Challenges Facing the Reconstruction of Iraq’s Infrastructure

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“The chief limiting factor to the success of development in Iraq may prove to be neither the amount of money for investment, nor even the limits of skilled labour and materials available, but the efficiency of the administrative machine.” Lord Salter, 1955

Overview of Iraqi infrastructure

Since the destruction of Baghdad by the Mongols in 1258 CE, a succession of governments in what is now Iraq have gradually created and maintained an extensive infrastructure to provide essential services such as water, power, communications, and transportation. But in the last three decades; civil conflict, the long Iraq-Iran war (1980-1988), the wars with US-led coalitions in 1991 and 2003, the associated UN sanctions, and the more recent fight with the insurgency have resulted in a sharp deterioration of national infrastructure both from direct damage and foregone maintenance. Not only has there been a substantial deterioration of “hard” infrastructure – the physical networks fundamental to the functioning of an industrial state – but also “soft” infrastructure has been severely degraded. Soft infrastructure includes governance, economic, and social institutions. In the case of Iraq, while the Government of Iraq (GoI) has focused on the
restoration of hard or physical infrastructure, it is the weakness and gaps in the country’s soft infrastructure that are the binding constraints to Iraq’s economic development.

For example, Saddam Hussein bought loyalty by providing most public goods and services for free or at very low cost. These subsidies were massive and financed by crude oil exports and large-scale foreign borrowing. And, since these fees were generally insufficient to cover maintenance costs, much less the capital costs required for any expansion, infrastructure improvements were driven not by demand but rather by the willingness of the Baghdad bureaucracy to expend funds based on political considerations.

In addition to the infrastructure challenges unique to Iraq, the country cannot escape the basic tradeoff inherent in any large-scale development. As has been long accepted among management experts, there are three qualities of a successful project - good, fast, and cheap – but you can only choose two. As stated in all three of the national post-Saddam development plans, the country’s leadership has decided on a rapid expansion of the nation’s infrastructure with special emphasis on the oil and gas sector. As a result, the nation’s infrastructure projects have tended to be either high quality/very expensive (e.g. the oil pipelines) or relatively inexpensive/low quality (e.g. waste water processing).

This paper examines first the determinants of the demand for infrastructure in Iraq then the determinants of its supply before concluding with policy recommendations.
Figure 1: Map of Iraq

Source: Professional Maps of Houston, Texas (2012)
Determinates of demand for infrastructure investment

In theory, infrastructure investment is carefully planned, coordinated, and executed to accelerate a country’s economic development. Of course, in the real world, the real motivations of such investment may be very different. In the case of Iraq, there are at least five determinants of infrastructure of which only two are motivated by accelerating economic development. These determinants of the types and scale of infrastructure investment in Iraq are: replacing the infrastructure destroyed during almost three decades of conflict, providing the infrastructure necessary for the government of Iraq’s (GoI) rapid expansion of the oil and gas industry, the substitution of investment in new facilities for adequate maintenance in existing facilities, the use of government infrastructure investment to deal with the adverse effects of market failure, and, finally, infrastructure investment intended primarily to facilitate corruption.

Massive destruction

Three decades of conflict devastated Iraq’s electrical infrastructure, oil pipelines and fields, irrigation system, communication systems, railroads, bridges, roads, airfields, factories, and ports. And the restoration of this infrastructure is generally more complex and expensive than building new “green field” projects for the same purpose. As an example of the complexities involved in restoring infrastructure, there are over 200 vessels sunk in or near Iraq’s primary port of Umm Qasr and hundreds more in the channels from Umm Qasr north to the major city of Basrah. Not only do these vessels limit access to the port but also the sunken ships are believed to be leaking hazardous chemicals from munitions, pesticides, refined fuels, and unknown toxins. Although the
GoI has begun to remove some of these wrecks, it will be a long process. (Nadim F. et al 2008, 5-6)

Further complicating the restoration of conflict-ravaged infrastructure is the question of the proper goal of restoration. Should the government concentrate on restoring the exact pre-war infrastructure? In other words, should the government of Iraq seek to restore the oil and gas, irrigation, electricity, etc. infrastructures to what they were in 1979 before the beginning of the Iraq-Iraq War? Or should there be recognition that there have been substantial changes in technology, population distribution, trade flows, and attitudes since then? The experience in Iraq varies from sector to sector but the bias to restore the past is strong even when conditions have changed dramatically.

