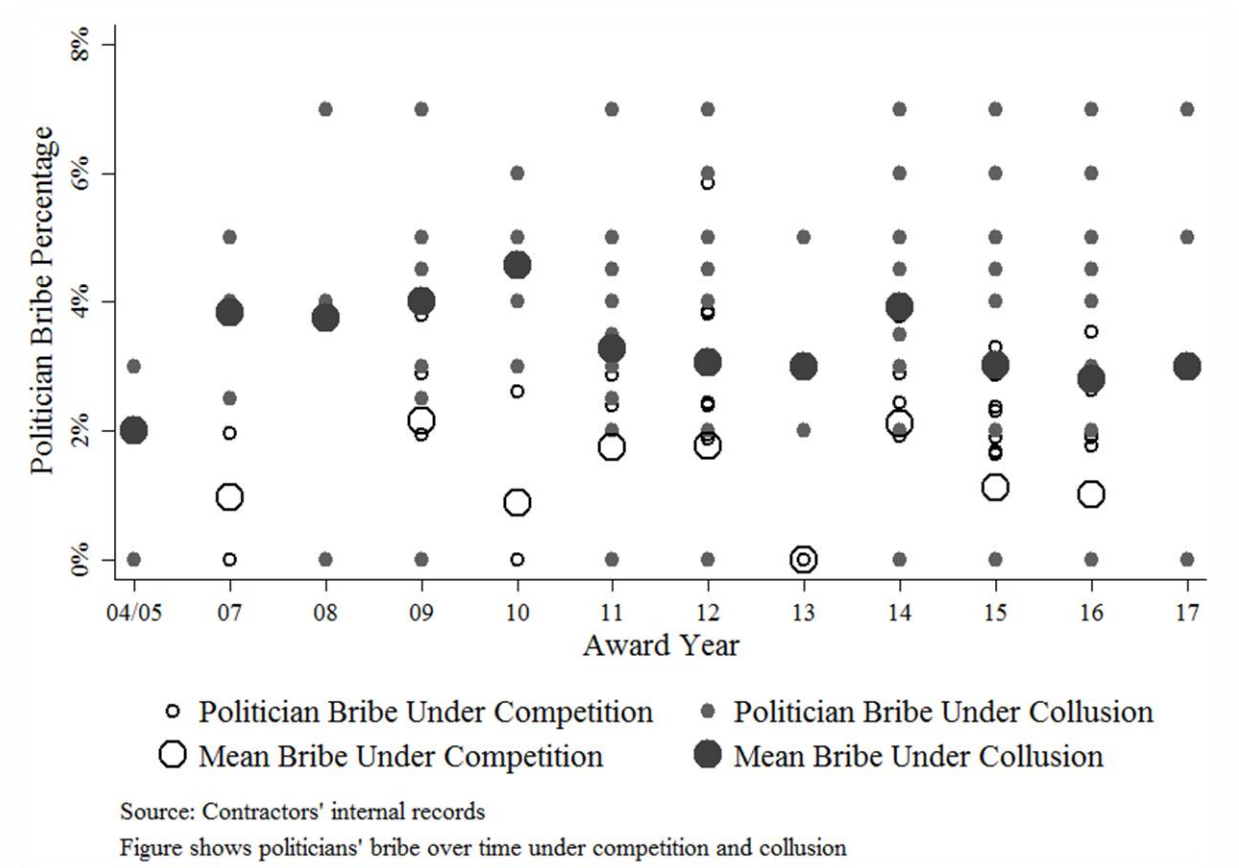
Source: Contractors' internal records

Figure shows politicians' bribe over project budget under competition and collusion

Figure 5.7 shows that the politician bribe percentage is again higher under collusion than under competition. In contrast to the department bribe however, politicians sometimes get no direct payments from the contract whatsoever and this happens even under collusion. Moreover, politicians seem to get a larger cut in higher value projects. On average, the politician bribe percentage in contracts under collusion is about 4% and under competition is it is about 2%. Figure 5.8 below shows that this pattern has been relatively stable between 2004 and 2017. These findings

suggest that politicians in Punjab take a substantial cut from project budgets of the PHED. The participation of politicians in bribery aggravates the situation.

Figure 5.8 Politician bribe percentage over time



Source: Contractors' internal records

Figure shows politicians' bribe over time under competition and collusion

5.1.6 Profit percentage

The previous sections have shown that total bribes represent about 10 to 15% of the project budget depending on whether the contract was awarded under competition or collusion. This section investigates how profitable the PHED projects are for contractors and whether their profits are sensitive to competition. Figure 5.9 below plots the profit percentage against project budget.

Figure 5.9 Profit percentage

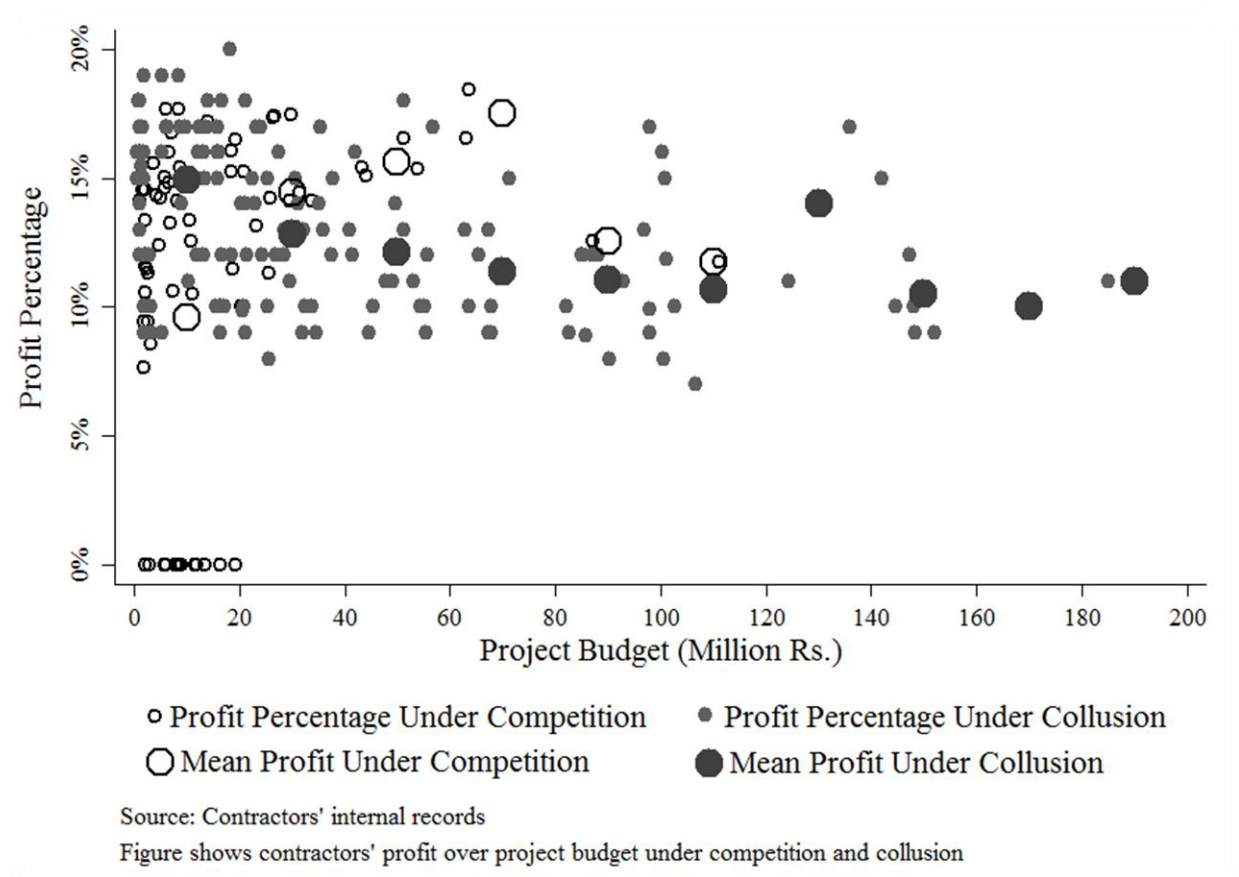
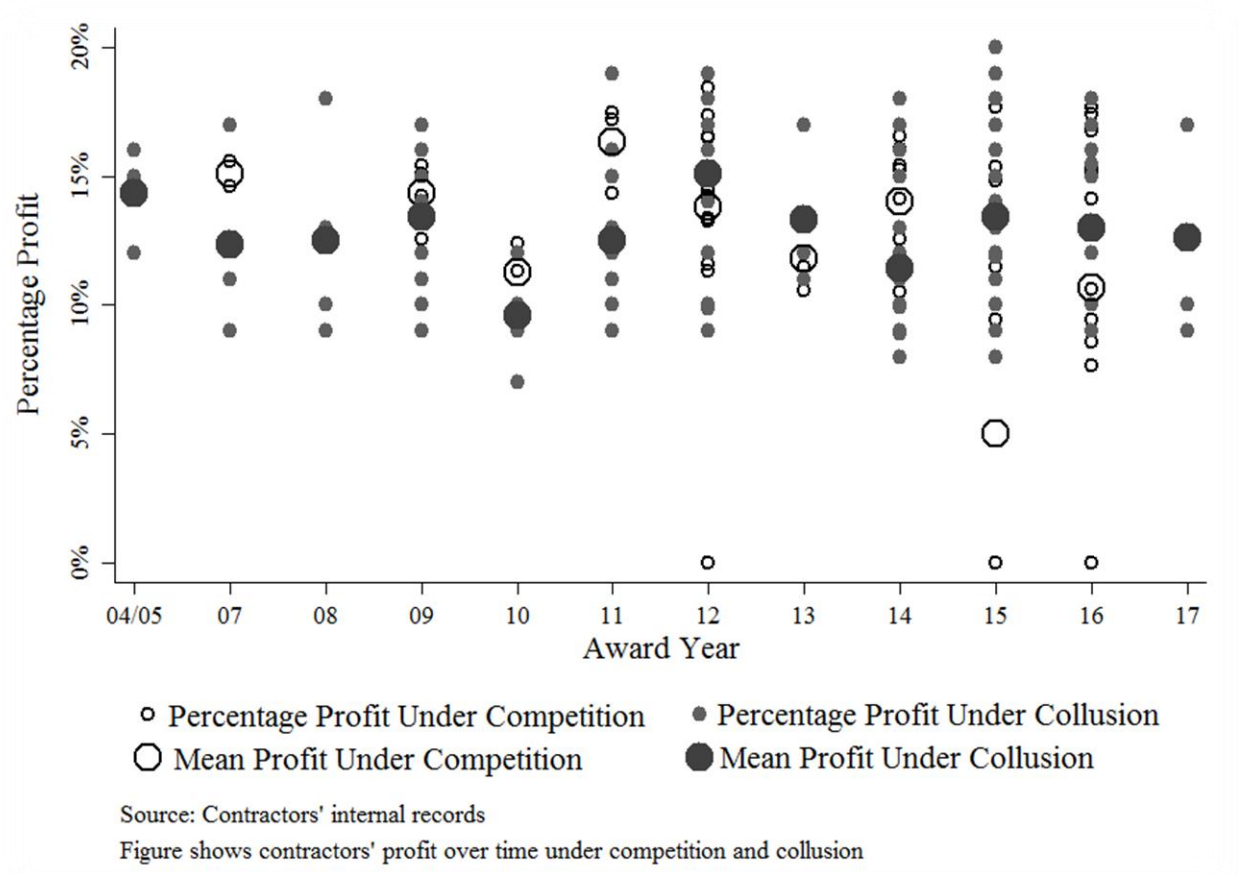


