

CIB2007-39

# Defining a Strategic National Agenda on the Theory of Construction for Development

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## ABSTRACT AND KEYWORDS

In exploring the possibility of establishing a theory of construction for development, this paper reviews concepts of theory and theory formulation, contextualises optimal developmental modalities, describes the role of construction within the context of the social contract, and explores postmodern research approaches. The guiding aim is to develop a research agenda that can lead to the formulation of a new theory of construction for development that is a viable alternative to the traditional doctrines which have long dominated construction and development inquiry and practice.

With regard to the theory of construction, the paper finds that where construction theory has been contemporaneously postulated it has explored concepts located mainly in the construction management and production sciences.

Having regard to identifying optimal development modalities, the paper finds that these have formed the substance of substantial debate within global forums, and have culminated most recently in the outcome of the World Summit on Sustainable Development (WSSD), the Millennium Development Goals (MDG). The paper finds that the role of infrastructure, and by implication, the delivery of that infrastructure, is now recognised as a fundamental keystone of development and poverty alleviation.

With regard to the role of construction within the context of the social contract, the paper finds the main idea of construction to be developmental, a potential theory of construction that generalises and carries to a higher level of abstraction the traditional conception of the social contract as found in Rousseau and Kant.

Having regard for the determination of a strategic research agenda, the paper considers postmodern research approaches. The paper constructs a strategic research agenda matrix against the background of optimal development modalities and construction processes. The conclusion is that a strategic research agenda aimed at developing a new theory of construction can provide an effective response to post-millennial developmental issues.

**KEY WORDS****Theory, Development, Construction, Research, Postmodern****INTRODUCTION**

The construction industry is widely criticised for its lacklustre performance: a significant body of published and anecdotal evidence indicates that the construction industry has among the highest rates of corruption; construction projects invariably take longer than planned; overrun budgets; seldom adds value; subject workers to irresponsible and life-threatening risks; manifests variable quality; and generally under-performs as a production entity (Woudhuysen and Abley 2004:1).

One of the reasons forwarded for the undesirable circumstance described above is that there are too many extraneous and variable factors (internal and external) impacting upon the construction production and delivery process. Although numerous reform initiatives aimed at improving construction processes have been devised and, in certain instances, implemented, few of these initiatives were aimed at developing a new theory of construction.

One of the groups advocating the formulation of a new theory is the International Group for Lean Construction (IGLC). Their call for a new explicit theory of construction is predicated on the assumption that the generation of new principles and methods for production more closely aligned with those found in manufacturing will enhance construction industry performance. This paper argues that before a new theory can be developed a strategic research agenda aimed at identifying the inquiry method for theory construction needs to be developed. The paper goes on to suggest what such a strategic research agenda could be.

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, levelling, 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 specialised human resources and specialised physical capital” (CETA 2004:11).

*Infrastructure* – are basic physical assets of a country, community or organisation. These assets are usually referred to as fixed assets (e.g. buildings, highways, bridges, roads, pipelines, water networks, rail tracks, signals, power stations, communication systems etc.) and moving assets (e.g. aircraft, train rolling-stocks, defence equipment, buses, etc.). Both

fixed and moving assets are necessary for any economy to function normally (CIRIA).

## **SITUATING THE RELEVANCE OF THEORY**

Etymologically, the word 'theory' is derived from the Greek 'theorein' meaning 'to look at' although 'theory' has a number of distinct meanings in different fields of knowledge depending on their methodologies and the discourse context. While in common usage the word 'theory' often refers to a conjecture or an opinion, in scientific usage 'theory' is a logically self-consistent model or framework used to describe the behaviour of a related set of phenomena. When theory originates from experimental evidence, it is a systematic and formalised expression of all previous observations that is predictive, logical and testable. For the purposes of this paper 'theory' is a proposed description, explanation, or model of the manner of a set of phenomena, capable of predicting occurrences or observations of the same kind, and capable of being tested through experiment or otherwise falsified through empirical observation.