Optimistically, in the communications sector, there has been no attempt to restore phone landlines; almost all Iraqis use cell phone services purchased from licensed private providers. However, in most cases, the restoration of war-ravaged infrastructure is blind to change inside and outside Iraq. In the case of restoring the oil and gas infrastructure, there appears to be a desire to restore past circumstances regardless of change. Most of the natural gas is wastefully burnt – flared – pending the restoration of pipelines that will once again permit natural gas exports. However, at the same time, energy intensive industries such as electrical generation and cement production continue to be fueled with costly refined fuel rather than natural gas. As an extreme example, I saw a cement plant that was newly restored using trunk borne refined fuel while, across the road, large quantities of natural gas were wastefully flared. Similar issues are raised with respect to restoration of bridges and investing in agriculture. Some bridges no longer have an economic justification as a result of changing trade and population flows yet they are
being rebuilt. Iraqi dates formerly dominated the world market in both quantity and quality. However, over the last decades, Iraqi dates have lost competitiveness and it is very unlikely that they will be able to win back former market share. However, the government of Iraq is currently involved in major investment expenditures to restore the orchards to their antebellum levels of production.

*Rapid expansion of the oil industry*

Despite large-scale production beginning in 1927, Iraq’s proven reserves are still huge. Reflecting a controversy over the best metric to estimate proven reserves, (Cordesman 2006, 229) Iraq is believed to have between 115 and 146 billion barrels. At 115 billion barrels, Iraq is in fourth place in the world behind Saudi Arabia (proven reserves of 260 billion barrels), Venezuela (206 billion barrels), and Iran (140 billion barrels) and ahead of Kuwait (100 billion barrels). Iraq is already the second largest oil producer after Saudi Arabia and yet, at current rates of production, its oil will last for more than a century.

Only about 10% of the country has been explored for oil or gas. In addition, the existing estimates of oil and gas reserves are outdated; based on obsolete technology. Ongoing attempts to more accurately estimate Iraq’s reserves may result in a 50 to 250 billion barrels increase in the country’s proven reserves. If the adjustment adds over 140 billion barrels to Iraq’s proven reserves then Iraq will supplant Saudi Arabia as the country with the largest proven petroleum reserves.

In addition to oil, Iraq also has huge reserves of natural gas. About 12% of Iraq’s gas (5.6 trillion cubic feet or tcf) is found in four major fields while the remaining 88%
(42.2 tcf) is associated gas mixed with crude oil. Since this associated gas is explosive, it must be either captured or flared off - wastefully burned. An estimated 65% of all associated gas was flared with much of the remainder re-injected into oil wells to maintain the pressure needed to force oil to the surface. (COSIT 2012 2012, Table 18/2; Ministry of Oil 2012)

Iraq’s crude is relatively inexpensive to get out of the ground. It is not only near the surface but also generally concentrated in large fields. Iraq has nine “supergiant” (over 5 billion barrels) fields and twenty-two “giant” (between 1 and 5 billion barrels) fields. As a result, along with Saudi Arabia, Iraq has some of the lowest production costs in the world. With reasonable efficiency, Iraq can break-even exporting oil at a world price of only $10 per barrel. In 2012, oil exports reached 2.6 million barrels per day (mbpd) out of a total production of 2.9 mbpd. (Ministry of Oil 2013)

The GoI National Development Plan 2010-2014 called for more than a 300% increase in oil production to 12.2 mbpd by 2017. However, this goal was later revised down to 10.0 mbpd. The International Monetary Fund thought that even this lower goal was unrealistic. In view of the massive investment required, the IMF estimated an 85% increase to 5.35 mbpd was probably the most rapid growth possible. And even this lower goal will require not only a massive expansion of the existing petroleum infrastructure but also the creation of new facilities to deal with problems such as waste water disposal that were simply ignored at lower levels of production.

Table 1: Oil Production Scenarios

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<th>2012</th>
<th>2014</th>
<th>2017</th>
<th>2017 GDP*</th>
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<td>2.90</td>
<td>6.20</td>
<td>12.20</td>
<td>$490</td>
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<td>Source: Gunter 2013, Table 6.1, p. 102, updated by author.</td>
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Extracting and processing oil for either export or domestic refining requires an extremely complex infrastructure. After the crude oil is extracted from the wells, it is pumped to a Gas-Oil Separating Plant to remove any associated gas, water, and salts from the crude. The next step depends on whether the oil has measurable amounts of the very corrosive and poisonous gas hydrogen sulfide (H$_2$S). If the oil contains this dangerous gas with its rotten egg smell then it must be sent to a stabilization plant to remove the H$_2$S before it can be delivered to a pipeline. Finally, the crude will be pumped either to an Iraqi refinery, to Turkey through the Kirkuk-Ceylon pipeline, or to crude carriers at the oil terminals on the Persian Gulf. (Hyne 2001, 10-1, 409-10; SIGIR 2009, 1-2; EIA 2010, 6-7)

The major links in oil production, refining, and exports can be seen in Figure 1. Most of Iraq’s current oil exports come from the fields in the Southeast of the country and are pumped aboard crude carriers in the ports south of Basrah to be shipped through the Persian Gulf. The second highest export capacity is through the Kirkuk-Ceylon pipeline from the Kirkuk supergiant field to Turkey. Both of these routes have little excess capacity.

