

Foresight Studies and Reform Initiatives in Construction: Lessons for Developing Countries

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Abstract

This paper analyses construction foresight studies and construction reform initiatives with a view to identifying lessons for developing countries. It notes the number of construction reform initiatives over the last 60 years, mostly in the developed countries, aimed at reforming the domestic construction industry, and equipping it to be globally competitive. The paper argues that although these studies contain a wealth of knowledge, they are prepared in the context of circumstances unique to developed countries. The paper then distils the lessons from these studies, contextualizes it and makes some observations relevant to a developing country's unique circumstances and challenges. The paper will analyze foresight studies relevant to construction identifying commonalities; analyze global construction reform initiatives identifying commonalities; collate the consistencies and identify issues critical for comparable studies in developing countries; and posit conclusions and recommendations for construction development initiatives in developing countries.

Keywords

Construction, foresight, industry development initiatives, technology, governance

INTRODUCTION

Background

A number of construction industry development initiatives have been undertaken in the past. In the United Kingdom, at least 23 reports have been produced since 1944. The UK reports include the *Simon* report [1944], *Phillips* report [1948-50], *Emmerson* report [1962], *Banwell* report [1964], *Tavistock* reports [1965, 1966], *Large Industrial Sites* report [1970], *Wood* report [1975], *Faster Building for Industry* [1983], *Wells* report [1986], *Faster Building for Commerce* [1988], *Latham* report [1994], *Levene* report [1995], *Egan* report [1998], *Achieving Excellence* [1999], *Achieving Sustainability in Construction Procurement* [2000], *Building a Better Quality of Life* [2000], *A Commitment to People: Our Biggest Asset* [2000], *A Vision Shared: The Movement for Innovation* [2000], *The Housing Demonstration Projects Report: Improving through Measurement* [2000], *Rethinking Construction* [2000], *Better Public Buildings: a Proud Legacy for the Future* [2000], and *Accelerating Change* [2002]. More recently, however, the construction sector in other countries have produced their own reports, including *Vision 2020* [2004] in Sweden, *Finnish Real Estate and Construction Cluster's Vision for 2010* [2001] and *The Construction Industry Technology Strategy* [2001] in Finland,

Construction 21 in Singapore [2002], *Construction 2020 – A Vision for Australia’s Property and Construction Industry* [2004] in Australia, and most recently, the *Inventory of International Reforms in Building and Construction* [2004] in the Netherlands. A *Status Report on Building Culture in Germany* [2001] has also been undertaken, but this report differs in that its focus is the value of a well-built environment. In addition, the International Labour Organisation prepared a report *The Construction Industry in the Twenty-first Century: Its Image, Employment Prospects and Skill Requirements* [ILO: 2001] that focuses specifically on employment issues within the constructors sub-sector. A recent addition to this body of reports is the preparation of foresight studies for the sector. Unlike the reform initiatives that identify current failures with a view to introducing interventions aimed at correcting or minimizing the failures, foresight studies aim to determine a number of future scenarios that can enable the sector to respond more effectively to future events. These reports include *Technology Foresight* report [1995], *Technology Foresight Ireland* [1998], *UK Construction 2010 – the Future Trends and Issues* [1999], *Adopting Foresight in Construction* [1999], and *Foresight: Constructing the Future* [2001].

Need

While the foresight and construction industry development reports identified above were produced in and for developed countries, the construction sector in developing countries experiences similar failures and faces similar challenges to developed countries. In addition, the economies of developing countries have other specific challenges relating, inter alia, to resource, technology and skill scarcity, and high levels of poverty and unemployment. A comparative analysis of foresight and reform studies can offer guidance to developing countries wishing to improve the performance of their construction sector.

Purpose statement

This paper analyses the findings of construction sector foresight and reform reports prepared for developed countries, extracts lessons for developing countries, and prepares observations, recommendations and conclusions relevant to developing countries.

Scope

This paper is limited to the review of specific foresight studies and reform initiatives as more fully described in the section on methods and materials. The paper did not investigate the methodologies used to prepare the reports in either case.

Definition of Terms

For purposes of this paper, the following definitions are used.