Figure 5.9 shows that for project budgets up to Rs. 20 million, the mean profit percentage for contracts under collusion is about 15%, while with competition the mean profit percentage is around 10%. Since the average winning discount for small projects is about 10%, these results suggest that contractors and the PHED/politicians split the gains from collusion for small projects equally, i.e. each party gets an extra 5 percentage points of project budget on top of the usual 10% if collusion is successful and the contract is awarded on full rates. However, for larger projects it seems that contractors are making even higher profits under competition than under collusion while at the same time the PHED and politicians are getting lower bribes (see Figs 5.5 and 5.7). Figure 5.10 below shows that average profitability of contractors is about 13% of project budget over the years and not systematically different under competition vs. collusion.

Figure 5.10 Profit percentage over time



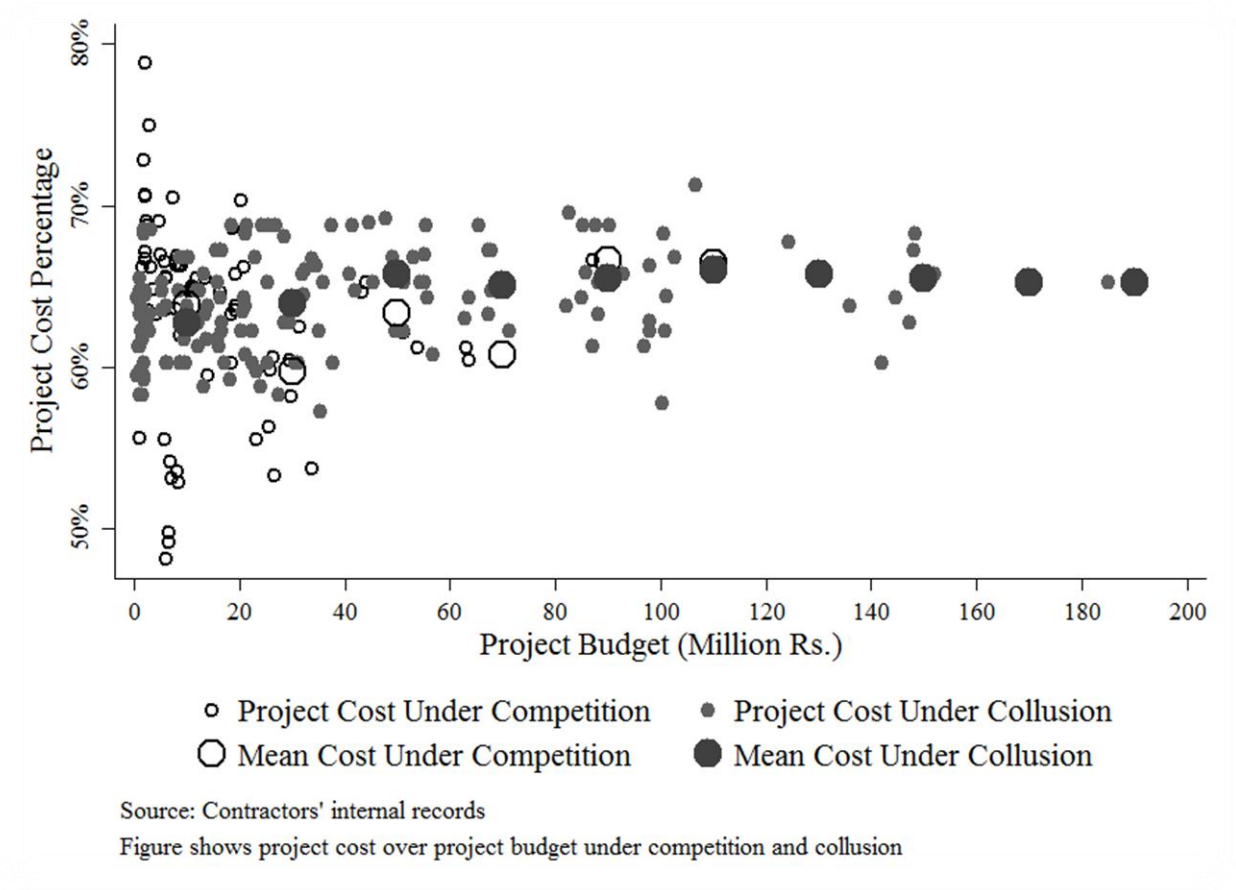
Source: Contractors' internal records

Figure shows contractors' profit over time under competition and collusion

5.1.7 Project cost percentage

The final budget component under control of the contractor is material and labor cost. Figure 5.11 below reveals that for small projects, the mean cost percentage with and without competition is about 63% of the project budget. However, under competition the variance of costs is notably higher compared to contracts awarded under collusion. For medium-sized projects, the cost percentage under competition is a few percentage points lower compared to collusion. Overall, it seems that cost is not a primary margin of adjustment for contractors when they have to compete for the contract.

