THE CONSTRUCTION SECTOR SYSTEM APPROACH: AN INTERNATIONAL FRAMEWORK

CIB Report ISBN 90-6363-039-5 Publication 293

W055
Building Economics

W065
Organisation Management of Construction

The Construction Sector System Approach: An International Framework

Report by CIB W055-W065 "Construction Industry Comparative Analysis" Project Group

CIB Publication No. 293

ISBN 90-6363-039-5

Editor:
Jean Carassus
Centre Scientifique et Technique du Bâtiment - Paris

Published by:
International Council for Research and Innovation in Building and Construction
CIB General Secretariat
Post Box 1837, 3000 BV ROTTERDAM
The Netherlands
E-mail: secretariat@cibworld.nl
http://www.cibworld.nl

April 2004

Contents

INTRODUCTION

The contents of this report present an innovative and exciting approach to analysing the operation and function of the construction sector within the economy.
The basis for the report arose from the initial ideas put forward by Jean Carassus in 1999 for the development of a framework for the analysis of the entire construction sector of the economy – the *mesoeconomic* or *sector system* approach. Due to his enthusiasm, Jean's proposal for a mechanism to test the framework led to the setting-up of an international group of economists concerned with this task.

A Project Group was set up, in 2000, by Working Commission W55 (Building Economics) and W65 (Organization and Management of Construction) of the CIB (International Council for Research and Innovation in Building and Construction). The membership of the Group was also drawn from a team working in the CIB Task Group 31 (Macroeconomic Data for the Construction Industry), as it was recognised that the proposed mesoeconomic approach supplements existing methods of viewing the industry in order to cover the entire construction sector.

The approach was subsequently tested in nine diverse countries and the case studies presented in this book are presented on a country-by-country basis. Each individual study deals with the specific situation and characteristics in that country giving a description and analysis of the system. The concept of the economic *sector system* presents a unifying approach but, taken together, the case studies present a fascinating overview.

The international comparison and general conclusion of the text summarises the key findings from the nine countries and illustrates the value of the *mesoeconomic* approach.

The report required three years and many meetings in Paris and Salford for its preparation and, on behalf of Jean and myself, I should like to thank the other writers of the chapters for their valuable contributions and Laurence Dubois for the formatting of the work.

Les Ruddock

CHAPTER I

FROM THE CONSTRUCTION INDUSTRY TO THE CONSTRUCTION SECTOR SYSTEM

Jean Carassus
Centre Scientifique et Technique du Bâtiment
Paris - France

Is the construction industry now playing a new role within the economy of developed countries? It is no longer focused on large-scale production but on the services provided by the built environment. This evolution calls for a new approach for the construction industry provided by "construction sector system" analysis.

A new role for construction within the economy?

The economic growth experienced by most developed countries between the late forties and the beginning of the seventies was succeeded by a recession lasting until the beginning of the nineties in the United States and until the end of the decade in Europe. This period of recession was a time of transformation.

In the general evolution of the economy, what kind of transformation did the construction industry in developed countries face during those changing times ? Between the late nineteen forties and the beginning of the seventies, the role of the construction industry was to complement the significant and relatively regular economic growth through the massive development of housing projects, non-residential buildings, and civil engineering infrastructures.

The dimension of the construction stock developed within the growth phase has become highly significant in several developed countries. Recently, the refurbishment and maintenance works of such stock in France, the United Kingdom, Italy and the Scandinavian countries, amount to approximately half of the construction firms' business, including civil engineering projects (Carassus, 1999).

Furthermore, both firms and public authorities have turned the upgrading of their stock management into an area of increasing concern. The quality and the reasonable cost of the service rendered by their buildings and civil engineering infrastructures have become of the essence. The popularity gained by the "Facilities Management" trend translates this concern, while the professionalization of in house building management or the outsourcing of this management are being fostered.

The expansion of processes not only in charge of production but also built environment management, over long periods of time, reflects the same evolution. In fact, several mechanisms such as Private Finance Initiative (PFI), Private and Public Partnership (PPP) have been created to foster such a trend. Such evolution is all the more marked as the profitability of service activities related to maintenance and management is higher and less cyclic than construction site activities.