Construction sector – *“The Construction Sector comprises establishments primarily engaged in the construction of buildings and other structures, heavy construction (except buildings), additions, alterations, reconstruction, installation, and maintenance and repairs. Establishments engaged in demolition or wrecking of buildings and other structures, clearing of building sites, and sale of materials from demolished structures are also included. This sector also includes those establishments engaged in blasting, test drilling, landfill, leveling, earthmoving, excavating, land drainage, and other land preparations. The industries within this sector have been defined on the basis of their unique production processes. As with all industries, the production processes are distinguished by their use of specialized human resources and specialized physical capital. Construction activities are generally*

administered or managed at a relatively fixed place of business, but the actual construction work is performed at one or more different project sites” [CETA, 2004].

Foresight – The definition of Foresight used is that by Averil Horton [1999], “*Foresight is the process of developing a range of views of possible ways in which the future could develop, and understanding these sufficiently well to be able to decide what decisions can be taken today to create the best possible tomorrow.*”

Industry Development – The Construction Industry Development Board (CIDB) of South Africa defines industry development as “*the deliberate and managed process to optimize the contribution of the construction industry in meeting national construction demand, in promoting national social and economic development objectives, industry performance and competitiveness, and improved value to clients and society*” [Milford et al, 2000].

Methods and Materials

How Raw Data was Obtained

Raw data was obtained from a desktop and literature review of the following specific reports: the *Latham* report [1994], the *Levene* report [1995], the *Technology Foresight* report [1995], the *Egan* report [1998], *Technology Foresight Ireland* [1998], *Achieving Excellence* [1999], *UK Construction 2010 – the Future Trends and Issues* [1999], *Foresight: Constructing the Future* [2001], *Construction 21* [2001], *Finnish Real Estate and Construction Cluster’s Vision for 2010* [2001] and *The Construction Industry Technology Strategy* [2001], *Accelerating Change* [2002], *Vision 2020* [2004], *Construction 2020 – A Vision for Australia’s Property and Construction Industry* [2004], and the *Inventory of International Reforms in Building and Construction* [2004].

How Data was Interpreted

The data was collected and categorized according to the notion of the five types of capital devised in the *Brundtland* report [Edwards, 2002], i.e. economic, social, environmental, technological, and ecological, and a comparative analysis undertaken to identify commonalities and dissimilarities.

AN ANALYSIS OF FORESIGHT REPORTS IN THE CONSTRUCTION SECTOR

An analysis of the findings of construction foresight reports, categorized in accordance with the sources of global resource that require skillful management, highlights the impacts, with probable responses, that possible future developments could have on the construction sector.

Economical Capital

- The decrease in the public funding of infrastructure is likely to continue even though present demand and indications of future growth in population requires an increase in construction outputs, specifically housing. The consequence hereof is a continued deterioration of public infrastructure.
- The sector is likely to come under increasing pressure to integrate the planning of total infrastructure demand, to respond to procurement policies that allow for margins of research and development, and to operate in an efficient and holistic regulatory environment
- The built environment will comprise much of what already exists, focusing the construction sectors attention on maximizing and exploiting the re-use of buildings.

- There will be an increasing recognition of the role of buildings and space as productive assets resulting in a strong emphasis on adding value through design. Designers will need to design facilities that are capable of deconstruction and reuse. Increasing land use restrictions will require the planning of buildings and infrastructure to be more efficient.

Social Capital

- Structural changes in developed societies are due to the shift from an industrial society to an information society, progressive globalization, rapid urbanization, demographic changes and an increase in the number of households and in individuality. These structural changes, driven in part by the revolution in computers, are driving a growing demand for life-time education, skills and training. Future business enterprises will be highly dependent on information sharing, customer-centric thinking, electronic commerce, and co-operation and integration at every level throughout the supply chain. These issues together may increase the risk of inequality and social exclusion, placing greater demands on the quality and efficiency of infrastructure.
- Construction will have to offer more attractive employment in an industry increasingly subjected to external competition. The sector will have to provide healthy, safe and attractive employment conditions that include lifelong education and training together with obligatory registration of the principal parties to the process.
- Customer and society's expectations for efficiency, quality, performance and life-cycle value will drive the competitiveness of the sector. A greater public appreciation of the value of infrastructure to social and economic development must be engendered. To do this, a culture of quality and excellence must be built, using the best technology and being innovative in producing infrastructure that also produces affordable housing and meets the special needs of the economy and an ageing population. One report called upon Government to support the inclusion of construction and infrastructural elements in the curricula of primary and secondary schools.
- The construction sector must be ready and capable to meet the anticipated huge demand for housing.
- The design of construction products in the future will be focused on a specific function and duration with in-built structural flexibility. Design will need to be based on empirical analysis of the client's situation with a concomitant massive increase in design inputs.
- There is a view that construction will need to develop and sustain the tradability of knowledge based and niche elements of construction.