In *Paradigms and Fairy Tales: An Introduction to the Science of Meaning* (1975), Julienne Ford describes the development of theories as a series of stages beginning with a 'puzzle' which demands a solution. From the moment a researcher begins thinking about the puzzle, the researcher, she argues, is in the business of theory construction. In most cases the germ of the theory is implicit in the researcher's 'hunch' as to where the solution to the puzzle may be found. As the researcher speculates about the variables which may play a part in bringing about the events which constitute the puzzle, so an 'analytical theory' begins to take shape. An 'analytical theory' is a theoretical construction in which possible combinations of elements of an explanation and of the relationships between them are developed. Models may be used to examine the relationship between elements, and relationships of functional necessity may be described without asserting any causal connections between them. The ultimate goal is to produce a full-blown 'explanatory theory' which transcends the analytical theory by identifying all relevant variables and, more importantly, by identifying the causal connections between them. Finally, the testing of a theory (whether analytical or explanatory) involves the generation of hypotheses and their subjection to "genuinely risky tests of truth" by an appropriate research strategy (Best et al, 1979:35).

In a review of her book, Best et al (1979:36) suggest that Ford does not believe that theories emerge by induction, or that she supports the idea that theory construction can be explained solely in terms of the deduction of new ideas from existing premises. According to Best et al, Ford argues that theory construction takes place in the context of a dialectical interplay between induction and deduction – what Ford refers to as the 'retroductive process'. According to Best et al, Ford believes that theories are formulated in the consciousness of the theorist, in which imagination and serendipity play a significant part.

**CONTEMPORARY APPROACHES TO A THEORY OF CONSTRUCTION**

Despite construction's long history, there is a lack of substantial construction theory formulation. Where such theory exists it has more to do with architectural theory, and a later theory of structures. Koskela (undated) argues that insofar as production is concerned, the important functions of a theory have, neither from the viewpoint of research or practice, been realised.

As one of the few protagonists for the development of a theory of construction he submits a vision "that during the next decade, the formation of a theory of construction will be the single most important force influencing the construction industry". He predicates the development of such a theory on two parts, firstly a theory of production in general and secondly, the application of this theory to the characteristics of construction. His methodological intention is to integrate the various existing theoretical strands into a useful theoretical framework which would give direction for further clarification and experimentation and which is applicable also to construction. Koskela goes on to describe how an explicit theory of production will provide an explanation of observed behaviour; contribute to understanding; predict a future behaviour; facilitate the building of tools for analysing, designing and controlling; provide a common language or framework through which the co-operation of people in collective undertakings – like project, firm, etc. – is facilitated and enabled; and give direction in pinpointing the sources of further progress.

For Koskela theory is a 'condensed piece of knowledge'; furthermore, if the theory is explicit it can be constantly tested for validity. He also argues that a theory of production should be prescriptive revealing how action contributes to the goals set to production. These actions include: design of the system; control of the system; and improvement of the system. Notably he submits that the theory of production should cover all essential areas of production, especially production proper and product design. He submits that the significance of the theory is that its application should lead to improved performance.

Koskela argues for the conceptualisation of production from three identified points of view: transformation, flow and value. Thereafter a number of first principles stemming from each can be induced from practice or derived from theory. Critically when looking at the endemic management problems associated with client decision-making, design management and construction management, he notes that they are self-inflicted and caused by the prevailing limited view of production: thus the performance problem is not one of implementation, but the present doctrine itself.

Koskela (2000) submits that the theory of construction should answer three fundamental, interrelated questions:

- What is production in general?
- Which principles should be used for achieving the goals set to production?

- Which methods and tools can be used for translating these principles into practice, taking the peculiar characteristics of construction into account?

The 'puzzle' that this presents is the presupposition that a) there is a causal relationship between construction industry performance and theory; and b) that a new theory should be constructed on a production theory.