Figure 5.11 Project cost percentage



Source: Contractors' internal records

Figure shows project cost over project budget under competition and collusion

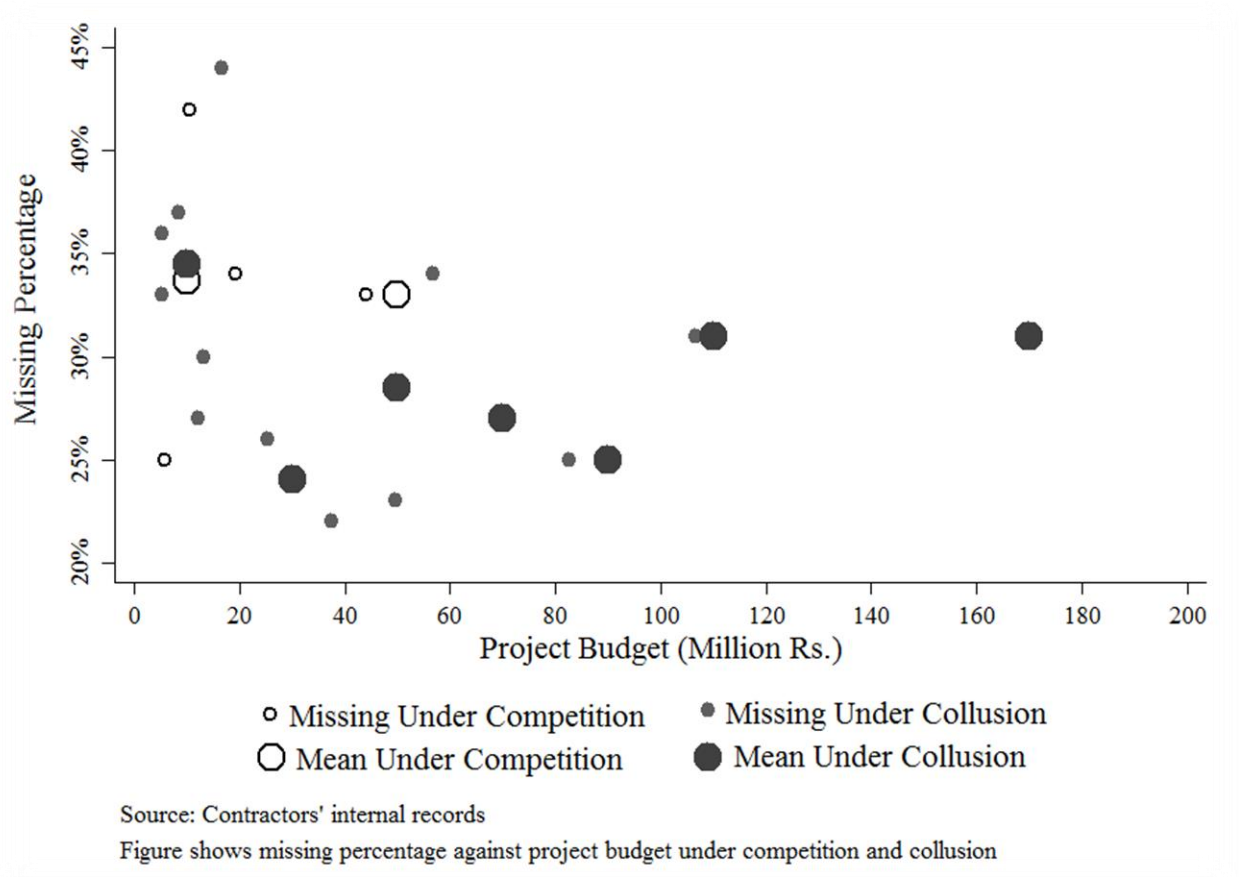
The confidence interval for the difference in mean cost between projects under collusion and competition runs from -2.5 % to 0.5%. So we cannot reject the hypothesis that mean cost is actually the same.

5.2 Quantitative evidence on contract execution based on field visits and engineer assessment

The previous results suggest that about two thirds of the project budget are spent on labor and materials and that competition does not dramatically impact on the how much is spent on project execution. The remaining third of the project budget is shared between taxpayers through the

winning discount, contractors and the PHED and politicians depending on competition or collusion. All these results are based on contractors' internal records and it is useful to get an independent measure of how much of the project funds go missing.

Figure 5.12 Missing percentage



Source: Contractors' internal records

Figure shows missing percentage against project budget under competition and collusion

Figure 5.12 above plots missing percentage against project budget. Although the sample size is fairly small, it appears that for small projects about 66% of the project budget is actually spent on the project, irrespective of competition for the contract or collusion. This result lines up nicely with the average cost percentage based on internal records, which came out at about 63% of project budget for small projects, again irrespective of competition (see Figure 5.11 above).

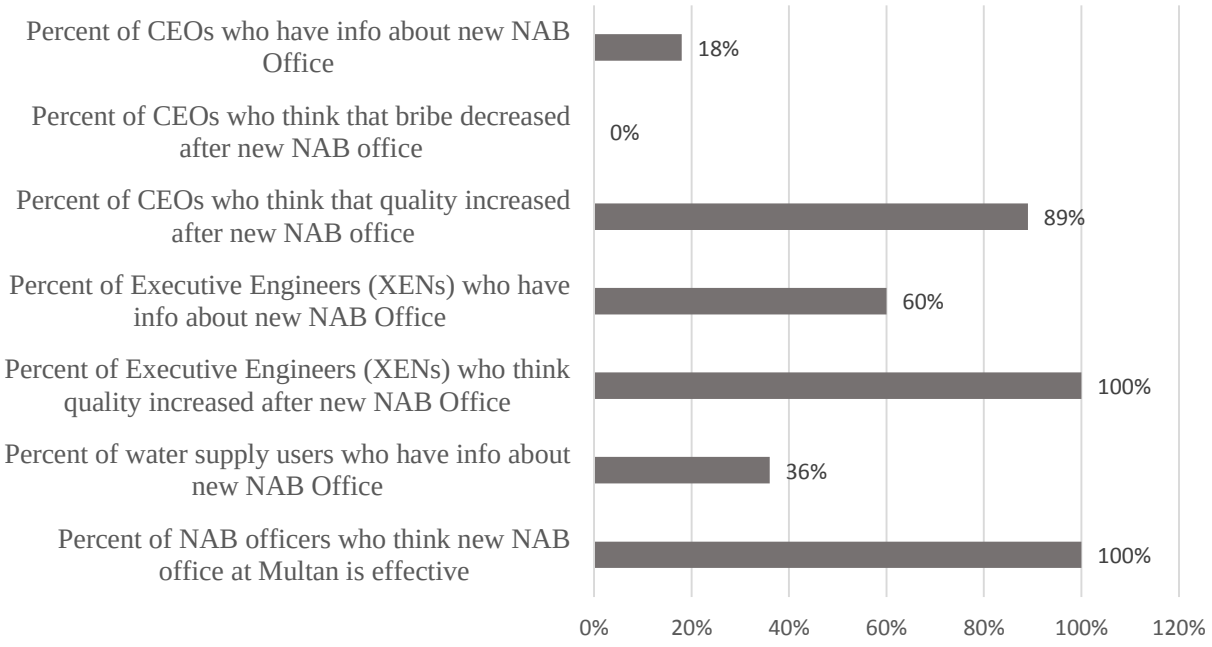
6. Impact evaluation of NAB Multan, including the NAB-related qualitative evidence

This chapter analyses the impact of NAB's establishment of a new office in Multan district in 2015. The hypothesis is that the new presence of an anti-corruption office has reduced corruption and increased project quality. The chapter starts with the qualitative evidence based on interviewees responses in Section 6.1, followed by a graphical analysis of the quantitative evidence based on contractors' internal records in Section 6.2.

6.1 Qualitative evidence on impact of new NAB office in Multan based interviews and focus groups

In our interviews we have asked one question form all the respondents about their knowledge of establishment of new NAB office in Multan.

BAR CHART 6.1 INTERVIEWEES' RESPONSES REGARDING IMPACT OF NAB MULTAN



Surprisingly, only 18% of the CEOs were are aware of the new NAB office in Multan. Out of those 28 CEOs 11 have worked with PHED Multan and only 2 of these 11 firms, who worked in Multan, knew about the new NAB office. The lack of knowledge about the functioning of NAB office in Multan has several interpretations. One is that the practice of corruption is so ingrained in the culture that the CEOs and departments do not bother about the presence of new NAB office in Multan. Moreover, CEOs have in their mind that no change is going to happen even after the establishment of NAB because any way they have to win the contracts with collusion and bribe. Further, NAB officers have shown their concern over the lack of resources. Perhaps it is because

NAB is only focusing on selective cases that the partners in white collar crime are undeterred by a new NAB presence in Multan. Last but not least, NAB Multan received 2523 complaints in 2016 but only worked on 79 inquiries and 29 investigations (NAB Annual Report, 2016). Since most complaints were not investigated, potential whistleblowers might have become discouraged.

In the next phase of the interview all the respondents were told that NAB is functioning in Multan since 2015. Still, 100% of the CEOs were of the view that the new NAB Multan office will have no impact on the bribe payment practices relating to the PHED. This shows that how the practices of bribe payment in public works projects have become the culture and norm which is difficult to change. However, on the question whether NAB Multan will have an impact on the quality of the project, 89% of the CEOs responded that the quality would increase due to the presence of the new NAB office. Those 89% CEOs were of the view that an increased risk of complaints to NAB by citizens would lead to better contract execution. The remaining 11% of CEOs responded that they have to pay bribe to politicians and department and they have to take this money from the projects by compromising the quality so they cannot afford to improve quality even after the existence of NAB.

Executive Engineers have to have liaison with all related departments in the district related to construction. The XEN being the head of the PHED in the district must have an idea of administrative changes like the establishment of a new NAB office in Multan. However, the XENs' responses reveal that 40% of the XENs did not know about the new NAB office in Multan.