Environmental Capital

- The threat to the sustainability of the physical environment is recognized and the conservation of non-renewable resources, environmental protection, and the destruction of cultural heritage are keywords for the future. A progressive improvement of the contribution to the inherent sustainability of the construction process and the built environment will require the development of associated technologies, skills and practices.

Technological Capital

- The sector will need to become and be perceived to be a competitive state-of-the-art 21st century industry capable of producing efficient and sustainable infrastructure. This requires the promotion of smart buildings and infrastructure. New technologies, intelligent products, standardized, pre-assembled components and advanced materials will be in greater demand. A shift toward more industrial-type product manufacturing is generally expected. The use of bio-and nanotechnologies in the future is predicted.

- In lieu of the growing importance of science, technology and innovation, consideration must be given to the establishment of some form of permanent centre/focus for accessing and transferring of new best practice technologies, with a strong element of industrial ownership.
- Information and Communication Technology (ICT) will be a powerful technological driving force providing customized and integrated information technology throughout the construction process is predicted. A rapid advancement of technology-driven thinking and practice across the whole lifecycle of facilities is predicted.
- Construction will need to track and optimize the benefits of advances in materials technology to construction and infrastructure in order to satisfy the demand for materials that offer improved performance overall.

Ecological Capital

- Climate change will have a significant influence on the production processes of the entire supply chain of the construction sector.

AN ANALYSIS OF CONSTRUCTION INDUSTRY DEVELOPMENT INITIATIVES

An analysis of the findings of construction industry development initiatives, categorized in accordance with the sources of global resource that require skillful management, highlights interventions construction should instigate to in response to past failures.

Economic Capital

- Set performance targets for the sector. Targets should be aimed at reducing capital costs, defects, accidents, improving construction time, predictability, productivity, and turnover and profits.
- Use procurement to drive behavior within the sector. This requires, inter alia, greater professionalism in procurement, public and private, to inculcate good governance practices, i.e. standards of capability, performance and behavior. The adoption of more integrated approaches to procurement including non-price factors in evaluation, the adoption of life-cycle costing or moving in the direction of concession i.e. design-build-operate contracts, and the selection of consortia for 'programmes' of projects, rather than single projects, is urged. Government is requested to adopt a more commercial approach, including the negotiation of contracts on the basis of value for money.
- There are significant opportunities for construction to engage in global markets provided the sector can improve its competitiveness.
- Improve the service to the housing market. Construction must focus on improving the products delivered to the housing market, improving the quality of housing, increasing the flexibility of housing and the development of housing-related services and conservation, especially through the use of new technology in production and service processes
- There are huge opportunities for construction in the refurbishment sub-sector and construction should exploit these opportunities.
- Standardized construction contracts are desired. Such contracts should deal with issues of clarity, fairness, roles and responsibilities, allocation of risk, payment, and better guidance on best practice and legislative changes to simplify dispute resolution and to ensure prompt payment. Short duration contractual relationships are preferred. The sector is urged to promote a single contract.