In the short-term, the binding infrastructure constraint on substantially increasing Iraq oil exports is the limited capacity of oil pipelines, storage facilities, and terminals in Basrah as well as the low throughput volume of oil pipelines from Kirkuk. The GoI has

<table>
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<th>GoI 2011 Revised Proposal</th>
<th>mbpd</th>
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<td></td>
<td>2.90</td>
<td>5.00</td>
<td>10.00</td>
<td>$410</td>
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<td>IMF 2011 Estimate</td>
<td>2.90</td>
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proposed a $8.4 billion project to build new storage facilities on the Faw peninsula south of Basrah, three new pipelines to the water’s edge, and four floating terminals in the Gulf to speed the filling of large oil tankers. (Hafidh 2011) As expected, this attempt to rapidly expand the oil infrastructure in the south has led to severe bottlenecks as sharply increased imports of equipment and supplies overwhelm existing port facilities. In addition, political groups, unions, tribes and government officials have sought to profit from the urgent activities by demanding “cooperation payments” or bribes.

In the long-term, the most serious challenge to expanding oil production is the water shortage. Depending on the viscosity of the oil and the nature of the oil reservoir; it can require two to eight barrels of water to produce each barrel of oil. A related issue is the disposal of contaminated water. Water used in oil recovery is often severely contaminated and will pollute river or ground water if it is dumped. This will also require large scale infrastructure investment in order to simultaneously provide potable water to Iraq’s rapidly growing population while ensuring that sufficient water is available to support increased oil production.

*Investment as a substitutive for maintenance*

One of the legacies of Iraq’s four and a half decades experiment with socialism is that maintenance has a very low priority. The Baghdad bureaucracy has a strong preference for investment in new facilities at the cost of maintaining older facilities. This thinking is, in part, a residual of socialist economic theory that favors production of goods over production of services. In addition, the incentive system for government management and workers provides little incentive to engage in long-term maintenance. In fact, in some cases, the incentives are perverse. When a water treatment plant outside
Baghdad was closed for repairs necessary because of the failure to perform basic maintenance; the workers received full pay without having to come to work. Also, as discussed below, new facilities also provide more opportunities for government officials to extract bribes or engage in other forms of corruption. Probably the best example of substituting new investment to compensate for maintenance failings is the electric industry.

Providing reliable quality round-the-clock electricity is the most critical infrastructure challenge facing Iraq. Despite billions of dollars in maintenance and investment as well as the hard work of many Iraqis, the gap between the demand and supply of electricity is greater than ever. This has resulted in outages that not only have stalled economic development but also have worked a genuine hardship on the population. Without air-conditioning, summer temperatures in Central Iraq of 110 °F (43 °C) are almost unbearable and constitute a public health hazard for the very young, the very old, and the sick.

Electricity in Iraq faces problems of both quantity and quality. There are scheduled and unscheduled blackouts in almost all Iraqi cities. These blackouts occur despite the fact that total electricity production and imports, 59.7 billion KWh in 2010, was 70% greater than the nation’s total electrical consumption, 35.1 billion kWh. (CIA 2013) With respect to quality, electricity from the grid is often substantially below the 50 hertz frequency promised. This can damage consumers’ electrical devices.

In other words, the nameplate capacity of national electrical generation in Iraq, the maximum output under ideal conditions, is substantially above the estimated electrical demand. However, actual peak production is only about 61% of feasible
capacity for a variety of reasons including planned and unplanned outages for maintenance, fuel shortages, and miscellaneous factors. (SIGIR 2010, Figure 2.29)

Among the three options for reducing the gap between the demand and supply of electricity - increasing the price of electricity, increasing nameplate generation capacity, and increasing the efficiency of existing power plants; increasing nameplate generation capacity is by far the most popular option among politicians and bureaucrats. Massive construction projects especially with a large imported component provide much greater opportunities for graft and favoritism than efforts to improve efficiency of existing capacity. However, not only is adding substantial capacity is fraught with engineering challenges, it is expensive. The Ministry of Electricity has proposed spending $77 billion over the next twenty years. (Reuters 2011)

The most controversial option is to accept that Iraq doesn’t have a shortage of capacity but rather is incredibly inefficient in its use of exiting capacity. If the GoI were able to increase the efficiency of existing generation then a substantial increase in electrical supply would be possible without the massive investment under consideration. For example, if the grid operators were able to minimize unscheduled maintenance outages and - with the cooperation of the Ministry of Oil - ensure that the correct standard fuel was available in sufficient quantities for existing generators then the existing electrical infrastructure could produce an additional 2,800 MW raising total production to over 10,000 MW.