When they were told about the functioning of new NAB office in Multan, they told afterwards that these XENs were posted in districts which were very far from Multan and therefore, had no idea about the new NAB office in Multan. It is alarming for NAB that 40% of top officers of PHED, where the corruption is said to be rampant, do not know about the intervention of NAB

of establishing its new office in Multan. This may also indicate that being highly centralized, NAB is leaving a perception of being superficial or only dealing with selective accountability under the garb of dealing only mega corruption cases.

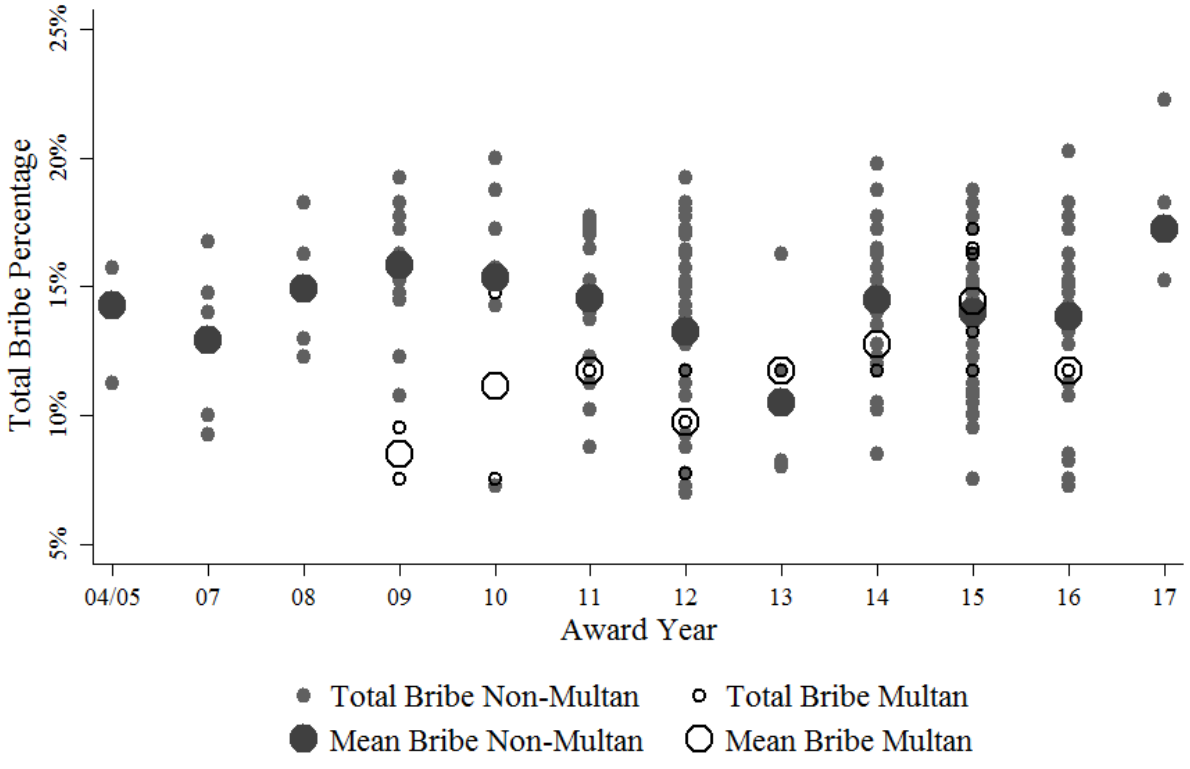
On the question of increase in quality due to the presence of NAB, 100% of the executive engineers responded that it would increase quality. The reason behind this response is that NAB's presence close to ongoing projects, like in the case of Multan, would have a psychological impact of maintaining the regulations and following the specifications. Executive engineers told that previously the absence of NAB in Multan had incentivized contractors and engineers to deviate from the standards due to less likelihood of being inquired or inspected. The engineers' views on the presence of NAB in Multan thus seem broadly consistent with the views of CEOs.

The focus group interviews with the users of water supply projects show that users from only 36% of the projects had information about the new NAB office in Multan. It transpired during discussions that they lack trust in government organizations in Pakistan. Secondly, they seem to be less educated and poor which prevents them to knock on doors of any agency for complaining about malpractices. Due to the lack of information about new NAB office in Multan, the users thought that it would be much too costly to lodge a complaint in Lahore office, which requires almost a whole day of travel. Moreover, the interviewees also reported that they have very little hope that the culture of bribing in PHED would be changed.

6.2 Quantitative evidence of impact of new NAB office in Multan on bribes

Figure 6.1 below plots the total bribe percentage over time separately in Multan and Non-Multan districts. The figure shows that total bribes have been trending upwards in Multan long before the establishment of the new NAB office in 2015. After the establishment of new NAB office in Multan in 2015 the bribe should have gone down but instead it kept on rising even in 2015. In non-Multan districts in contrast, the mean total bribe percentage was relatively constant at about 14%. On the face of it, the intervention does not seem to reduce the bribe practices in the Public Health Since the common trend assumption seems violated in the pre-2015 period, the quantitative evidence remains inconclusive unfortunately.

Figure 6.1 Total bribe percentage over time (Multan / Non-Multan)



Source: Contractors' internal records

Figure shows total bribe percentage over time in Multan and other districts

7. Conclusion

This study provides the first systematic quantitative evidence on corruption in government construction projects based on contractors' internal records. The findings suggest that competition is circumvented in about two-thirds of all contracts and that PHED executive engineers orchestrate collusion among contractors. The evidence collected here shows that in contracts awarded under collusion, bribes on average account for about 15% of project budget, with 12% going to the engineering department (i.e. PHED) and 3% to politicians on average. In contrast, bribes related to contracts awarded under competition are 10% of project budget on average, with 8.5% going to the PHED and 1.5% on average to politicians. Contractor profit margin is about 13% on average, irrespective of competition. Both the level and distribution of bribes as well as profit margins were stable between 2007 and 2017.

Despite the substandard quality of many of the projects, people in rural areas report satisfaction with the availability of drinking water at home. One main reason for user satisfaction is the reduction of their labor; previously they spent a lot of time fetching water from rivers, wells, and canals. The users also seem to be happy with the results of drinking water supply projects as they have reduced the incidence of water borne diseases. However, lack of maintenance and poor project quality, particularly in rural areas, is still problematic. Khan, Shahnaz, Jehan, Rehman, Shah, and Din (2013) conducted a study in Charsadda district of Khyber Pakhtunkhwa (KPK) Pakistan and confirmed evidence of coliform bacteria in the drinking water which is a cause of diseases including diarrhea, hepatitis, and gastroenteritis. Most recently, Haydar, Arshad, and Aziz (2016) found that in district Lahore of Punjab 50-62% of water samples contained bacteriological contamination before monsoon and up to 70% after the monsoon. That study identified leakage of main pipes and cross connections between water mains and sewers as cause of the contamination.

This implies that even in big cities there is contamination due to poor maintenance or negligence by water authorities. Although the users of water supply projects in this study are satisfied with the outcome in terms of reduced water borne diseases, there is a need for policy measures to ensure good quality projects and proper maintenance and monitoring for provision of safe drinking water.

The data gathered did not provide sufficient evidence to indicate whether the establishment of the new NAB office in Multan resulted in suppression of bribe practice. Results of the bribe measurement, utilizing the internal records of construction firms, suggest that mean total bribe percentage in Multan was increasing prior to the establishment of the new NAB office in 2015. At the same time, in other districts, the mean total bribe percentage was constant during that period, at around 14%. The qualitative evidence does indicate a lack of information about and awareness of the functioning of the new NAB office in Multan. 82% of contracting firms CEOs, 40% of XENs, and the users of 64% of water supply projects were not aware of the establishment of the new NAB office in Multan. The respondents, after receiving information about the new NAB office including those who already had the information, said that the consistent functioning of NAB might help to improve the quality of construction projects.

This study provides several important contributions to literature. Following the first study using inter records by Tran (2014), this study directly measures bribes based on internal records provided by CEOs of 28 construction firms. Second, it focuses on not only quantitative measures through internal records but also takes into account the qualitative perspective based on the interviews with CEOs of construction firms, district heads of engineering department (PHED), NAB officers, and users of water supply projects. Both qualitative and quantitative evidence offer a better understanding of why corruption is so pervasive in the public works of developing countries. Third, through the physical inspection by an expert engineer, this study cross verifies

the quality of water supply projects and the cost of construction as compared to specifications. The outcome of engineer's assessment are consistent with that of contractors' internal records. Fourth, this is the first study to quantify the impact of competition on bribe payment and contract execution. Although the phenomena of bribes and project quality are interrelated, they have not until now been explored together in the literature. And finally, this study demonstrates that politicians are systematic partners in crime in the construction business. In order to design a practical remedy to such practice, it is important to know that not only government officers but also politicians are involved in bribe taking.

