POTENTIAL OPPORTUNITIES FOR THE UK CONSTRUCTION INDUSTRY IN THE WATER SECTOR

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Many construction industry leaders agree that falling workload, government spending cuts, sustainability issues, increasing energy and resources costs, and decreased capital availability, pose profound strategic challenges for the construction industry in the UK and beyond. However, desperate need for infrastructure development has increased demand for the UK construction industry. The UK water-related infrastructure sector is projected to attract investment worth £4.5bn per annum over the next ten years. Therefore, this sector will become vital to the construction industry over the next decade or so. It is, therefore important to explore the key opportunities available for the UK construction industry in the water-related infrastructure development. This paper is based on review and synthesis of literature, presents the outlook of the UK water industry, key characteristics of the water-related infrastructure, opportunities for the construction industry in the water-related infrastructure and water-related infrastructure procurement methods. It is concluded that it is inevitable that the UK construction industry will see reduced workload arising from the recession and capital spending cuts. However, the need to spend on infrastructure creates opportunities for the industry. The construction industry needs to step forward and develop solutions with the public sector and create new physical infrastructure procurement models that will underpin mutual goals.

Keywords: infrastructure, investment, procurement, public-private partnership, water sector.

INTRODUCTION

The current business environment is novel and has presented many challenges for the UK construction industry. The private residential construction spending rapidly declined more than any recession since the Depression (Chamberlin and Yueh, 2009). The latest forecast by Experian shows the total UK construction workload will fall by 3.6% this year and by a further reduction of 0.4% in 2012 before recovering by 5.1% in 2013 (EC Harris, 2011). According to PwC and Pinsent Masons (2010) report capital budgets across government departments would fall by an average 30% over the period to 2014/15. The transport capital budget, which is seen as a driver for economic growth, will be cut by 11% over the next four years. The Schools Programme will be reduced by 60% in real terms by 2014/15. The cuts in public spending are expected to impact overall gross construction output by 4.5%. As a result, the construction industry is expected to lose up to 100,000 jobs.

Another major concern for the UK construction industry is the cash flow constraint. For instance, the KPMG (2009) global survey revealed that finance for construction

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projects will be a problem: 61% of the survey respondents believed that current economic conditions will prevent the necessary investment and 57% thought that a lack of financing will do the same. Thus, clearly KPMG survey revealed that there is fear of not enough money being invested in construction projects. Capital constraints are affecting not only the price of credit, but also the quantity available as financial institutions ration credit regardless of price.

The UK construction industry is of vital importance, not only because of the sector's size, but also because of its output - the built environment - underpins most other economic activity, as well as contributing to the delivery of the Government's economic, social and environmental sustainability objectives (House of Commons, 2008).

According to the OECD (2007), around the world, governments will need to spend average 3.5% of world GDP annually on telecom, roads, rail, electricity and water infrastructure until 2030 including additions, renewals, and upgrades. Rough estimates from the OECD study suggests that at a global level investments in infrastructure assets amounts to a sum of over USD 60 trillion will be required between now and 2030 in order to improve the key infrastructure facilities around the world in line with requirements. Although the OECD comprehensive study fails to provide details of the assumptions underlying these estimates, there is no reason to doubt the urgency over the need for infrastructure investment (Webber and Alfen, 2010).

The need for maintaining aging and building new physical water infrastructure has grown dramatically around the world in the last decades (Webber and Alfen, 2010). For example, due to underinvestment in Scottish Water infrastructure many Scottish households had drinking water that was contaminated with lead and the quality of the water infrastructure was also very poor with over half of the water mains being more than 50 years old (Bailey, 2002). The key challenges of the water sector include the need to expand access to water and wastewater services, investment in building new, replacing and maintaining ageing infrastructure, and address security and environmental concerns (OECD, 2007). The massive pressure for new water-related infrastructure stems from a conflation of interrelated factors: population increase, migration flows towards cities, deterioration and obsolescence of existing assets, and the globalisation of supply chains (WEF, 2011).