Generally, increasing the efficiency of electrical generation in Iraq is treated as an engineering challenge. But a more productive approach might be to focus on incentives. Currently, managers and workers at electrical generation plants are not rewarded for
long-term increases in efficiency nor financially punished for unnecessary drops in the quality or quantity of electricity. In the absence of such incentives, politically motivated efficiency drives can be expected to have only a short-term impact on electrical production often paid for with a long-term degradation of equipment.

*Investment to compensate for market failure*

In Iraq, the public has grown to expect free or heavily subsidized electricity, water, fuel, medical care, and education. As expected, this leads to great waste since if something is “free” then the consumer treats the good or service as if it has zero cost. If an Iraqi store can obtain power from the grid at no charge then the owner will run his air conditioner at maximum cooling while keep the door of his store open to encourage customers to enter. In this situation, the demand for public services is not constrained by prices as much as by consumer incomes and the availability of complements in consumption. To continue the electricity example, if incomes rise or air conditioner prices fall then the typical consumer will purchase another - probably larger - air conditioner and demand for electricity will rise even further.

In the absence of a realistic market price for electricity, GoI estimates of demand are almost meaningless. Since the marginal cost to the user of additional electricity consumption is near zero, any increase in the supply of electricity leads to the purchase of more electricity-using goods and services. And more electricity-using products lead to increased demand. As a result, the gap between the amount of electricity demanded and the amount supplied never closes. This problem with artificially low electrical prices was recognized fairly early in the reconstruction process by both military and civilian
authorities. (See, for example, Robinson 2008, 173) But inertia and leadership overload prevented any serious attempt to charge reasonable electrical charges until late 2010.

In October 2010, the Ministry of Electricity introduced, for the first time, a tiered system of charges for electricity. However, in response to widespread protests, the pricing system was modified in February 2011. According to the new system, the first 1,000 kWh each month will be free, between 1,000 and 2,000 kWh per month will cost the consumer 50 ID/kWh (4.3 cents per kWh), between 2,000 and 3,000 will cost 80 ID/kWh (6.8 cents per kWh), and higher charges for larger usage. (Reuters 2011) While a small step in the direction of rationalizing electricity demand, there are at least two unresolved issues.

First, metering is not available in many areas and is considered unreliable. Second, and more importantly, the 2011 decision to make the first 1,000 kWh free, while popular and politically astute, eliminates most of the efficiency benefit that the pricing was intended to achieve in the first place. The GoI stated that the purpose of the change was to help the poorest 8 million Iraqis obtain the electricity they need. But a 1,000 kWh is a lot of electricity, the average American household only uses between 900 and 1,400 kWh per month depending on season. By allowing free electricity up to 1,000 kWh, the GoI has committed itself to providing free power to more than half the population.

Providing heavily subsidized utilities also produce perverse incentives for the government ministries and State Owned Enterprises (SOE). Since the consumer pays little or nothing for electricity, water, medical care, etc. his or her needs can be ignored. The only exceptions are if the consumer has political connections or is willing to offer a bribe. The bureaucracy has little incentive to provide services to anyone who lacks
political or other connections since they will not receive increased funds for providing service to a particular customer. As a result, consumers must pay bribes to receive basic essential services.

Since allowing prices to rise enough to clear markets remains politically unacceptable in Iraq, the GoI responds to public protests over shortages of electricity, water, fuel, education, medical care, etc. by promising further infrastructure investment.

and, in the absence of market prices or reliable estimates of shadow prices, the use of infrastructure investment in Iraq to compensate for market failure will continue.

**Investment to facilitate corruption**

Iraq is an extremely corrupt country and corruption not only increases the cost of infrastructure investment but also partially determines the scale and type of investment. Government expenditures that facilitate extracting illegal payments will be preferred to those that make corruption more difficult or less profitable. In Iraq, as in many developing countries, this has led to a bias in favor of building new infrastructure facilities as opposed to spending on the maintenance of existing facilities. Road and construction and maintenance in Iraq illustrate this tendency.

Road maintenance would seem to be relatively inexpensive in Iraq. In the lower two-thirds of the nation, temperatures rarely, if ever, fall below freezing which excludes a major cause of road deterioration. Also, in the lower two-thirds of the nation, the land is relatively flat which simplifies roadway engineering although there are almost 1,300 bridges required not only for the two rivers but also for the large number of irrigation
canals. However, failure to limit overweight trucks has led to rapid deterioration of major trucking routes.