## DEVELOPMENT AND THE GENERAL INTEREST

In general terms development is considered a dynamic process of improvement implying a change, evolution, growth and advancement. The Concise Oxford Dictionary's definition places emphasis on change and growth to "make or become fuller, more elaborate or systematic, or bigger" (1982:262). Development as a social phenomenon suggests that people are able to control their future and can improve their condition in the world (living conditions, capacity to feed, education level, life length, etc.) through process towards something better (Skeldon, 1997).

The latter context forms the substance of the theory of the social contract: here one can refer to Thomas Hobbe's *Leviathan* (1651), John Locke's *Two Treatises on Government* (1689), and Rousseau's *The Social Contract* (1762)<sup>1</sup>. While much of the early writings on the social contract had to do with the gaining and respecting of 'civil rights' per se, the value of the social contract in terms of this paper is located in the contract being a means to an end – the benefit of all – and (according to some philosophers such as Locke or Rousseau), *is only legitimate to the extent that it meets the general interest*<sup>2</sup> ([http://en.wikipedia.org/wiki/Social\\_contract](http://en.wikipedia.org/wiki/Social_contract)). Furthermore, since rights come about through agreement when they serve the general interest, it can be argued that development rights too can be expected to meet the general interest. Critically the social contract and the civil rights so gained are neither permanently fixed nor inalienable. Thus, where it can be proved that the general interest is no longer served the contract terms and the resultant rights can be renegotiated.

Setting aside issues relating to individualism versus the collective will, and conventionalism versus contractualism, two critical components arising from the social contract can be identified for the purposes of this paper: the first has to do with the emergence of 'corporate social responsibility', and the second global agreements on development.

Governance, it is now conceded, is not the sole preserve of either government or corporations: governance has to do with how relationships within societies are regulated. A significant characteristic of the globalising world is the dynamic shifting of relationships within the four sectors of

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<sup>1</sup> Reference can also be made to Kant's ethical works beginning with *The Foundations of the Metaphysics of Morals* which, with Rousseau's *The Social Contract*, arguably serve as the definitive of the contract tradition. In addition, Gough's *The Social Contract* and Gieke's *Natural Law and the Theory of Society* provides a useful historical background.

<sup>2</sup> The emphasis is mine (author).

society situated among the citizens at large (business, the institutions of civil society, government, and the media) both intra- and internationally (van Wyk & Chege 2004:89). Since governance occurs in any form of collective action, it underscores strategic decisions regarding direction, participation and capacity. Fundamental to the strategic decisions is the dynamic interplay between core values and management, and operational 'space' i.e. cyber, global, national, organisational, and community. Because this process is so complex and difficult to observe, systems or frameworks are established to define how agreements, procedures, conventions or policies are made and how accountability is rendered.

However, good corporate governance extends beyond the decision-making processes of institutions: an important component of corporate governance is Corporate Social Responsibility (CSR). CSR originates from the late nineteenth century as a consequence of commentators urging the private business community "not to undermine social values through their brand of rapacious capitalism" (Chatterji & Listokin 2007). This led to business leaders like Andrew Carnegie and John D. Rockefeller believing that they were stewards of a 'social contract' between business and society and as such were required – through philanthropy and good management – to hold society's resources in trust in order to increase total social welfare. This notion developed further in the 1960s and 1970s into an institutional philosophy that placed business alongside government, local communities, and religion to collectively enhance society. A variant on the CSR model is Socially Responsible Investing (SRI) that seeks to direct money toward responsible companies and away from those that pollute, treat their employees badly, have poor corporate governance, or operate in dirty industries.