This paper is based on review and synthesis of literature, presents the outlook of the UK water industry, key characteristics of the water-related infrastructure, opportunities for the construction industry in the water-related infrastructure and water-related infrastructure procurement methods.

RESEARCH METHODOLOGY

The aim of this paper is to explore the key opportunities available for the UK construction industry in the water-related infrastructure development. In order to achieve the aim of this paper, a robust research methodology is essential. The choice of research methodology is a crucial and difficult step in the research process (Walker, 1997). Dainty (2007) noted that research methodology in social enquiry refers to far more than the methods adopted and encompasses the rationale and philosophical assumptions that underlie a particular study. These, in turn, influence the actual research methods that are used to investigate a problem and to collect, analyse and interpret data.

This paper is based on review and synthesis of literature. Fink (2010) defines "a literature review is a systematic, explicit, and reproducible method of identifying, evaluating, and synthesising the existing body of completed and recorded work produced by researchers, scholars, and practitioners. Literature reviews usually aim at two objectives: Firstly, they summarise existing research by identifying patterns, themes and issues. This way the literature review provides a starting point for research. Secondly, this helps to identify the conceptual content of the research field and can contribute to theory development (Brewerton and Millward, 2001). The review of literature involved the background study on the UK water industry, infrastructure investment and development, and water-related infrastructure procurement options. The reviewed literature was mainly retrieved from major construction and water industry-related journals, books, internet databases, periodicals, government reports and conference proceedings.

OUTLOOK OF THE UK WATER INDUSTRY

The UK water industry is generally known for its diversity, complexity, universality, reliability, and high quality of service (WEF, 2011). For its excellence and success, the UK water industry is recognised as an international benchmark and it has contributed to some best practices in this sector worldwide. However, water industry has a low profile compared to the other infrastructure sectors such as telecommunications, energy, and transportation (Grigg, 2010). Perhaps the low profile of water is because the sector is fragmented. However, recently its profile is rising because of highly visible social and environmental problems.

The UK water industry employs over 35,000 people. The total revenue of the regulated water industry was £11.35bn in 2009/2010, which represents an increase of 2.3% on the previous year (Water UK, 2010). The water industry in England and Wales accounts for approximately 90% of the total UK water industry. According to Ofwat (2010) the UK water industry has invested about £90bn (in today's prices) over the past 21 years to: improve services; increase environmental and drinking water quality; and maintain and build new critical infrastructure. Because of this huge investment: drinking water quality has improved; leakage levels are 35% lower than they were in the mid-1990s; the companies' compliance with strict environmental standards is higher; and customer bills are 30% lower than they would otherwise have been.

Although the UK water industry has been considered a success, it is undergoing profound and far reaching changes due to its unique drivers including: water scarcity, EU directions, regulations, climate change, demand for high-quality clean water, sustainability issues, aging infrastructure, security, and new information and smart technologies (Means, *et al*, 2005).

In the UK, different business models are used for water and wastewater services. In England and Wales water and wastewater services are fully privatised. In contrast, water and wastewater services in Scotland and Northern Ireland are provided by public operators. According to Deloitte (2009) report the UK water companies have already plucked the low hanging fruits on potential efficiency improvements, mitigating price increases. However, more structural changes are required for the industry to progress. In addition, McKinsey's (2009) report estimate that, to improve water efficiency USD 66.4bn per year on average over the next 40 years will be needed in water demand management. However, with a major capital expenditure programme is looming, water companies will face many challenges in near future.

KEY CHARACTERISTICS OF THE WATER-RELATED INFRASTRUCTURE

The scope of the water sector is complex, owing to its diversity, interactions and synergies with other industrial, commercial and financial sectors, and its international nature (Palaniappan *et al*., 2007). The ubiquitous nature of the industry, combined with high levels of regulation, makes water industry more dynamic sector (Deloitte, 2009). The water-related infrastructure comprises of vast physical assets that help support everyday life and allow a country to operate efficiently. The water-related infrastructure has certain characteristics that make it unique and plays a key role in meeting economic, social, and environmental objectives at both national and international levels (WEF, 2011).