While it is widely accepted that Iraq would greatly benefit from better maintenance of existing roads, incentives make this difficult to achieve. Most roads are public goods – neither rival in consumption nor excludable at reasonable cost. Therefore, most roads in Iraq are financed by the national government but built and maintained by contractors chosen by provincial or local governments.

Unfortunately, in Iraq, the road construction and maintenance business is riddled with corruption. A large proportion of the money committed to road maintenance or construction is diverted into other uses or private accounts. The construction firms are generally chosen on the basis of political or family connections as well as willingness to pay bribes. This leads to a bias in favor of building new roads instead of maintaining old ones since the greater complexity involved with building new roads provide more corruption opportunities as well as photo opportunities for governmental officials. And the quality of road construction is often low because of the substitution of lower quality materials for those specified in contracts. This results in more rapid roadway deterioration and additional contracts for even more new roads.

Of course, the demand for infrastructure investment to rebuild the country after the destruction that resulted from three decades of war, to rapidly expand the oil and gas industry, to substitute for foregone maintenance, to compensate for market failure, and to facilitate corruption is only one blade of the scissors. It is also important to consider the determinants of the supply of infrastructure investment in Iraq. In most developing countries, the binding constraint on the supply of infrastructure is shortage of finance.
But Iraq is the exception to this general rule, it is not finance but institutional weakness that most seriously constrains infrastructure investment.

**Determinates of supply of infrastructure investment**

*Available finance*

For decades, almost all of Iraq’s infrastructure investment has been planned, financed and executed by the GoI either directly or through State Owned Enterprises (SOE). For example, in 2009, public sector investment accounted for almost 93% of all fixed capital formation. (COSIT 2012, Table 14.10) Due to the dominance of public sector investment, each year’s infrastructure investment is a function of the country’s oil export earnings and the degree of efficiency in budget execution.

Figure 2 illustrates the pattern of GoI revenues that are a function, of course, of both the volume of oil exports and the world price of oil. While the volume of oil production and exports has increased almost every year since the 2003 invasion by the U.S.-led coalition, there have been dramatic year-to-year changes in world oil prices. And changes in total oil export revenues have a multiplied impact on GoI infrastructure investment. This occurs because investment spending is the “shock-absorber” of the GoI. When oil export revenues decline, the GoI maintains its budgeted spending levels on wages, pensions, and subsidies. Therefore, since the GoI has very limited capacity to borrow either domestically or internationally, falls in oil export revenues are immediately reflected in sharp cuts in government infrastructure investment. For example, the 2009 drop in oil prices resulted 33% decrease in total revenues to about 55 trillion ID ($46.8 billion). During this year of severely constrained revenues, salaries and pensions
expenditures actually increased by about one-third to 28 trillion ID ($23.8 billion)! The combination of lower revenues and higher expenditures for government employee salaries and pensions required an almost 40% drop in 2009 government investment to 16.7 trillion Iraqi dinars (ID equivalent to $14.3 billion). And the recovery of oil prices in the following year was accompanied by a 17% growth in government investment expenditures to 19.5 trillion ID ($16.7 billion).

Figure 2: Oil Production, Exports, and Prices

Source: Gunter 2013, Figure 6.1, p. 91; revised by author.

These unforeseen sharp changes in government investment not only have a substantial impact on long-term capital accumulation but also lead to great inefficiency and corruption. When, in response to unexpectedly low oil prices, the GoI sharply cuts investment expenditures; most infrastructure investment in roads, electricity, schools, clinics, water supply, etc. slows or grinds to a stop. Partially completed multi-year
building projects are abandoned for months or years until investment spending is restored in a future budget. When projects are restarted, it is often discovered that previous work must be redone due to looting, vandalism, environmental damage, or plan revisions.

However, the large year-to-year variance in oil export earnings and government infrastructure investment shouldn’t conceal the favorable long-term trend of both. As shown in Table 1, even using pessimistic IMF estimates, Iraq can expect an 85% increase in oil export volume by over the next two years. Assuming that real oil prices remain at approximately $100 per barrel then the GoI can expect almost a $90 billion increase in oil export revenues by 2014. As a matter of scale, this increase in government revenue would be greater than Iraq’s entire GDP as late as 2010. Iraq’s infrastructure investment will not be constrained by a shortage of finance.

*Lack of managers of billion dollar projects*

A more serious problem for the supply of infrastructure investment is the country’s shortage of skilled labor. There are large numbers of unskilled unemployed and underemployed in Iraq but electricians, plumbers, and other types of skilled workers are in short supply. Iraq must either train the needed skilled workers or hire expatriate electricians, plumbers, etc.