The generalizability of this study to other developing countries and to measure other types of corruption, for example award of licenses and permits for rent seeking, bribe payment in mega contracts, or hidden private campaign finances, stems from its methodology. It is difficult to measure corruption due to it secretive nature and hidden activities. A connection in the construction business is important to conduct this type of research. In this study, one of the firms was in connection to the researcher which helped to contact other 48 firms out of which 28 firms agreed to give access to their internal records of bribe payment because they consider bribe as an additional cost to them. Thus enabling this study to find the data of 237 contracts from 28 out of 36 districts in the province of Punjab in Pakistan. Expectedly, the study has the potential to be replicated in other developing countries.

The perceptions of NAB officers suggest that, aside from lack of resources and heavy work load, lack of political will hampers accountability. Political will, as mentioned by Dixit (2016) and Quah (2011), is necessary for the success of an anti-corruption agency and for its cause of good governance. However, in developing countries, as in the case of Pakistan, the absence or lack of political will is a major obstacle to combating corruption and achieving good governance. A

shortcoming of this study is that it did not conduct interviews with politicians to take their view of corruption (bribes) in public works projects. One of the reasons is that during the course of research while conducting interviews with the CEOs, it was transpired that politicians are the partners in bribes. The study has successfully measured the amount of bribes being paid to politicians in the public works. However, amid the difficulty in approaching the politicians in that short span of time of field work, the interviews with the politicians could not be conducted. Further study is needed to take the view points of politicians regarding the causes of political corruption and the plausible solutions for its control in developing countries.

References

Beck, Paul J., and Michael W. Maher (1986). A Comparison of Bribery and Bidding in Thin Markets. *Economics Letters,* 20: 1-5.

Banerjee, A., Mullainathan, S., & Hanna, R. (2012). *Corruption* (No. w17968). National Bureau of Economic Research.

Azizullah, A., Khattak, M. N. K., Richter, P., & Häder, D. P. (2011). Water pollution in Pakistan and its impact on public health—a review. *Environment International,* 37(2), 479-497.

Dawn (2012). Pakistan loses up to seven billion rupees daily to corruption – NAB chief. 13 December 2012. Retrieved from www.dawn.com/news/771042 (accessed 15 June 2017)

De Sousa, L. (2010). Anti-corruption agencies: between empowerment and irrelevance. *Crime, law and social change*, *53*(1), 5-22.

Diamond, Larry. 2007. "A Quarter-Century of Promoting Democracy. *Journal of Democracy* 18 (4): 118–120.

Dixit, A. (2016). Anti-- Corruption Institutions: Some History and Theory.

Ghalib, A., Qadir, A., & Ahmad, S. R. (2017). Evaluation of Developmental Progress in Some Cities of Punjab, Pakistan, Using Urban Sustainability Indicators. *Sustainability*, 9(8), 1473.

Graycar, A., & Prenzler, T. (2013). *Understanding and preventing corruption*. Springer.

Habib, M., & Zurawicki, L. (2002). Corruption and foreign direct investment. *Journal of International Business Studies, 33*(2), 291-307.

Haydar, S., Arshad, M., & Aziz, J. A. (2016). Evaluation of drinking water quality in urban areas of Pakistan: A case study of Southern Lahore. *Pakistan Journal of Engineering and Applied Sciences.*

Kaufmann, D., Hellman, J. S., Jones, G., & Schankerman, M. A. (2000). Measuring governance, corruption, and state capture: How firms and bureaucrats shape the business environment in transition economies. *World Bank Policy Research Working Paper*, (2312).

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2006). Measuring corruption: myths and realities. *Development outreach, 8*(2), 124-37.

Kenny, C., & Søreide, T. (2008). Grand corruption in utilities.

Khan, F. (2016). Combating corruption in Pakistan. *Asian Education and Development Studies*, *5*(2), 195-210.

Khan, S., Shahnaz, M., Jehan, N., Rehman, S., Shah, M. T., & Din, I. (2013). Drinking water quality and human health risk in Charsadda district, Pakistan. *Journal of cleaner production*, 60, 93-101.

Khan, Z. U. (2017). Political and legal frame work and supply of clean drinking water with special reference to Lahore, Istanbul and Karnataka. *Journal of Political Studies*, 24 (1)

Kim, T. (2003). Comparative Study of Anti-Corruption Systems, Efforts and Strategies in Asian Countries: Focusing on Hong Kong, Singapore, Malaysia, and Korea. Fighting Corruption in Asia. Causes, Effects, and Remedies, New Jersey: *World Scientific*, 349-376.

Kim, T. (2010). Comparative study of anti-corruption systems, efforts and strategies in Asian countries: With focus on Hong Kong, Singapore, Malaysia, and Korea.

Laffont, Jean-Jacques, and Jean Tirole (1991). Auction Design and Favoritism. *International Journal of Industrial Organization.* 9, 9-42.

Litschig, S., & Zamboni, Y. (2015). Judicial Presence and Rent Extraction. BGSE Working Paper 796, *R & R, Journal of Law, Economics, and Organization.*

Mungiu-Pippidi, A. (2013). Becoming denmark: Historical designs of corruption control. *Social Research*, 80(4), 1259-1286

Mungiu-Pippidi, A., & Dadašov, R. (2016). Measuring Control of Corruption by a New Index of Public Integrity. *European Journal on Criminal Policy and Research*, *22*(3), 415-438.

National Accountability Bureau (2016). Annual Report 2016, NAB Islamabad. Retrieved from http://www.nab.gov.pk/Downloads/NAB%20Annual%20Report%202016.pdf (accessed 04 January 2018).

Nawaz, T., Shareef, N. A., & Ikram, A. A. (2013). Cost performance in construction industry of Pakistan. *Industrial Engineering Letters*, 3(2), 19-33.

Nystrand, M. J. (2014). Petty and grand corruption and the conflict dynamics in northern Uganda. *Third World Quarterly*, *35*(5), 821-835.

Olken, B. A. (2007). Monitoring corruption: evidence from a field experiment in Indonesia. *Journal of Political Economy*. 115 (2), 200-249

Olken, B. A., & Pande, R. (2012). Corruption in developing countries. *Annu. Rev. Econ.*, 4(1), 479-509.

Pakistan Defence (2013). How come PPP and PMLN governments altered in 1990s? 15 May 2013. Retrieved from https://defence.pk/pdf/threads/how-come-ppp-and-pmln-governments-alternated-in-1990s.252209/ (accessed 12 January 2018).

Persson, A., Rothstein, B., & Teorell, J. (2013). Why anticorruption reforms fail—systemic corruption as a collective action problem. *Governance*, *26*(3), 449-471.

Public Health Engineering Department (2017). Public Health Engineering Department, Functions. Retrieved from http://www.hudphed.punjab.gov.pk/budget (accessed 11 December 2017).

Philp, M. (2016). Corruption Definition and Measurement. In *Measuring corruption* (pp. 61-72). Routledge.

Quah, J. S. (2007). Combating corruption Singapore-style: Lessons for other Asian countries. *Maryland Series in Contemporary Asian Studies*, 2007(2), 1.

Quah, J. S. (2011). *Curbing corruption in Asian countries: An impossible dream?* (Vol. 20). Emerald Group Publishing.

Reinikka, R., & Svensson, J. (2004). Local Capture: Evidence from a Central Government Transfer Program in Uganda. *The Quarterly Journal of Economics*, 679-705.

Rose-Ackerman, S. (1997). The political economy of corruption. *Corruption and the global economy*, 31, 60.

Seligson, M. A. (2002). The impact of corruption on regime legitimacy: A comparative study of four Latin American countries. *The journal of Politics*, *64*(2), 408-433.

Shleifer, Andrei, and Robert Vishny. 1994. "Politicians and Firms." *Quarterly Journal of Economics*, 46: 995-1025.

Sohail, M., & Cavill, S. (2008). Accountability to prevent corruption in construction projects. *Journal of Construction Engineering and Management*, 134(9), 729-738.