Therefore, did the change faced by the construction industry in the nineties change its role within the economy? While during the 1950-1970 period, the goal of construction was to massively build all the works necessary to meet the needs of the economy, since the nineties, is the emphasis not placed on the *management of the service rendered by such works all along their life cycle?*

The requirements of sustainable development, which focus on the need to increasingly master medium and long-term consequences, not only regarding production, but also management of the works during their whole life cycle have strengthened this change of role within the economy. This focus on the service rendered by the works calls for a new approach for the construction industry.

Economic analysis has to take into account such recent evolution and all the participants involved in the life cycle of building structures (not only order, design, production but also operation, maintenance, refurbishment, demolition). Most of the time, construction industry analysis, on mesoeconomic or sector level, deals with only the construction firms. Some researches include professionals and the materials industry but not the service aspects and the stock management firms.

The aim of this work is *to propose a new framework for a mesoeconomic analysis of the construction industry including service, management and stock aspects. This framework has been tested in nine developed countries.*

Mesoeconomics : An unusual approach

Mesoeconomics is the intermediate level (in Greek, meso means “median”) between the microeconomic one and the macroeconomic one (Holland 1987). Microeconomics deals with individuals and firms being profitable in a market of scarcity. Further, it explains how actions of all buyers and sellers determine prices and how prices influence the decisions and actions of individual buyers and sellers (Perloff, 2001).

Macroeconomics operates on a national economy level and deals with relations between average prices, employment, income, production, and the effects of taxes, government spending and budget etc. (Parkin et al, 2000). The mesoeconomic approach may be considered as a supplement and not a replacement to the traditional analysis of micro- and macro-economics (Preston, 1984).

Mesoeconomics deal with entire sector economies and puts focus on industry structure in developed economies as well as the political dimensions of economic development and policy formation (Preston, 1984). In Table 1 the main elements of mesoeconomics are simplified and visualised in comparison to micro and macroeconomics.

Table 1: Micro, Meso and Macroeconomics

	Areas and Topics	Elements of Analysis
Microeconomics	Households	Demand theory
		Cost and production theory
	Firms	Market and price theory
		Competition theory
	Markets	Distribution of income
Mesoeconomics	Industries	Theory of economic structure and change
	Regions	Regional economics
		Environmental economics
	Groups	Theory of groups and associations
		Economic theory and politics
Macroeconomics	Macro-aggregates	National economic accounts
		Economic stability and growth
	Total economy	Monetary theory
		International trade
		Macroeconomic distribution theory

(Peters, 1981)

In English economic literature, one of the first economists to explicitly propose a mesoeconomic analysis, adheres to the tradition embodied in the work of Joseph Schumpeter (Cole, 1968). Then Michael E. Porter demonstrates that the structure of the sector has a vital influence on the way the rules of competition are determined (Porter, 1980). The mesoeconomic approach is also at the heart of the work of economists analysing the mechanisms of sectors governance (Hollingsworth et al., 1994).

In French economic literature, an industrial mesoeconomic approach was very active in the seventies and eighties (Barrère, 1978, Aréna, 1983, Marchesnay, 1983, Morvan, 1991, de Bandt, 1989, 1991). The sectorial dimension is also well represented in the institutional macroeconomic approach (Boyer, 1990, du Tertre, 1995, Saillard, 1995, Gilly, 1997).

Research in the English language on construction often analyses the way the construction firm operates within the sector's particular environment (Hillebrandt, 1985, Briscoe, 1988, Manser, 1994). Experts' reports are centred on the relationship between the construction firm and its client and the designer (Latham, 1994, CIB, 1997, Egan, 1998). The approach in terms of a supply chain integrates materials manufacturers (London and Russell 1999). Studies dealing with the construction industry (Finkel, 1997), occasionally include industry professions (Ball, 1988). Studies also deal with the relationship between the level of construction activity and the level of economic development (Bon, 1997, Ruddock, 1999) or link up with the national economic structure on the basis of input-output econometric models (Bon, 2000). Overall or cluster approaches are rarer (Atkins, 1993, AEGIS, 1999, Ive and Gruneberg, 2000 a and 2000 b).