And most importantly, there is a shortage of the necessary managerial human capital. In particular, Iraq has very few (or no) individuals who are currently capable of efficiently managing billion dollar projects. To efficiently manage a billion dollar project requires not only a first-class education – most likely an engineering degree followed by a MBA - but also 12-20 years of “on the job” experience on complex projects with regularly increasing responsibilities. During the thirty years that Saddam’s Iraq was
substantially cut off from the world, the quality of higher education particularly in the
engineering and management fields deteriorated greatly for those who were able to
attend. Further increasing the difficulty of finding good managers is the large number of
forged degrees. Before the 2009 elections, the Inspector General of the Higher Education
Ministry found that as many as 4,000 of the almost 14,000 candidates had forged
university degrees. (Jawari 2009)

In addition, even those Iraqis who have obtained a good education probably have
little chance of obtaining appropriate positions of responsibility. The Baghdad
bureaucracy rewards and promotes managers more for their political agility then for their
ability to achieve technological or market efficiencies. As a result, in the absence of
quality management, the rapid increase in infrastructure investment discussed above can
be expected to result in waste, delay, and corruption.

Attempts to overcome the shortage of domestic big-project managers by a
“temporary” reliance on expatriate managers will not only be expensive but raises other
issues. Who will manage the managers? There is a principal-agent problem since the
motivations of the GoI and expatriate managers are different. It is difficult or impossible
to draft large project management contracts for expatriate managers and ensure their
compliance with these contracts without substantial technical and management capability.
But with few exceptions, these capabilities are lacking at the upper levels of the GoI.

Unlike many countries, Iraq doesn’t have the option of turning to successful
private sector managers to oversee large complex infrastructure projects. The economy of
Iraq continues to be dominated by State Owned Enterprises (SOE) that tend to be high
cost/low quality producers. Therefore any large-scale infrastructure investment will involve one or more of these inefficient SOE.

_Inefficiency of the public sector – ministries and state owned enterprises_

Iraq is not Sweden. The Baghdad bureaucracy is less professional, less well trained, and – to be blunt – less honest than that of any of the OECD countries. But in today’s Iraq, detailed economic planning, coordination, and execution continues to be the responsibility of dozens of ministries in Baghdad. These plans determine in exhaustive detail almost all economic activities from fertilizer consumption by farmers to setting the price for imported automobiles. These plans are executed by almost 200 SOE. In addition to their direct political and economic responsibilities, the SOE provide a means to reward supporters and, by exclusion, punish those who were less than enthusiastic or lack high-level government protectors. Also, SOE provide multiple opportunities for government officials to extract bribes and divert funding for their personal benefit.

In Iraq, almost all of the infrastructure construction and maintenance costs throughout the fifteen non-KRG provinces are paid for by the national government. For example, with respect to the provision of clean drinking water in urban areas, the national government builds the reservoirs, purification plants, and the system of pumps and pipes that will bring adequate quantities of clean drinking water to each consumer. Then an SOE takes responsibility for operation and maintenance of the system possibly charging a small fee – less than the average cost – for the water. This causes several problems.

There is a tendency for a significant portion of the funds dedicated for infrastructure investment to be spent by the ministerial or SOE bureaucracy in Baghdad
on salaries and benefits for its employees. When the national ministry makes the decisions on which water system to build and who shall build it, the primary motivation is often not the welfare of the ultimate water consumer but rather how building the necessary infrastructure can increase the influence or wealth of the ministry or SOE leadership. When construction material is purchased, it will often be from entities that have relationships with ministerial or SOE officials. Hiring is driven more by connections than competency. Promotions are based on the ability to successfully navigate a complex web of political relationships rather than engineering or other competency. Maintaining well-paid employment of ministerial employees is generally more important than consumers receiving adequate clean water.

Thus the national financing of both the fixed and variable cost of Iraqi infrastructure leads to perverse incentives for the bureaucracy. Since Baghdad ministries pay the agencies responsible for providing the “last mile” of public goods from the earnings from crude oil exports (and not from the payments by the customers), they have little incentive to actually meet customer needs. A successful program is one that expended all of its budgeted funds, not one that actually achieved its goals.

Can SOE efficiency be improved? Too often the debate over SOE reform is Iraq treated as a choice between two extremes. One must choose either the status quo or the radical reform of privatizing all SOE. But this is a simplistic view since there are at least six options for Iraq SOE reform. The options are: status quo, better state management of SOE, managerial contracts to allow private management of SOE, public-private partnerships, the privatization of natural monopolies but with detailed state regulation, and complete privatization. As can be seen from Table 2; three of these options assume
continued state ownership, one proposes joint private-state ownership, and the remaining two options are forms of privatization.