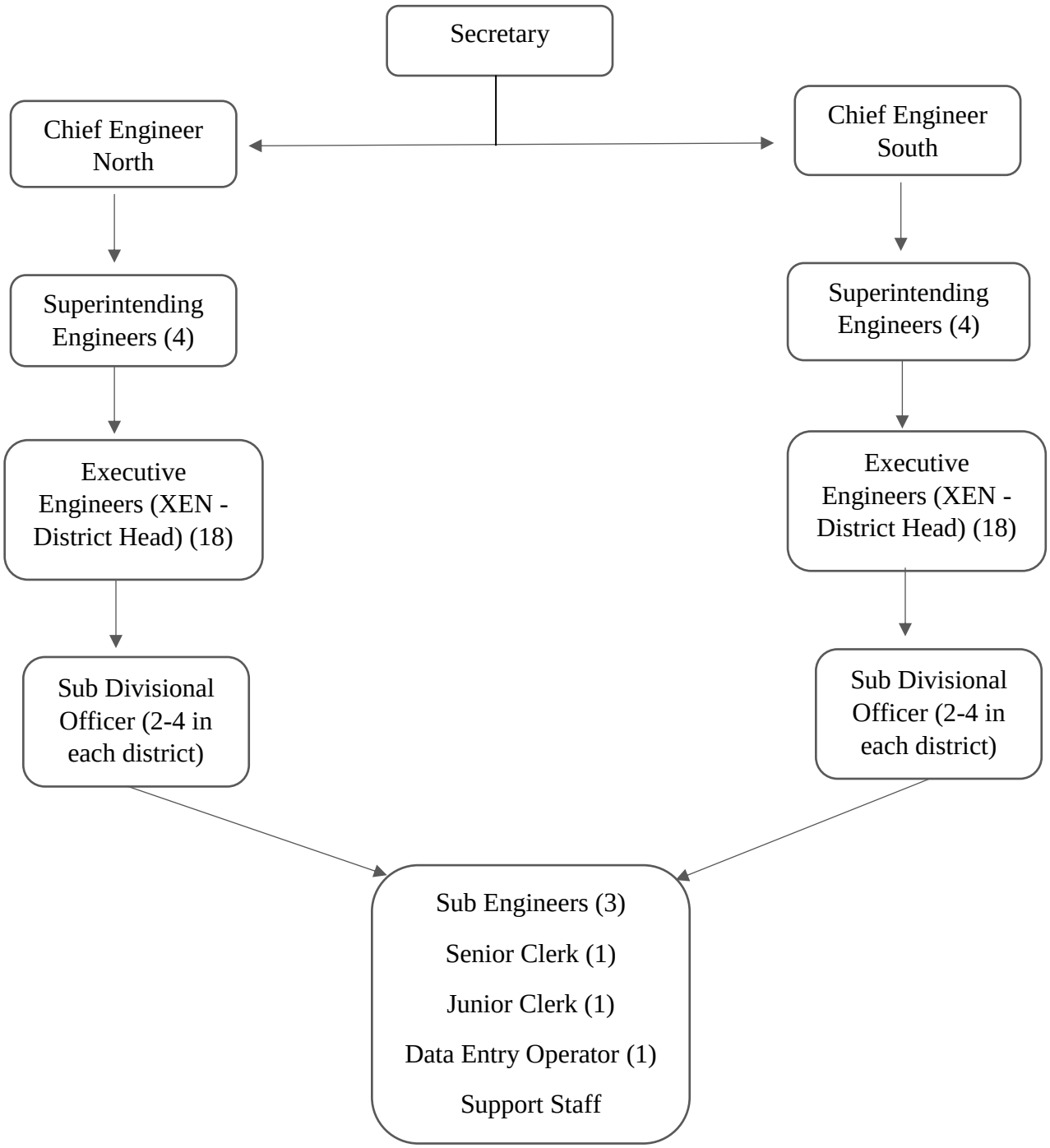
Sonobe, T. (2014). An Inquiry into Corruption Norms and Development. *State Building and Development*, (157-178). 1st ed. Oxon: Routledge.

Supreme Court of Pakistan (2013). Criminal Appeal No. 140 of 2005. Announced on 07 June 2013. Retried from www.supremecourt.gov.pk/web/user_files/File/Crl.A.140of2005.pdf (accessed 11 March 2017).

Tran, A. (2014). Which Regulations Reduce Corruption? Evidence from the Internal Records of a Bribe-paying firm, unpublished manuscript.

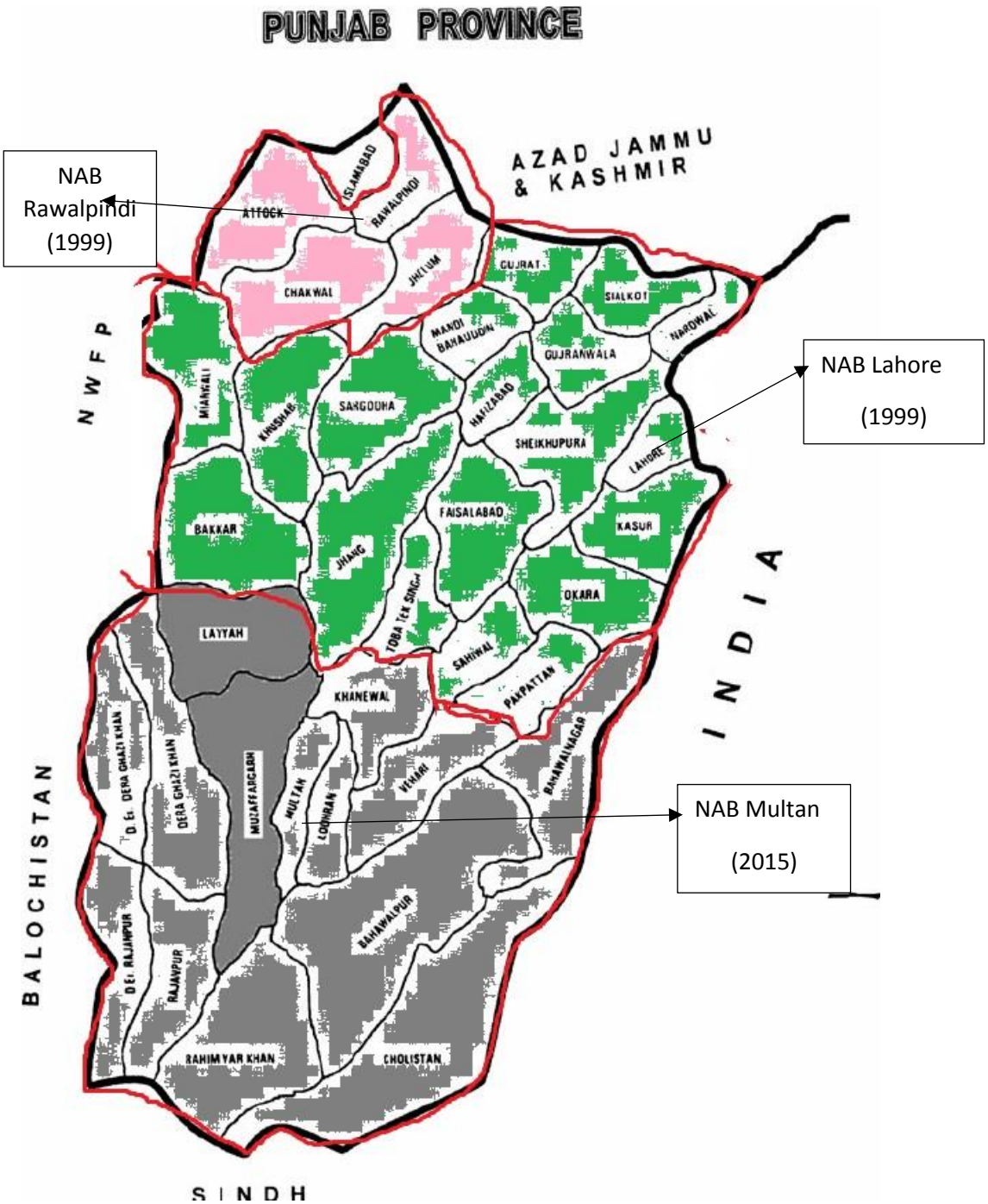
Transparency International (2018). Transparency International, What is corruption? *Transparency International*. Retrieved at July 9, 2018, from: https://www.transparency.org/what-is-corruption

Figure–A Organigram of PHED



Source: Own illustration

Figure–B Map of Punjab province indicating the regional NAB offices



Appendix–A Questionnaire for interview with CEOs of Contracting Firms

Q. 1. Personal Information?

a. Name
b. Place
c. Education
d. Establishment of Firm (since when)
e. No. of Employees
f. Self-initiative of business or Inheritance
g. How many contracts your firm has won so far (number / amount)

Q. 2. Construction Business Motivation?

a. What motivated you to start this business?
i. High Profits
ii. Social Respect
iii. Ease of doing business
iv. Others
b. Are you comfortable with present practices of doing business or you want change in the system?
i. Yes
ii. No, Why----------

Q. 3. Bribe in Licensing?

a. How many years have you had the license to compete for government construction contracts?
i. Put no. of years
b. Have you ever had to pay a bribe to get this license approved or renewed?
i. No
ii. Yes, (to whom?---------- And how much----------)

Q. 4. Impact of Prequalification of Firms on Bribe and Quality?

a. How is prequalification different from normal bidding process?
i. Lacks competition
ii. Few firms are chosen
iii. Gives more discretion to XEN
iv. Best value auction rather than best prices auction
b. Whether any discrimination in award of the contract is done under pre-qualification of the firms (e.g. bribe or anything else)?