Social Capital

- Leadership must be provided at all levels throughout the entire construction sector. This includes improving management, showing leadership in the creation of integrated teams, single point of responsibility, partnering, changing relationships, and framework agreements.
- Trust must be restored. Interventions include the use of Codes of Practice and Codes of Ethics, and the development of a common vision for and of the sector. The common objective is to improve the image and overall stakeholder satisfaction with the industry. The sector must accept responsibility for the services delivered, and ensure that they are cost-effective throughout the whole life of the facility.
- Registration and pre-qualification mechanisms are required. Constructors must apply for formal registration against a set of criteria, and pre-qualify before submitting bids.
- Professionalism in the sector must be strengthened. Suggested interventions include enhancing the tertiary curriculum for construction-related studies and aligning design courses with industry needs. Continuing professional development should be obligatory.
- A quality-driven agenda is necessary. This requires the building of a culture of continuously seeking improvement.
- A commitment to people must be made. This requires improvements to the total working environment through, inter alia, the better management of the effects of adverse weather and more off-site prefabrication, improving the health and safety of workers, introducing lifelong training, placing the welfare of the labour force at the centre of the production process, developing a computer literate and highly skilled workforce, showing mutual respect for each other through management and workers acting collaboratively.
- Construction must focus on the customer. The sector is urged to meet clients' needs, including current project initiators, future owners and tenants. The sector should provide a superior quality of customer service through integrated approaches in the delivery process, including design, throughout the whole sector. The fragmentation of responsibilities must be stopped to enhance customer-driven operations and overall efficiency, and to add value to the entire customer chain.
- Redefine the roles of associations and of new information systems, of research, and of regulations. Their role should enhance the development of high standards in the industry.
- The sector must broaden its focus on design. Design decisions should take into account factors such as adaptability of spaces, structural and material life expectation, maintenance demands, fitness for purpose, health and safety, energy and environmental impacts. The design phases should be reworked to support and integrate packaged technical solutions.
- The role of construction industry boards is supported.
- Governments should commit to be a best-practice client, particularly with regard to the preparing of realistic budgets and timetables. Government officials are urged to develop a proper understanding of risk and therefore risk management.

Environmental Capital

- There is a real need for environmental responsiveness. The sector must develop construction products that are energy-efficient, buildings that are classified on environmental grounds and that use new innovative systems for energy production, distribution and consumption, and support extensive research and development investment in sustainable development. Facilities should be whole-life planned, and sustainable construction should include reducing environmental impacts through recycling and material conservation should be added.

Technological Capital

- The sector must establish strategic partnerships to supply sub-assemblies and constructors should strengthen partnering in the supply chain. The product team must be integrated. The sector must achieve single point responsibility from the facility supplier.
- There is a need for new production systems. These systems could include product development, the commercial packaging of products, building components and systems for buildings, off-site manufacture, lean manufacturing, and IT.
- There is significant potential to add value through the embedding of ICT. The sector can add value to premises throughout the delivery chain, from using 3-D modeling throughout the design process to real time contract documentation updating to modeling whole lifecycle of buildings. State-of-the-art information technology and management should be used to undertake construction and product model-based construction design, production and procurement, storage, maintenance and utilization of building product data during the various stages of the facility, intelligent materials, and the employment of monitoring sensors able to communicate whole life performance. Construction should maximize the construction-related business opportunities contained in the use of wireless communication, a variety of applications of e-infrastructure, energy infrastructure, fault tolerance under demanding conditions and the construction of infrastructure for extreme temperatures.

Ecological Capital

- Construction should minimize negative impacts on the natural environment and preserve environmental choices for future generations.

LESSONS FOR DEVELOPING COUNTRIES

In analyzing the interventions suggested in the reports, the following lessons are extracted.

1. Understand and appreciate the role of the sector. This notion recognizes that the physical infrastructure that constitutes the built environment, also underpins human development, is crucial to the economic development of any country – especially developing economies – and is a fundamental component to poverty reduction. In the main, the onus is placed on owners, particularly at government level, to realize that an efficient and profitable construction sector is a key fundamental for national success. However, users too should appreciate the value of infrastructure to their social and economic development. Construction sector participants can make this appreciation more immediate by maximizing and exploiting the effective and efficient re-use of buildings, and by paying particular attention to meeting the housing demand and improving the performance of housing.
2. Establish a shared vision. The core component of the vision should be to make the sector a state-of-the-art 21st century industry.
3. Devise strategies and structures for change. Revisit the respective roles of official and industry associations (including academe and research institutions), strategy preparation and communication, and how individual stakeholders can participate in the change process.
4. Use procurement to drive behaviour. Examine the degree to which procuring bodies can shape industry performance through their ongoing purchasing power, including new contractual and financing systems, the balance between imposed and negotiated requirements, and the entire supply chain delivery process.
5. Monitor and evaluate change. Introduce a monitoring system to determine the extent to which the objectives are being met, and include benchmarking and indicators in its application.