Global developmental agenda and global target setting are also not new: in 1961, governments agreed at the United Nations to aim for an average economic growth rate of 5 per cent per annum during the so-called 'first development decade'. In 1966, the objective was set to eliminate smallpox. In 1992, governments agreed at the United Nations Conference on Environment and Development (the Earth Summit) to the 27 Principles of the Rio Declaration and to Agenda 21. In 1996, governments adopted, at the Second United Nations Conference on Human Settlements, the Habitat Agenda. In 2002, governments agreed at the World Summit on Sustainable Development (WSSD) to the Johannesburg Plan of Implementation, affirmed UN commitment to the full implementation of Agenda 21, and set the Millennium Development Goals (MDGs).

The Millennium Development Goals, which synthesised the previously agreed goals and targets, are 18 numerical and time-bound targets. Achieving them would mean that during the lifespan of this generation, we would achieve gender equality; halve the proportion of people suffering from hunger; guarantee that all children complete primary school; reduce by two-thirds a child's risk of dying before age five; cut by three-quarters a mother's risk of dying from pregnancy-related causes; and halve the proportion of people without access to safe drinking water. While opinions differ as to the validity or otherwise of the MDGs, the fact is that they do represent the

results of a prolonged process of generating a political consensus on the elements of the global development agenda. This view is shared by the South African Government as reflected in the statement of the Minister of Transport that “at the macro level we are guided and assisted by the vision and programmes of action of the United Nations (UN) Millennium development Goals adopted at the World Summit on Sustainable development (WSSD) in Johannesburg in 2002” (Radebe 2005).

We may therefore conclude that increasingly all future development (improvement and advancement) and the nature of the improvement and advancement will be subject to broader societal consensus on the extent to which the benefits serves the greater interest. This consensus will include issues of economic, social and environmental accountability. Thus the consideration of ‘construction for development’ must take place within this theoretical context.

### **SITUATING CONSTRUCTION WITHIN THE GENERAL INTEREST DEVELOPMENT PARADIGM**

Construction is often used as an example when defining the term ‘development’: the *Concise Oxford Dictionary* uses construction to define development, viz. “construct buildings etc. on (land), convert (land) to new use”. However, the ‘improvement’ or ‘advancement’ component of the definition is significantly enhanced by the subsequent words “so as to realize its potentialities” (1982:262). The potentialities within the context of the definition in traditional doctrine would include only the potential of the development itself. However, within the theoretical context set out in the preceding section, the potentialities must also include the benefits to be derived in the general interest. Davis (2000) argues that contemporary buildings – like buildings of the past – are anchored in contexts that are much larger than the industry, and that these contexts affect both the content of the buildings and the conduct of practice. Thus when physical development is considered it must not be confined to the conventional idea of brick and mortar but must develop a new perspective based on the recognition that building is fundamentally a social enterprise; that the nature of this enterprise has changed over history; that it differs from place to place; and that in particular situations it controls the quality of the bulk of the buildings that are built. In applying this new perspective to construction for development the notion that investor’s responsibility cannot be limited to their assets but must include environmental and social stakes in real estate and must be the subject of investor’s benchmarking to prepare property responsible investment practices. Radebe (2005) argues that infrastructure development is “not a socially neutral activity” and that in a developmental state “we must not be dazzled by the brilliance of plans if they do not reflect the legitimate desires of ordinary people”.

The connection between efficient and effective infrastructure and development is now recognised: the World Bank’s ‘Annual Bank Conference on Development Economics (ABCDE) held in Tokyo in 2006 was titled

'Rethinking Infrastructure for Development'. One of the impediments identified at the conference was that the global supply of infrastructure is not able to answer today's needs resulting in a severe mismatch between the need for infrastructure and its supply. The World Bank's rethinking on infrastructure is predicated on two pillars: the first has to do with re-engaging on the lending side, and the second has to do with using knowledge and technical expertise to more effectively mobilise other investments and help create the right economic, financial and regulatory environment for infrastructure investment (Wolfowitz 2006). In his address Wolfowitz called for a development focus not just on economic growth or human growth, but also on smart growth. He defined smart growth as "growth that is economically sound, environmentally friendly, socially acceptable, locally desirable and most important, growth that makes a real difference in the lives of poor people" (2006). That means promoting infrastructure investments that encourage efficiency, are built around smart technological choices, and bring together cutting edge knowledge on infrastructure from both theoretical and practical aspects.