i. Yes (the firms of choice are given the contracts)
ii. The firms likely to give more bribe are given contracts.
c. How often and what difficulties you face in getting contract award letter after being qualified (i.e. pre-qualification of firms)?
i. No difficulty
ii. Some times
iii. Very often What? ----------

Q. 5. Malpractices during Bidding Process?

a. What is the procedure of taking part in bidding? Are PPRA (Public Procurement Regulatory Authority) Rules being followed (w.r.t. advertisement / bidding documents etc.)?
i. PPRA Rules are being followed in letter and spirit
ii. NO. PPRA Rules are not being followed
iii. What are the deviations from PPRA Rules
b. Is the information about the tendering timely, accurate, and clear to prepare the tender forms and to take part into bidding?
i. Yes it is accurate
ii. No, it is not accurate (what deviations?-------)
c. Is the criterion for winning the contract clearly specified in the call?
i. Clearly specified
ii. No. Not clearly specified (what is important which is not specified and why?----------)
d. How do engineers oblige the contractors through pooling i.e. (full rate contracts without competition)?
i. By taking bribes (%age)
ii. By obliging other contractors to pay money (%age)
e. Have you ever had to pay a bribe to win the contract?
If so, to whom? And how much?

Q. 6. Malpractices during construction of Project?

a. What are the phases of release of money for completion of contract?
i. It's always on completion
ii. After the inspection the bill for payment is processed.
b. What is the amount of commission during implementation phase with competition contracts and without competition contracts?
i. Commission with competition ----------
1. XEN, SDO, Sub-engineer (Technical Wing)
2. Head Clerk, Head Draftsman, Draftsman (Clerical staff)

ii. Commission without competition ---------
1. XEN, Sub-engineer (Technical Wing)
2. Head Clerk, Head Draftsman, Draftsman (Clerical staff)
c. What discount below the full-rates (in %) do you normally have to offer to win the contract?
i. Lowest e.g. 30%
d. How do you meet the minimum quality requirements with such low rate quotations?
i. We compromise quality due to bribe
ii. We do not earn profits
e. What is the impact of full-rates work (without competition) on the quality of the project?
i. No impact on quality
ii. Quality suffers
f. How much amount (in %age) is paid to (AG Office) Accountant General Office to clear the payment of work done?
(----------%age)

Q. 7. Role of Politicians?

a. Is there any involvement of politicians in the awarding of the contract?
i. No involvement
ii. Yes they are involved (How----------)
b. Do politicians take monetary or other benefits from engineers or contractors in the government construction projects?
If so, how and how much--------?
c. Do the politicians provide any kind of protection in the affairs of construction business?
i. No Protection
ii. Yes they help in completion of work by approaching engineers of PHED
d. Do they provide any help in case of an inquiry?
i. Departmental inquiry?
ii. Anticorruption or NAB inquiry?

Q. No. 8 Information about NAB office

a. Do you know how many NAB offices are there in Pakistan?
i. Numbers of offices--------
b. Do you know where they are located?
i. Places----------
ii. ----------
iii. ----------
c. Is it easy for people to complaint if the office is close to the construction site?
i. No, it makes no difference
ii. Yes it is easy if the office is close to construction site
d. Do you think that presence of NAB office closer to your work site can have any impact on the amount of bribe or quality of work?
i. No impact
ii. Yes (decreased bribe, how much----); Improved Quality ---
e. Do people blackmail you in the name of complaint before NAB?
i. They don't
ii. They do
f. How do engineers of PHED think about the establishment of new NAB office in Multan?
i. New office has made no change
ii. It has cautioned engineers with their practices
iii. Any other
g. Does the presence of NAB office in Multan, closer to PHED office, has any effect in terms of change in commission or improvement in quality of work?
i. No change
ii. Yes. What -------
h. Do you think that NAB has played any role in changing the practices of govt. construction projects?
i. No
ii. Yes. What-------
i. Can NAB be managed in case an inquiry is started against you?
i. NAB Can be managed
ii. NAB cannot be managed

Appendix–B Questionnaire for interview with Executive Engineers (XENs)

Q.1 Personal Information

a) Name:
b) Designation:
c) Posting:
d) Qualification:
e) Age:
f) Experience:
g) Time on Present Position:

Q.2 Working Environment

a. Are you satisfied with the working environment in the govt. engineering job?
b. What are the main challenges in the govt. engineering job?

Q.3 Salary Satisfaction

a. Do you think that the salary structure is satisfactory for the PHED engineers or would you like to suggest to change it?
b. Can the main issues of governance be addressed with the increase in salary?

Q.4 Departmental Issues

a. Are the transfer posting done on merit or it is a tool in the hand of higher management?
b. Do you have a specific promotion criteria?

c. What incentive do you have on retirement? Are these sufficient and smooth?

Q.5 Contractors Issues

a. Are the contractors capable enough to meet the required criteria?
b. Do you think that they put pressures (e.g. through politicians) to get contracts?
c. Do some engineers have personal connections with engineers to get some benefits?

Q.6 Political Issues

How far do you think the politicians are responsible for not being successful in smooth functioning of PHED?
i. I don't think so. They are very competent and interfere for betterment.
ii. They are incompetent
iii. They interfere unnecessarily
iv. They are corrupt and take bribe

Q.7 Procedural loop holes in the bidding process

a. Do you think the bidding process is followed in letter and spirit?
b. What are the main loop holes and how they can be rectified?

Q.8 Quality of contracts

a. Why it is alleged that the quality of the projects in not maintained up to the mark?
b. Whether the department or the contractors are responsible for that?

c. Any suggestion for improving the quality of the contracts?

Q.9 Culture of bribing

a. Why there is so much criticism on construction related projects to be allegedly involved in bribe taking?
b. Is there any relevance of bribe to the quality?
c. How can the bribe culture be changed?

Q.10 Information about new NAB office in Multan

a) Where is NAB office
b) Impact of new NAB office in Multan
c) Are people now more active to lodge complaint? Does it have any impact on the departmental performance of PHED?
d) People black mail due to NAB office or not?
e) Is there any reporting to NAB regarding the work?
f) Any NAB officer take part in bidding? Should NAB be involved in bidding process?

Appendix–C Questionnaire for interview with NAB officers

Q.1 Personal Information

a) Name:
b) Position:
c) Posting:
d) Age:
e) Experience:

Q.2 Training level (sufficient, needs improvement, issues)

a. Do you think that the training of NAB officers is sufficient to tackle corruption?
b. Whether on the job training helps to get the expertise?
c. Any suggestion for improvement in training?

Q.3 Working environment (staff, load of work)

a. Do you think that the work load is sufficient to maintain the efficiency of the logical conclusion of corruption cases?
b. Do the officers of NAB have the sufficient staff to take care of the work load?
c. Are you satisfied with the infrastructure which NAB provides you to tackle corruption inquiries?

Q.4 Mechanism of control of corruption in construction related inquiries

a. What is the policy to tackle construction related inquiries?
b. Are there any preventive measures NAB has taken to control corruption in construction inquiries?
c. How can NAB be helpful as a watch dog for smooth procurement in the govt. construction projects?

d. What do you think about commission (bribe) in construction contracts? And what should be the policy at govt. level to control bribe?
e. Do you think that politicians take bribe in construction? If yes what could be done to control bribe to politicians?

Q.5. Are finances sufficient for smooth running of affairs

a. How much funds are provided to NAB each year?
b. Are these finances sufficient to run the affairs of anti-corruption organization?
c. Do you think that there is proper utilization of financial resources within NAB?

Q. 6 Impact of new NAB office at Multan

a. Whether NAB has been successful in its cause to control corruption by establishing its office at Multan?
b. Why there is need of a separate office at Multan
c. What change has been there after the establishment of new NAB office at Multan?
d. In case of the creation of new office, does it hamper the situation with more work load or shortage of staff at other regional offices?
e. Do you think there should be more NAB offices and why?

Q.7 Transfer-Posting issues (infrastructure, settlement in case of new office)

a. Is there any transfer posting policy at NAB?
b. In case of transfer of an officer to newly established office, what infrastructure for living of his and his family members are provided?
c. Is transfer posting used to exploit the officers?

Q.8 Cooperation / Coordination with other departments

a. How does NAB manage the coordination / cooperation with other departments?
b. What are the main issues of overlapping of NAB with provincial anti-corruption and FIA? And how do you tackle it?
c. Is it viable if NAB goes to division level?

Q.9 Political issues

a. Do you think that political will is existing to strengthen NAB?
b. What are the major political issues in the accountability process?
c. How does NAB tackles these issues?

Q.10 Prosecution and other supportive wings

a. Are the contractual prosecutors in the NAB's interest?
b. Do you think NAB should have its permanent prosecution squad?
c. What are the major issues of prosecution in NAB and how do you think that these can be tackled?