The specific characteristics of the water-related infrastructure sector can be summarised as follows (OECD, 2009; Webber and Alfen, 2010; WEF, 2011):

(1) Governance in the water industry is poor, and until recently, only few countries have recognised water to be a scarce resource.

(2) Requires long-term, large and irreversible investment.

(3) Large-scale constructions projects involve large financial flows.

(4) Decision making in the water industry is difficult because of fragmented nature of the industry.

(5) The economic, social and environmental benefits of adequate access to water are not fully recognised. Consequently, water prices rarely reflect costs.

(6) The size and complexity of water-industry financing required, and the risks peculiar to the water industry, imply not only the need for both private and public sector finance, but also the need to invest on both the demand and supply sides.

(7) High risk sector (cumulates commercial, political, contractual, legal, regulatory and reputational risks).

(8) Water prices have remained much less volatile. Water price volatility is capped because the water market for the most part, unlike oil, is publicly run.

(9) Very heterogeneous sector, with different comparative advantages and capacities to bear risks.

(10) Water and wastewater facilities are mainly underground and difficult to appraise assets.

(11) The high level of sunk investment costs and the decreasing average cost to the operator for each additional household connected to the network mean that the water sector is a natural monopoly.

OPPORTUNITIES FOR THE CONSTRUCTION INDUSTRY IN THE WATER-RELATED INFRASTRUCTURE SECTOR

The perennial challenge for water-related infrastructure development is raising the project finance (WEF, 2011). The lack of available finance is widely regarded as the main constraint for the development of the water-related infrastructure and is typically linked to risks specific to the sector: commercial (tariffs, cash flow, credit risks), political (expropriation, political interfaces, devaluation), legal, regulatory,

contractual, water resources-related (scarcity, flooding, pollution), and reputational. However, as an investment sector, water industry can look seductive because demand for it is certain to grow with population.

According to the Deutsche Bank (2010) report there is a huge need for investment in the global water sector, though the focus varies from region to region. The OECD (2009) reported that for water infrastructure investment around the world, a large gap between what is financed and what is built remains. Furthermore, the OECD (2007) estimates that annual global spending on water and wastewater services will require USD 700bn by 2015, rising to over USD 1 trillion by 2025. Although large and fast-growing emerging economies, such as China or India, will face heavy water investment costs, the same will also be true for the US, Europe and even Japan.

An increasing number of analysts view the high future demands for water-related infrastructure in both developed and developing worlds as an attractive investment opportunity (UBS, 2009). This could be due to the fact that water is a commodity with no alternative and no substitute, which all human activities require and for which analysts suggests that we will face a 40% global shortfall between demand and supply by 2030 (WEF, 2010). Therefore, many large scale investors are interested to invest in water-related infrastructure because of: dwindling supply; soaring demand; no alternative or substitute goods for water; limited competition; and a relative lack of price volatility on revenues due to public-sector regulations on price, making it easy to model the returns and identify key risks.

The water industry uses extensive infrastructure to provide services to customers. This has to be maintained and extended to meets the needs of existing and new population centres. The level of investment in different parts of the industry's infrastructure - water treatment, water distribution, wastewater treatment and sewage treatment - provides the context for its performance in these areas of activity (Webber and Alfen, 2010).

The current performance of the UK's infrastructure, as well as its preparedness to meet present and future challenges, varies across sectors (HM Treasury, 2010). For example, water infrastructure requires ongoing maintenance and renewal to maintain service levels, meet environmental standards and ensure sustainability whereas the energy sector requires increased investment – electricity generation capacity that is going offline needs to be replaced with new low-carbon generating stations (which are more capital intensive) and declining indigenous gas production increases demand for new gas import and storage facilities.

The water-related infrastructure sector includes water; wastewater; flood and coastal defence system; which require new investment of up to £45 billion, or £4.5bn per annum over the next ten years (see Table 1).