Studies in the French language deal with the construction industry taking into account in particular the problem of land (Ascher and Lacoste, 1972, Lipietz, 1974), on-site work processes (Campinos-Dubernet, 1984, 1996, du Tertre, 1989, 1991) and demand

(Berthier, 1992). Some studies, using the notion of production chain, have stressed the technical dimension (Chemillier, 1977), the development aspect (Vincent, 1986) or are based on an overall approach (Boublil 1980, Carassus, 1987).

The “construction sector system” approach : An analysis different from the construction industry one

The mesoeconomic method proposed consists of studying a system implemented by economic and participant institutions to solve a production issue concerning socially necessary goods or services. The method consists of using a unifying concept, the "*economic sector system*", to study the system implemented, and in applying a mesoeconomic method of analysis based on the notions of *aim of the construction activity, shaping characteristics, groups of activities, profit formation, fragmentation, operational configurations of players and institutional regulations* (Carassus, 1998, 1999).

Table 2. Main differences between construction industry analysis and the construction sector system approach

	Construction industry analysis	Construction sector system approach
The industry aim	To build buildings and infrastructures	To produce and to manage the services provided by the structures throughout their life-cycle
Role of the existing stock	Not taken into account	Very important role of the existing stock: - Weight of the stock - large part of the repair & maintenance works - Important role of stock management
Shaping characteristics	Prototype Site	- Diversity and heterogeneity of orders - Immobile products (prototype, site)
Activities	Construction firms	- Stock management firms - Project/site (clients, engineering, construction) firms - Industry (materials, machinery) and distributors
Profit formation	Depending on cycles	- Stock management: recurrent, non cyclical, high - Project/site: cyclical, low - Industry: depends on the industry, linked with the cycle
Fragmentation	Weight of SMEs and self -employed	Differentiated fragmentation depending on: - Fragmentation of the order - Degree of technical complexity - Capital intensity
Processes	Especially new construction	Three kinds of operational configurations of actors: - Production - Production & management - Management
Institutional regulations	Often taken into account	- Structures regulations (building permits, construction codes, product and service certification) - Firms regulations (firms standards, labour management, prices) - Environment of the firms' regulations (procurement methods, funding, tax, R&D support, education and training).

The aim of construction activity

What is the aim of the construction activity? The most common answer to this question is building. In addition, the object of economic interest is often what is generally known as the "act of building". This answer is, however, too limited. The productive issue to be solved by construction is more wide-ranging and represents a considerable economic and social challenge. It is a question of producing and managing the living and working environment of a whole population. The entire built environment, as distinct from the natural environment, falls into the field of activity of construction. Building environment is not the only activity in this field. There is also management, maintenance, improvement, demolition, reconstruction, etc.

A first hypothesis made about construction is that its principal aim is not to produce and manage necessary structures for people's living and working environment, but rather *to produce and manage the services rendered to end users by these structures throughout their physical life-cycle* (production, use, improvement, through to demolition).

The notion of the economic sector system applied to construction

Mesoeconomic literature offers several possible unifying notions: sector, production chain, economic meso or sector system, industry cluster. The notion of sector, defined as an economic sub-group uniting firms with the same core business, is very useful but too limited in relation to a research subject dealing with the entire system set up to solve a complex productive issue.

The notion of the production chain, defined as a series of successive production stages linked by commercial exchange fluxes where production technology plays an essential part (Morvan, 1991), is centred too exclusively on production and techniques to analyse a complete system with varying production techniques, the aim of which is not to build structures but to produce and manage the services structures provide.

The notion of the economic meso or sector system is the most adequate for this. Following de Bandt (1991) and Gilly (1997), and taking into account the observations of Boyer (1990), Saillard (1995) and du Tertre (1995), an economic sector system can be defined as a complex system of organised commercial or non-commercial relations between participants, having the capacity to solve a productive issue relating to a type of goods or services. An economic sector system consists, on the one hand, of participants producing this specific type of good or service and, on the other hand, of institutions responsible for regulating the individual and collective behaviour of the participants involved in production.

The construction economic sector system can be defined as *the organised complex of commercial and non-commercial relationships, between productive and institutional actors, taking part in the production and the management of services provided by the structures used, throughout their life cycle, as the living and working environment of a population.*

The economic sector system as applied to the construction sector is close to the concept of “construction product system” suggested by Australian industrial economists (AEGIS, 1999).