Q.11 Hierarchal issues

a. Are there any hierarchal issues in NAB?
b. How far the internal politics of NAB have harmed the cause of accountability and anti-corruption?
c. How do you think NAB should tackle the hierarchal and seniority issues?

Q. 12 Awareness and Prevention vs. Enforcement to control corruption

a. How far Awareness and Prevention strategy of NAB has been successful?
b. Has NAB achieved its goals of awareness and prevention by establishing the character building societies
c. How effective NAB could be to focus more on awareness and prevention?
d. Whether enforcement should be more strengthened or awareness and prevention?

Appendix–D Questionnaire for focus group interview with users of water supply projects

1. Short introduction of the interview participants
Local natives and Committee members of WASCO

2. Duration of construction / difficulties?
a. When the contract was started?
b. When it was finished?
c. What difficulties they faced during the operations of water supply project?

3. Durability of the project / Quality?
a. Whether you are satisfied with the quality of water supply project or not?
b. Is there any change in quality of life due to this project or not?
c. Did the project remain durable during the provision of safe drinking water?
d. Is the maintenance done on regular basis?

4. Reasons of poor quality?
a. If you are not satisfied with the quality of the water supply project what are its reasons:
i. Poor quality material / corruption (bribe)
ii. Misuse of the project
iii. Lack of proper maintenance

5. Evidence of bribe / corruption?
a. Do you think that there has been any corruption in this project?
b. Do you have any proof of poor quality or bribe?
c. Did you complain against it before any forum?

6. Role of local political supporters?
a. Have the local political supporter played any role to make it an appropriate project?
b. How do you think that the local politicians or political worker can be instrumental in ensuring the best quality project?

7. Know how about NAB Where is its office?
Have you ever complained at NAB?
If yes how was your experience? Its impact on quality etc.?
If not why?
Has new office created any positive impact?

Appendix–E Quality of Water Supply Project

Urban Water Supply Scheme

GENERAL ABSTRACT OF COST.

Sr No.	Description of Work		Amount	Followed/ Eng. Check	
1	Sub Head No.1	GROUND WATER INVESTIGATION	Rs. 148694	Rs. 105573	71%
2	Sub Head No.2	TUBE WELL BORING AND ITS CONVERSION.	Rs. 483133	Rs. 343021	71%
3	Sub Head No.3	PUMP HOUSE SIZE 12' X 12'	Rs. 883254	Rs. 607914	69%
4	Sub Head No.4	PUMPING MACHINERY.	Rs. 4104000	Rs. 3693600	90%
5	Sub Head No.5	RISING MAIN/DISTRIBUTION SYSTEM	Rs. 19608714	Rs. 14009057	71%
		TOTAL =	Rs. 25227795	Rs. 18759165	74%

Pump House Specifications

Description		Amount Rs.	Engineer's Check	
Ch:No.3 Item No.21-b				
Excavation in foundation of building, bridges & other structures, including dagbelling, dressing, refilling around structures with excavated earth, watering and ramming lead up to one chain 100 ft. and lift up to 5 ft. in ordinary soil.		2,191 /-	1555.61	71%
Ch:No.6 Item No.3D				
Cement concrete brick or stone ballast 1- 1/2" to 2" gauge in foundation and plinth.(1:6:12)		21,002 /-	14701.4	70%
Under Foundation	1.00			
Under Foundation	2.00			
Ch:No.7 Item No.4i				
Pacca brick work 1:5 cement sand mortar foundation and plinth up to 10 Ft height		72,558 /-	50790.6	70%
Ch:No.6 Item No.33-b-i				
Providing and laying 1/1/2" damp proof course of cement concrete 1:2:4 (using cement, sand and shingle) with 2 coats of bitumen.		2,489 /-	1742.3	70%
Ch:No.7 Item No.5				
Pacca brick work for ground floor up to 10' height in 1:5 cement sand mortar above P.L.		123,526 /-	86468.2	70%
Ch:No.6 item No.6a-3				
Providing and laying reinforced cement concrete (i/c pre stressed concrete) , using coarse sand and screened graded and washed aggregate, in required shape and design, i/c forms, moulds, shuttering, lifting, compacting, curing rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, complete.		385 /-	273.35	71%

(a) (I).Reinforced cement concrete in roof slab , beams , columns , lintels , girders and other structural members laid in situ or pre cast laid in position , or pre stressed members cast in situ , complete in all respect. Type C (nominal mix 1: 2: 4.			
Ch:No.6 Item No.9-b Fabrication of mild steel reinforcement for cement concrete, i/c cutting, bending, laying in position, making joints and fastenings, i/c cost of binding wire and labour charges for bending of steel reinforcement (also includes removal of rust from bars) Deformed bars	30,230 /-	21161	70%
Ch: No. 25 Item No.31 Making and fixing steel grated door with 1/16" thick (1.5mm) sheeting, including angle iron frame 2"x2"x3/8" (50x50x10 mm) and ¾" (20 mm) square bars 4" (100 mm) centre to centre, with locking arrangement.	21,755 /-	10877.5	50%
Ch: No. 25 Item No.41-b-iii P/Fixing steel window with openable glazed panels making beams section for frame 1 ½ "x1"x5/8" section for leaves ¾"x1"x3/8" T-section 1"x1" x1/8"embedded over a thin layer of putty duly screed with leaves brass fittings holds fast, duly painted complete in all respect i/c cost of approved design as directed by the Engineer In charge fixed with wire gauze 22 SWG. Glass panes 3 mm thick window.	11,222 /-	7967.62	71%
Ch:No.12 Item No.54 Providing and fixing M. S. flat 1/2"x 1/8" grill, i/c 3 /4"x 1/8" M.S. flat frame, in windows of approved design, i/c painting 3 coats, complete in all respect.	534 /-	379.14	71%

Ch:No.9 Item No.5 Single layer of tiles 9”x1 ½ “x1 ½ “ laid over 4” earth and 1” mud plaster without bhoosa grouted with cement sand 1:3 on top of RCC roof cement RCC provided work 34 LBS bitumen coating sand grouted.	9,404 /-	7053	75%
Ch:No.9 Item No.14 Kassi Parnalas in cement sand mortar 1:2 12” outside width finished smooth with and floating coat of neat cement.	1,012 /-	718.52	71%
Ch:No.9 Item No.15 Khurras on roof 2’2’x6”	435 /-	308.85	71%
Ch:No.9 Item No.16 Bottom khurras or brick masonry in cement mortar 1:6,4” x2”x4” over 3” cement concrete 1:4:8	780 /-	553.8	71%
Ch:No.3 Item No.15 Filling, watering, and ramming earth under floors with surplus earth from foundation etc.	360 /-	255.6	71%
Ch:No.7 Item No.30 Supplying and filling sand under floor or plugging in well	1,838 /-	1304.98	71%
Ch: No.10 item No.15i Providing and laying topping of cement concrete '1 : 2 : 4, including surface finishing and dividing in panels '© 3 inch thick	8,673 /-	6938.4	80%
Ch: No.11 item No.8-b Cement plaster ½” thick 1: 3, up to 20’ height.	8,473 /-	4236.5	50%
Ch:No.11 item No.18A+31			

Cement pointing struck joints on wall up to 20' height ratio 1:2 i/c extra cost of labour and material for red oxide pigment in cement pointing to match with the colour of bricks. Outside. P.House	27,469 /-	19502.99	71%
Ch: No.11 Item No.25 White washing new surface three costs.	1,534 /-	767	50%
Ch: No.13 Item No.5C Painting of new surface, preparing surface and painting of doors and windows any type, three coat.	1,691 /-	845.5	50%
Market rate Providing and fixing R.S. joist quality china made, i/c 3 coats of paint and cost of masonry work, complete in all respect. 8"x4" Size	1,680 /-	840	50%
Market rate P/F ceiling fan 56" dial (Pak, Royal, Asia, GFC) complete in all respects	4,500 /-	3195	71%
Ch: No.10 Item No.9 Brick on edge flooring, laid in 1: 6 cement mortar, over a bed of 3/4" thick cement mortar 1: 6,	87,886 /-	61520.2	70%
Sub Total	441,627	303957.06	69%

2 * Pump Houses @ 441,627

TOTAL	883,254	69%

Table-I Variables and Sources

Variables	Unit of Analysis	Sources
Bribe payment to PHED officials and politicians	237 projects from 28 construction firms/contractors	CEOs.
Responses of • CEOs of construction firms • PHED Officers • NAB Officers • Affectees of water supply projects (Focus Group)	Interviews with ---28 CEOs ---10 PHED Officers ---15 NAB officers ---11 Focus Group of affectees of water supply projects	Own data collection
Quality of water supply projects on the basis of physical inspection by an expert engineer	20 water supply projects	Civil engineer