Major water infrastructure related projects in the pipeline include (HM Treasurey, 2010): Ofwat's final charges for 2010-2015 allow for £22bn to be invested in the next five years; Thames Tideway tunnel waste water scheme (£2.5bn); and Environment Agency planned capital expenditure of £1.1bn on new and improved flood defences between 2008-09 and 2010-11. Future investments in specific large project like the Thames Tideway, water infrastructure project intended to improve the capacity of London's wastewater system and prevent wastewater overflows, will require approximately £6bn. Other projects like the Anglian Water (£3bn) Seven Trent Water (£3bn), and Yorkshire Water (£3bn) required investment around £9bn in next 10 years (Helm *et al.*, 2010).

Table1: Aggregate water-related infrastructure investment required in the UK between 2010-20

Water sector	Cost (billion)
Water and sewerage networks	£37
Flood and coastal defences	£8
Total	£45

Source: Helm *et al.*, 2010.

Water infrastructure sector in emerging markets is expected to grow considerably. Expanding into fast growing global markets may be good idea for the large UK construction organisations. The global construction market is worth an estimated USD 7.5 trillion today, but is likely to grow to USD 12.7 trillion by 2020 (PwC and Pinsent Masons, 2010). Major markets for the UK construction organisations in the water infrastructure development include but not limited to China, India, the USA, Europe and Gulf States. For instance, according to the OECD (2006) China will need to invest over USD 247bn annually on water and wastewater services by 2025.

WATER-RELATED INFRASTRUCTURE PROCUREMENT OPTIONS

According to Marques (2010) water-related infrastructure procurement models are not very different from the models in other infrastructure sectors. Table 2 presents procurement options available for water-related infrastructure developments.

From Table 2 it is clear that there are three types of procurement models available for water-related infrastructure developments including pure public sector model, public-private partnership models, and pure private sector model. These procurement models vary in terms of level of decentralisation, who owns system assets, who finances investments and who defines the price and level of service (See Table 2).

Developing and maintaining water-related infrastructure facilities, treating raw water, making it available to the public, and managing wastewater are expensive processes. For instance, KPMG (2008) reported that the average capital investment in water projects runs between USD 200 to USD 300 million. Given the level of capital expenditure required, traditionally, the government has been fully responsible for water supply and the development and management of water-related infrastructure facilities. To fund, build, and manage the cost of water infrastructure assets, governments have long used available funding sources from tax revenues, user fees, foreign aids, international lending agencies, issuance of municipal bonds, or pension funds. In many cases, even under the traditional procurement method, the design, construction, operation, and maintenance were carried out by the private sector under different contracts (Tan, 2007).

Jones (2010) has argued that the conventional procurement model does not tap the full range of expertise and funds from the private sector. In addition, shortages of capital funding and rising maintenance costs of ageing water infrastructure, sustainability issues, as well as more stringent environmental standards, have placed many governments in the position of the need to undertake substantial capital replacement, refurbishment, or expansion of their water and wastewater facilities without sufficient available capital (KPMG, 2009). Given the inability of governments to fund massive

investments and faced with the challenge of meeting the Water Framework Directive, and in particular the growing investments required in the sector in order to comply with the EU's Urban Waste Water Treatment Directive and its 2000 and 2005 compliance deadlines have driven the public-private partnership (PPPs) mode of procurement across the Europe (Mandri-Perrott, 2009). Akintoye (2009) define PPP as a contractual agreement of shared ownership between a public agency and a private company, whereby they pool resources together and share risks and rewards, to create efficiency in the production and provision of public or private goods. Jones (2010) noted that profit is the prime motive for private company involvement that PPPs frequently do not offer the best of both worlds, and that involving private sector in water-related infrastructure development has made it harder for governments to uphold public sector values.