6. Strengthen the regulatory environment. Introduce statutory controls to drive behaviour, although some markets are less amenable to government intervention than others.
7. Recognize the value of human capital. The vision must recognize the need to greatly advance the depth of human capital within the construction sector, and should advocate a number of strategies aimed at attracting skills, encouraging change, training for change, and creating a safe and healthy workplace conducive to innovation and improved productivity.
8. Recognize the value of environmental capital. Although the sustainability of the construction sector and reducing the environmental impacts of construction are common concerns to all the reports, clearly define and separate the two concepts.
9. Recognize the value of technological capital. Recognize the need for the sector to become more innovative and to a greater or lesser extent look to technology as the vehicle. Understand the differences with regard to which technologies these should be, but note the drive toward the greater use of off-site assembly and a more industrially-orientated process. This includes the promotion of smart buildings and infrastructure, new technologies, intelligent products, standardized, pre-assembled components and advanced materials.
10. Step up research and development. The focus of the research and development agenda can vary, and include the current interest in technologies such as biotechnology and nanotechnology.

However, there are a number of observations pertinent to industry development initiatives that are critical to improving the performance of construction in developing countries and that were not included in the initiatives analyzed.

1. Confirm the need for change. This truism requires the construction sector to shift its core focus from process-dominated (supply-side) interventions to product-orientated (demand-side) interventions. For developing countries it is imperative that the beneficiaries of construction sector performance improvements be extended to include society. Include the full structure of the construction sector in industry development initiatives: the structure of the construction sector – and those who add value to it – extends very deeply into the societal fabric of a community. A useful guide to test for inclusivity is to refer to the definition of the construction sector included in this paper.
3. Construction development initiatives must be solidly founded on the principles of good corporate governance, should commit to corporate social responsibilities practices, and abide by a sector-wide code of ethics and code of practice. Although most reports included codes and best practice, the best practice culture (thinking the best and behaving the best) was not linked to good corporate governance. Concomitant issues relating to leadership, professionalism, respect for people, partnerships in the supply chain, integrated teams, and fair contracts are all derived from this foundation.
4. Not surprisingly, the initiatives reviewed fail to address the challenges central to developing societies, and the role of construction in addressing those challenges. However, many of these challenges are central to constructing the future, including recognizing construction's role in contributing to the knowledge economy, developing skills to shape tomorrow, understanding the Millennium Development Goals, directly facing the human rights abuses inherent in contemporary construction practices [ILO: 2001], ending discrimination against women in the sector, improving job quality, engaging with the social issues surrounding the Diaspora including enhancing social cohesion, contributing directly to reducing global warming, and responding to the HIV/AIDS pandemic. Construction has the ability to cross the divide between the first and second economies by employing the disempowered, developing their skills through on-job training, fostering social cohesion, and building an environment that enhances the economic, social and environmental quality of life.

CONCLUSIONS AND RECOMMENDATIONS

Many other industrial sectors, manufacturing in particular, have undergone significant structural changes and product creation improvements. By contrast, the construction practices remain firmly rooted in the building tradition of the Mesopotamian Era. The sector remains configured on the traditional model in which laborers, trades-people, professionals, and clients work in short-term, lowest-offer contractual arrangements that present high financial risk and show a low respect for people, delivering poor quality, over budget and time, with a propensity for legal action. In responding to this challenge, essentially two approaches are available. The first aims to correct past failures, while the second aims to deliver construction outputs that meet future demands. Few manufacturing activities are more future-sensitive than construction. This is because construction outputs, quite distinct from other manufacturing outputs, have such an extraordinary long life. It is therefore critical that industry development initiatives shift the core focus from process-dominated (supply-side) interventions to product-orientated (demand-side) interventions, making full use of new skills and technologies. In summary, strive to do what is right, and then do it in the right manner.

It is recommended therefore that construction sector development initiatives be responsive to the environment in which it operates, both now, and for the likely future. This also happens to be the fundamental principle of good corporate governance and corporate social responsibility. Ultimately, we can conclude that construction sector development initiatives must strive to confirm the legitimacy of construction, i.e. by committing to a new paradigm based on the proper understanding of technology and the principles of good corporate governance.

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