Hillebrandt (1974) argues that construction economics is a branch of general economics insofar as it is about choosing the manner in which scarce resources are and ought to be allocated between all their possible uses. Economists contest whether economics is interested in the end, or just the means. Nonetheless, the economist is required to state the implications of the use of scarce resources in one application against a range of alternative applications. One of the methods for doing this is to employ the Benefits-to-Resources-Used (BRU) ratio. The construction industry is a significant consumer of raw materials locking in enormous capital (Edwards 2002:10). Buildings produce or consume:

- Materials: 50 per cent of all resources globally go into construction
- Energy: 45 per cent generated is used to heat, light and ventilate buildings and 5 per cent to construct them
- Water: 40 per cent of water used globally is for sanitation and other uses in buildings
- Land: 60 per cent of prime agricultural land lost to farming is used for building purposes
- Timber: 70 per cent of global timber products end up in building construction
- Carbon emissions: buildings are the source of nearly 50 per cent of carbon emissions

Since the interest is always scarce resources, the determination of means and ends takes on a new significance in the light of issues such as CSR, sustainable building and construction, and questions of legitimacy (the right to use scarce resources and the general interest).

## **POST MODERN APPROACHES TO RESEARCH**

From the outset it must be stated that this section is both introductory and exploratory given the controversy surrounding the term 'postmodern'.



Besides, postmodern – and poststructural – approaches are not research methods per se: Cheek suggests they are rather ways of thinking about the world that shape the type of research that is done and the types of analyses that are utilised (2000:4). According to Pillow (2000:22), postmodernist approaches continually question the ‘taken-for-granted’ structures of intelligibility, to make visible the foundations of the very categories we are dependent upon – truth, progress, rationality, humanism, gender, and race to name a few – and to consider how such questioning would affect what we research, how we do it, and how we know it.

Research can be described as an active, diligent, and systematic process of inquiry aimed at discovering, interpreting, and revising facts (Wikipedia 2006). This intellectual investigation produces a greater knowledge of events, behaviours, theories, and laws and makes practical applications possible. Basic research, also referred to as fundamental or pure research, has as its primary objective the advancement of knowledge and the theoretical understanding of the relations among the variables. It is also exploratory and often driven by the researcher’s curiosity, interest, or hunch. The terms ‘basic’ or ‘fundamental’ indicate that, through theory generation, basic research provides the foundation for further, sometimes applied research.

However it is within the current philosophy of epistemology – the study of how we know or of what the rules for knowing are (Scheurlich 1997:29) – that postmodern approaches are founded. There are significant philosophical issues surrounding quantitative versus qualitative research methods and the debate over their relative merits dominated first social and later other sciences, including construction management sciences (Wing et al 1998:99 – 104). Scheurlich (1997:2) argues that postmodernist theory challenges all the preconceptions about research methods and suggests that positivist and postpositivist views of research are inadequate from a postmodernist perspective. The main point of contention seems to be about notions of reality: Scheurlich argues that the modernist researcher uses decontextualised monads of meaning to construct generalisations which are used to predict, control, and reform. While these generalisations are said to represent reality, Scheurlich argues they mostly represent the mindset of the researcher. Modernist research, he suggests, does not describe as much as it inscribes (Scheurlich 1997:64). Scheurlich suggests that the positivist perspective – a view that all true knowledge is scientific – attempts to derive rigorous ‘scientific’ rules for creating a one-to-one correspondence between what reality is and how it is represented in research and that how knowing is accomplished does not shape, frame, determine, or create what is known. He goes on to claim that all of the main forms of positivism are now regarded as false (Scheurlich 1997:29).