Table2: Water-related infrastructure procurement models

	Pure public sector models	Public-Private Partnership models						Pure private sector models
	Fully public	Service contract	Management contract	Affermage / Lease	Concession	BOT	Joint Venture	Full Divesture
Fixed assets ownership	Public	Public	Public	Public	Public/ Private	Public/ Private	Public/ Private	Private
Capital investment	Public	Public	Public	Public	Private	Private	Shared	Private
Commercial risk	Public	Public	Public	Shared	Private	Private	Shared	Private
Operations and maintenance responsibility	Public	Public/ private	Private	Private	Private	Private	Shared	Private
Contract duration	Without duration	Short (1-2 years)	Short or medium (3 – 5 years)	Medium (8 – 15 years)	Long (25-30 years)	Long (20-30 years)	Long or without duration	Without duration
Examples	Scotland water supply	Chennai (India)	South Africa (Johannesburg)	France, Senegal	Jakarta, Manila	China, India	French water supply	England and Wales
Occurrence 1991-2009 (World Bank PPI Database)	Not part of scope	Not part of scope	Together: 111 of 715projects	278 of 715 projects	294 of 715 projects	Not a separate category	32 of 715 projects	Not part of scope

Source: Marques (2010) and World Bank (2010)

There is an array of options for involving the private sector, characterised by a variety of contractual forms. These contractual forms differ in the degree of responsibility and risk transferred from the public to the private sector, include: service contract, management contract, affermage/Lease, concession, Build-Operate-Transfer (BOT) and joint venture. Some governments have embraced concessions and other forms of PPPs to help turn a significant short-term financial cost into a long-term financial proposition for sponsors (KPMG, 2009). Under PPP, for example, a water project delivery and finance methods such as design-build and build-operate-transfer enable government to take advantage of the capital and expertise of the private sector while securing public benefits of water infrastructure systems. The long-term contractual

relationships between public and private entities involve aligning a significant investment of private capital, transferring some risk to the private sector, and increasing the public benefit from public infrastructure. However, critics contend that PPPs are an expensive and inefficient method of delivering infrastructure, and can undermine the capability of government to plan for public interests (Shaoul, *et al*., 2006).

At the other extreme, some governments have opted for an outright sale of the water assets and wastewater services. The principal argument in favour of privatisation is that private companies can go to the stock market and banks for funding and overcome the problems of under-investment that had led to ageing and inefficient water infrastructure (Harris, 2003). World Bank (2004) argues that privatisation of the water industry may be expected to improve efficiency, extend the service, bring in more investment, and relieve governments of budget deficits. The most notable example of this is the sale of water companies in England and Wales. Even though privatisation of publicly owned water systems has received a lot of attention, interest in it has waxed and waned (Grigg, 2010). However, there is a trend towards repackaging privatisation through different means such as PPP initiatives, arguing that PPP offers the same benefits as privatisation (IMF, 2004).

CONCLUSIONS

The changing economic, social, environmental and political environments have presented many challenges for the UK construction industry. Desperate need for water-related infrastructure development has increased opportunities for the construction industry. The scope of the water-related infrastructure sector is complex, owing to its diversity, interactions and synergies with other industrial, commercial and financial sectors, and its international nature. Three different procurement models are used for water-related infrastructure development, include: pure public sector model, public-private partnership models and pure private sector model. These models vary in terms of level of decentralisation, who owns assets, who finances investments and who defines the price and level of service.

It is concluded that the water sector is a low profile, capital intensive, large, diverse, and highly regulated sector. The key challenges facing the water sector include: the need for maintaining aging and building new physical water infrastructure, the climate change, meeting regulations, innovation and ability to adapt to changing business environment. It is inevitable that the UK construction industry will see reduced workload arising from the recession and capital spending cuts. However, the need to spend on water-related infrastructure creates opportunities for the industry. The construction industry needs to step forward and develop solutions with the public sector and create new physical infrastructure procurement models that will underpin mutual goals. Therefore, it is recommended that new procurement models must evolve to allow delivery of the broader long-term sustainability agenda, particularly in relation to climate change issues and to attract long-term, large scale infrastructure investments.

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