The two main characteristics shaping construction activity

The mesoeconomic approach, when applied to an activity, often highlights one or several important features structuring this activity. A characteristic is said to be structuring insofar as it may determine production conditions, products, demand, markets and institutions. The characteristic often retained in mesoeconomic analyses is the dominant production technique, in the analytical framework in terms of "one sector, one technique".

In the case of construction, the following characteristics are mentioned: the physical nature of the product, the structure of industry, the factors determining demand and price (Hillebrandt, 1985), the specificity of “merchant producer” builders in the construction sector (Ball, 1988), the demand for single structures, the diversity of clients (Briscoe, 1988), the importance of improvement-maintenance, the assembly process on-site at the structure's place of use (Manser, 1994).

Other authors mention the geographical dispersion of worksites, the derived nature of demand (Gruneberg, 1997), the long life expectancy of structures, uninformed users (Atkins, 1993), the variability of work on a construction site (Campinos-Dubernet, 1984), the heterogeneity of production and techniques (Du Tertre, 1989), three very distinctive economic logics regarding orders, households, firms and government (Berthier, 1992).

From these characteristics, it is clear that production technique is not the structuring characteristic. But is there one (or several) characteristics, which tend to structure the whole? A second hypothesis about construction is that two characteristics are in particular decisive: *the orders for these products present an extraordinary diversity and heterogeneity* and *products are localised and static on a site*. Other elements characterising construction tend to be determined by these two structuring particularities.

Firstly, the diversity and heterogeneity of orders, is very important. An order, by definition, is always localised on a given site and concerns construction, improvement, transformation, repair, maintenance, management of structures (dwellings, offices, shops, factories, schools, roads, bridges, tunnels, etc.) participating in the living and working environment of the population. The origin of this type of order is very diversified: households, SMEs, large companies, local authorities and central government. The same sector system must be able to repair a washbasin tap as well as satisfying a demand for funding, designing, implementing and managing a giant tunnel under the sea.

Construction is the only production process in which products are static on a site. The consequences of this particularity are considerable: structures are prototypes adapted to each site and environment; firms do not control structure design; the products produced by the industry are implemented and assembled on an itinerant site; the structures have a very long life and are adaptable to evolving demand; institutional rules play an essential role.

A third hypothesis about construction is that, in the more developed countries, sheltered from war for over 50 years, *the stock of existing construction, its optimisation and*

renewal, has become a central issue of construction activity. A significant indication of this evolution is the major role played by improvement and maintenance work in the construction activity of a large number of more developed countries.

Three groups of activities

The construction economic sector system is made of segments, which are professions or sectors. These segments are part of the groups of activities. In construction, there are three main groups of activities.

The first group of activities concerns the *continuous management of the existing stock of structures*. Continuous management is a three-dimensional service activity: asset management (strategic stock management by decisions to purchase, sell, renovate, demolish, build); property management (heavy renovations and administration), facilities management (managing services provided to the final user, care taking, operation, everyday maintenance). Profit in this first group of activities is recurrent, not dependant on the cycle and may be at a high level. For ease of purpose, we associate this activity with another form of service activity: real estate activity, purchasing and selling new or existing buildings.

The second group of activities concerns the *short-lived design and complex production assembly on itinerant sites*. This group of activities covers on the one hand service activities involving project management (order, design, co-ordination and control of structure construction and renovation operations) and, on the other hand, implementation and assembly activities on itinerant sites of industry-produced elements. Profit in this group of activities is volatile, depending on the construction cycles and for the construction firms often low.