Table 2: SOE Reform

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<th>Type of Reform</th>
<th>Ownership</th>
<th>Management</th>
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<td>1 Status Quo</td>
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<tr>
<td>2 Improved State Management</td>
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<td>3 Managerial Contracts</td>
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<td>4 Private-Public Partnership</td>
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<td>5 Regulated Privatization of Natural Monopolies</td>
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<td>6 Complete Privatization</td>
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Current management of firms in Iraqi SOE suffers from ambiguous incentives. The managers are assigned multiple—often contradictory—goals that are evaluated according to bureaucratic not market standards. For example, loyalty will probably be more valued than efficiency. Incentive ambiguity can be reduced in several ways. Large firms can be unbundled so that managers aren’t required either to manage very diverse products lines or to manage product lines that compete with each other. SOE could also be restructured so as to provide factory directors with greater autonomy, to reduce the number of decisions that must be referred to the SOE headquarters or the Ministry in Baghdad. (See the detailed discussion in World Bank 1995, Chapter 5)

Another approach that is often advocated is that a SOE sign a formal agreement or contract with an individual manager explicitly laying out the SOE firm’s goals and means, and providing financial or other incentives for successfully achieving these goals. This individual manager could be a government official or a private sector individual. However, based on a student of over 700 such contracts in thirty-two countries, there are
great differences in the efficiency improvement between contracts with government officials and those with someone from the private sector. (World Bank 1995, 107-108)

Contracts with government officials tend to fail as a result of asymmetrical information, the lack of meaningful rewards for success, and lack of trust in government’s commitment to its agreement. In addition, one would expect that a contract would have the greatest motivational impact on the residual claimant; the claimant who is allowed to keep whatever is left after other contractual parties have been paid. But most performance contracts state that the government, not the manager, is the residual claimant. The additional reward to the public official who successfully manages a SOE may be zero or a very small fraction of the gains from his or her managerial success.

Contracts between a government and a private party to operate a SOE firm have been more successful. In a study of 158 management contracts in fifty countries, a World Bank study found that two-thirds of the firms experienced improvements in both profitability and productivity. (World Bank 1995, 137-8) Unlike performance contracts for government managers, management contracts for private sector managers appear to have a better chance of overcoming the problems of asymmetrical information, adequate risk and rewards, and trust in government’s commitments.

Management contracts tend to have fewer and more transparent performance standards. The private managers are granted greater autonomy and their financial rewards are more closely connected to firm success. Finally, management contracts provide options for the government to improve the credibility of its commitments through long-term contracts with the possibility of renewal. It should be noted that, in addition to the exact terms of the management contracts, Iraq’s economic environment would probably
have a substantial impact on whether there is a measurable improvement in SOE firm performance. Management contracts tend to be more successful when the SOE firm that has implemented a management contract is in a competitive industry – when there are other SOE firms or private sector firms competing for the same customers.

Also, management contracts tend to be more successful when the managers have broad authority to hire, train, and fire workers without government interference. It is expected that allowing SOE private sector managers the necessary authority to prune unnecessary employment, especially “ghost” workers, would be extremely difficult in Iraq. Even in joint-ventures, the GoI has made it very clear that not only are workers not to be fired regardless of performance but also, in some joint-venture agreements, if a worker quits or retires, he or she is to be replaced with the selection of the new employee handled by the Iraq partner.

*Corruption and regulatory hostility constrains private sector*

Corruption is the abuse of public power for private benefit. Corruption occurs if a government official has the power to grant or withhold something of value and – contrary to laws and publicized procedures – trades this something of value for a gift or reward. Corruption is a form of rent seeking. Among corrupt acts, bribery gets the most attention, but corruption can also include nepotism, official theft, fraud, certain patron-client relationships or extortion. (Gunter 2008, Bardhan 1997, 1320-2)

Corruption in Iraq extends from the top to the bottom of official Iraq. Allawi in his excellent discussion of Iraqi corruption went as far as to state that corruption had turned the GoI into a “Potemkin State”. (2007, Chap. 12, 348-368) Ministers responsible for Trade, Electricity, and Oil have been investigated for corruption and several have fled
the country with hundreds of million of dollars. It has been estimated that a third or more of some agencies’ budgets are lost to corruption. (See Sattar, 2012, Al Mendhar 2005, al Rahdi 2007, and Rubin 2008) At the other extreme, there is evidence that the official village grain merchants who are responsible for distributing the monthly food baskets (Public Distribution System) are substituting lower quality items in the baskets and selling the higher quality products.