The strength – and validity – of postmodernism is that it is Western civilization’s best attempt to date at critiquing its own fundamental assumptions, particularly those assumptions that constitute reality, subjectivity, research, and knowledge (Scheurlich 1997:2). All approaches and propositions considered as postmodern question the assumptions embedded within modernist thought. Postmodern approaches can thus be

described, at least in part, as a response to what has come to be viewed as a crises of representation – a challenge to the view that it is possible to represent reality, speak for others, make truth claims and attain universal essential understandings (a decidedly common perspective of Modernist architectural movement).

Postmodern approaches recognise the presence of multiple voices, multiple views and multiple methods when analysing any aspect of reality, including the reality of construction – an approach traceable in the architectural attack on modernism of Jane Jacob's *The Death and Life of Great American Cities* (1961), Robert Venturi's *Complexity and Contradiction in Architecture* (1966), Robert Stern's *New Directions in American Architecture* (1969), *Learning from Las Vegas* by Robert Venturi and his South Africa-born wife Denise Scott-Brown, and Steven Izenour (1972), and Peter Blake's *Form Follows Fiasco* (1974).

### **DEFINING A STRATEGIC NATIONAL RESEARCH AGENDA ON THE THEORY OF CONSTRUCTION FOR DEVELOPMENT**

Having regard for the above arguments, the construction of a strategic research agenda could be predicated on three factors: one, the production processes of construction; two, the resources used; and three, 'benefits' or resources so created. Koskela makes a valid linkage between poor doctrine and weak construction performance: however, the processes of production, the allocation of the resources so employed, and the capital derived need expansion for completeness. A useful analogy in this case could be the Rocky Mountain Institute's Factor Ten Engineering (10xE) project aimed at accelerating reform of engineering pedagogy and practice (RMI 2006). The RMI submits that the 'Next Industrial Revolution' will raise natural resource productivity 10- to 100-fold, and suggests that such radically efficient solutions are possible through integrative design that optimizes whole systems for multiple benefits – not isolated components for single benefits. Thus all construction processes from 'cradle' to 'grave' must be included in the agenda.

Identifying the resources used can be easily satisfied by applying the five types of capital identified in the report of the World Commission on Environment and Development, also known as the Brundtland Commission, after its chair, Norwegian Prime Minister Gro Harlem Brundtland. The report, which pretty much invented the concept of sustainable development and led to the Earth Summit in Rio, was entitled *Our Common Future*. Significantly, the year of the CIB Conference *Construction for Development*, 2007, marks the 20<sup>th</sup> anniversary of the publication. Brundtland define types of capital, namely economic, social, environmental, technological, and ecological. Finally, since construction is about immovable capital formation, the benefits derived can just as easily be measured in terms of the five types of capital.

Placing 'capital' and 'processes' in a matrix therefore generates the following research agenda as depicted in Table 39.2 below.

**Table 39.2** A Strategic Research Agenda Matrix for Construction for Development

Capital Processes	Economic	Social	Environmental	Technological	Ecological
Regulatory					
Typologies					
Morphologies					
Topologies					
Design					
Viability					
Documentation					
Management					
Production					
Operation					
Deconstruction					

## CONCLUSION

The paper argues that the development of a new theory of construction for development could generate a postmodernist doctrine based on new knowledge founded on the ‘social contract’ notion. In this theoretical context construction is a means to an end, where the end is a legitimate allocation of scarce resources in the general interest. Thus, the acceptability of what construction delivers is inseparably linked to satisfying the legitimate aspirations of ordinary people.

However, before a new theory can be developed, a strategic research agenda aimed at identifying the inquiry method for theory construction needs to be developed. Despite the controversy around the concept of ‘postmodernism’, the paper posits that such research approaches should be postmodernist insofar as it continually questions the ‘taken-for-granted’ structures of intelligibility, makes visible the foundations of the very categories we are dependent upon – including truth, progress, rationality, humanism, gender, race, ethics – and considers how such questioning would affect what we research, how we do it, and how we know it.

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