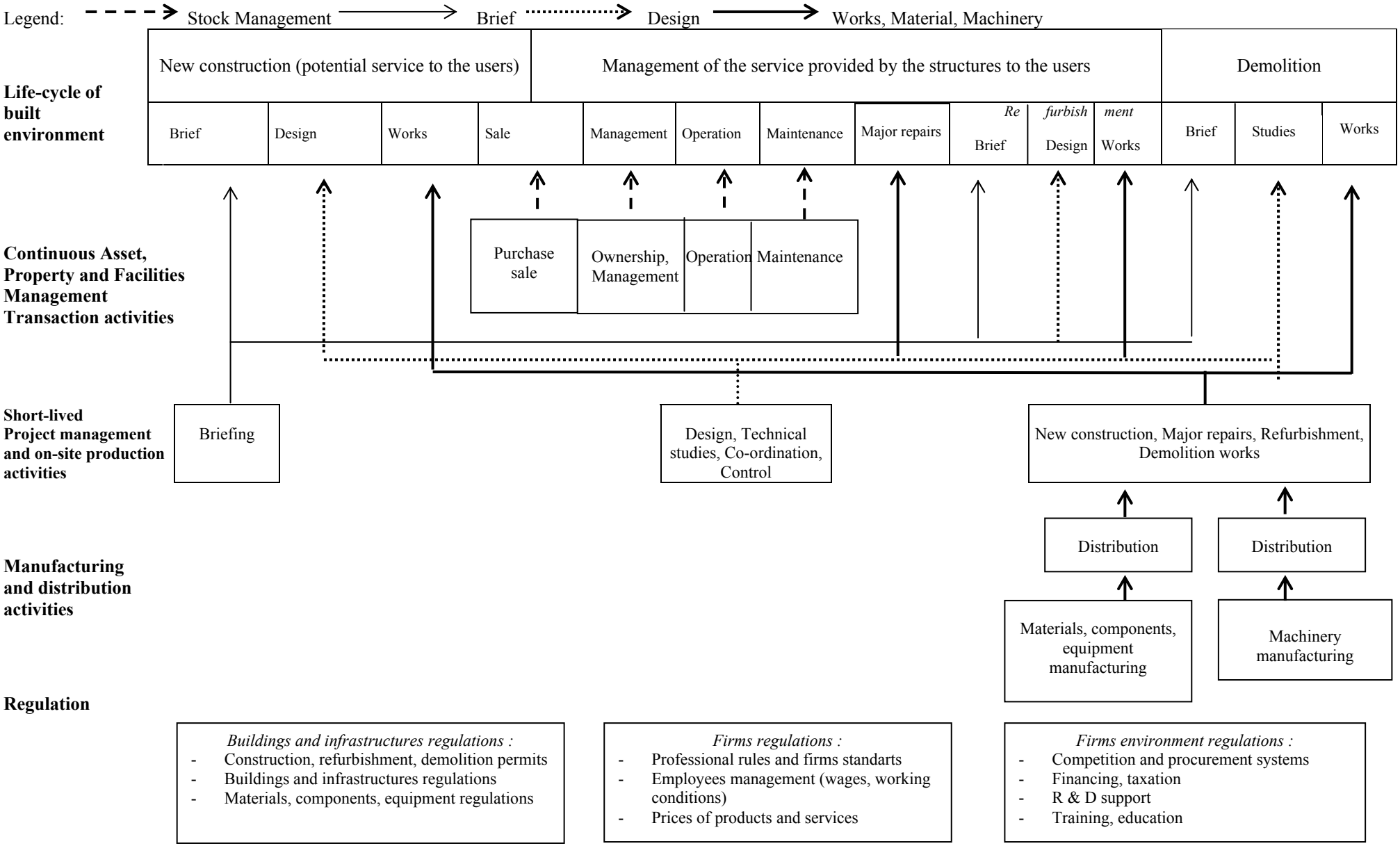
The third group of activities is focused around the *industrial production and distribution of materials, components, equipment and plant* implemented, assembled, installed by construction firms on worksites. Profit in this third group of activities depends of the industry and is often linked to the construction cycles.

Figure 1 sums up the main functions and regulations taken into account in this construction sector system approach.

A characteristic of the construction sector system is its fragmentation into a large number of segments, themselves composed of numerous small and medium-sized companies.

A fourth hypothesis is that *fragmentation is determined in particular by three factors: fragmentation of the order*, *the degree of technical complexity and the capital intensity of the activity*. Depending on the situation of the sector system segment in relation to these three criteria, the segment will be more or less fragmented into a large number of companies. This is thus a differentiated fragmentation. One of the forms this fragmentation may take is the eventual existence of construction sub-systems determined by the nature of the structures, their complexity, the type of market and the size of the construction firms.