According to the 2013 Transparency International report, Iraq is not the most corrupt country on earth - that dubious honor belongs to a tie between Somalia and North Korea - but Iraq is in eighth-to-last place ranking 169th out of the 176 countries evaluated. While academics may argue that small amounts of corruption act as a “lubricant” for government activities, the large scale of corruption in Iraq undermines private and public attempts to achieve a better life for the average Iraqi.

Unfortunately, in Iraq, infrastructure investment is riddled with corruption resulting in both higher costs and poor performance. Blackouts continue, pipelines leak, school buildings collapse, roads rapidly deteriorate, and households must boil tap water to prevent infection.

While there are cultural and historical explanations for Iraq’s ubiquitous corruption, the country’s corruption is also a function of bad policy. (Gunter 2013, Chapter 4) Most germane to the discussion of infrastructure investment in Iraq, is the country’s policies toward the regulation of the private sector. According to the 2013 “Ease of Doing Business” survey of the World Bank that is summarized in Table 3, Iraq has one of the most hostile regulatory environments in the world ranking 165th out of the 185 countries surveyed and its ranking has deteriorated over the last several years.
Table 3: Private Sector Regulation

<table>
<thead>
<tr>
<th>Best Business Environment in World has Ranking of 1</th>
<th>Iraq Ranking</th>
<th>Egypt Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worst Business Environment in World has Ranking of 185</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Ranking (out of 185 nations)</td>
<td>165</td>
<td>109</td>
</tr>
<tr>
<td>1. Starting a Business</td>
<td>177</td>
<td>26</td>
</tr>
<tr>
<td>2. Dealing with Construction Permits</td>
<td>84</td>
<td>165</td>
</tr>
<tr>
<td>3. Getting Electivity</td>
<td>46</td>
<td>99</td>
</tr>
<tr>
<td>4. Registering Property</td>
<td>100</td>
<td>95</td>
</tr>
<tr>
<td>5. Getting Credit</td>
<td>176</td>
<td>83</td>
</tr>
<tr>
<td>6. Protecting Investors</td>
<td>128</td>
<td>82</td>
</tr>
<tr>
<td>7. Paying Taxes</td>
<td>65</td>
<td>145</td>
</tr>
<tr>
<td>8. Trading Across Borders</td>
<td>179</td>
<td>70</td>
</tr>
<tr>
<td>9. Enforcing Contracts</td>
<td>141</td>
<td>152</td>
</tr>
<tr>
<td>10. Closing a Business</td>
<td>185!</td>
<td>139</td>
</tr>
</tbody>
</table>


The complexities and expense of starting a new business in Iraq exemplify the GoI’s regulatory hostility towards private business. To legally start a private business in Baghdad requires ten procedures (compared to 6 in Iraq’s Persian Gulf neighbor, the UAE). There procedures require approximately 74 days to complete (8 days in the UAE), cost 81% of the average Iraqi salary (6% in the UAE), and require a paid-in minimum capital equal to 25% of the average salary (0% in the UAE). (World Bank 2013, p. 10) Combined with the difficulty of getting credit for your new business, trading across borders, or resolving insolvency, it should be no surprise that most of the private sector is willing to accept all of the inefficiencies and risks of remaining in the underground economy. While there are no reliable statistics, it is estimated that while about 50% of
Iraq’s total labor force is directly or indirectly employed by the government, only 3% are employed in the legal private sector with almost 20% employed in the illegal underground economy. (Gunter 2013, p. 16)

The lack of a vibrant private sector has several adverse effects on infrastructure investment. Arguing that there are no alternatives, the GoI relies on SOE or foreign firms to execute its infrastructure plans. Without private sector suppliers, SOE tend to have higher costs than otherwise. Also, the absence of private sector competitors tends to reduce the incentive of SOE firms to become more efficient. Finally, the hostile regulatory environment be forcing businesses into the underground economy makes them vulnerable to demands for bribes.
Conclusions

That Iraq needs to spend large sums on infrastructure investment to both repair the damage of three decades of conflict as well as enable the country to profit from increased oil exports is indisputable. However, it will be a challenging expenditures on

The most important infrastructure investment is to build (rebuild?) human capital

Bibliography


Public works infrastructure is "... both specific functional modes – highways, streets, roads, and bridges; mass transit; airports and airways; water supply and water resources; wastewater management;
solid-waste treatment and disposal; electric power generation and transmission; telecommunications; and hazardous waste management – and the combined system these modal elements comprise. A comprehension of infrastructure spans not only these public works facilities, but also the operating procedures, management practices, and development policies that interact together with societal demand and the physical world to facilitate the transport of people and goods, provision of water for drinking and a variety of other uses, safe disposal of society's waste products, provision of energy where it is needed, and transmission of information within and between communities. "Infrastructure for the 21st Century, Washington, D.C.: National Academy Press, 1987."