Figure 1. Construction industry sector system: the main functions and regulations (Simplified diagram)



Operational configurations of players

In reality, the construction sector system is implemented within the framework of operational configurations of players, or "construction business systems" (Winch, 2000), participating in structure production or management. For all structure production or management, a configuration of players is set up, forming an organised system of operational relationships, and determined more particularly by the clients' procurement methods for works or services.

This notion of a configuration of players is close to the concept of the " supply chain " (London and Kenley, 1999), but this latter term seems to be used mainly for structure production rather than management. The concept of a configuration of players creates a direct link with microeconomics, centred on the company and its relationships with its partners.

A large number of institutional regulations

Due to the fact, in particular, that structures are static on site, with all the implications for users and neighbourhood, the sector system is mediated by a large number of institutional regulations. These regulations may concern the structures (building permits, construction codes, product and service certification), the firms (firms standards, labour management, prices), the environment of the firms (procurement methods, funding, tax, R&D support, education and training). They are defined and applied by a complex system of public institutions (international, national, regional, local) and private institutions (industrial, unions, consumer organisations).

Table 3 sums up in a schematic matrix the main types of regulations and institutions concerned in the sector system approach.

Table 3. Institutional participants and main types of regulations (schematic matrix)

	Buildings and materials			Firms			Environment of the firms		
Regulations / Institutions	Construction permits	Rules concerning structures	Rules concerning materials	Professional rules and firms standards	Safety/security and personnel management	Agreements on price and quality of products and services	Competition and procurement systems	Financing Taxation	R & D support Education
International institutions									
Government									
Local authorities									
Clients, industrial, professional organisations									
Trade unions									
User Associations									

The implementation of the sector system approach in nine countries

A Project Group was proposed in 1999 to the CIB (International Council for Research and Innovation in Building and Construction) to implement this approach in nine countries: Australia, Canada, Denmark, France, Germany, Lithuania, Portugal, Sweden and the United Kingdom[1].

This sector system approach is more suited to application in developed countries. On the one hand, the importance of the existing stock is not high in developing countries where the main aim of the construction industry is to create buildings and infrastructures stock. On the other hand, the weight of the informal part of the construction activity is so high that another methodology has to be used to analyse it. However some aspects of the proposed approach may still be useful for developing countries construction industry analysis.

The nine national study cases are now presented. In the concluding chapter, similarities and differences between the countries are examined.

REFERENCES

- AEGIS (1999) *Mapping the Building and Construction Product System in Australia,* Department of Industry, Science and Resources, Canberra.
- Arena, R. (1983) Méso-analyse et théorie de l'économie industrielle : in *Economie industrielle, Problématique et méthodologie*. Association pour le développement des Etudes sur la Firme et l'Industrie (ADEFI), Economica, Paris, pp. 21-40.
- Ascher F. and Lacoste J.(1972) *Les producteurs du cadre bâti* , Tome 1 : *Les obstacles au développement de la grande production industrielle dans le secteur du BTP* ; Tome 2 : *Le développement des " mobiles homes " aux USA* ; Tome 3 : *Les entreprises de BTP*, Université des Sciences Sociales de Grenoble, Grenoble.
- Atkins (1993), WS Atkins International, *Strategies for the European sector construction*, European Commission, Directorate General III/4173/93, Brussels.
- Ball, M., (1988) *Rebuilding Construction, Economic change in the British Construction Industry*, Routledge, London.
- Barrère, A. (1978) Propositions sur la constitution d'une méso-analyse, In *Hommage à François Perroux*, Presses Universitaires de Grenoble, Grenoble, pp. 99-119.
- Berthier, J. P., (1992) " Une analyse sur 20 ans de l'activité du bâtiment travaux publics ", *Économie et Statistique*, 253, Institut National de la Statistique et des Études Économiques, Paris.
- Bon, R. (1997) *Whiter global construction ?* ECERU Opinion Surveys, 1992-1997, Reading.
- Bon, R. (2000) *Economic Stucture and Maturity, Collected papers in input-output modelling and applications.* Ashgate, Aldershot.

[1] The « Construction Industry Comparative Analysis » CIB Project Group is a joint group of CIB Working Commissions n°55 "Building Economics" and n°65 " Organization and Management of Construction ". The Project Group works in close relationship with CIB Task Group n°31 "Macro-economic Data for the Construction Industry".

- Boublil, A. (1980) *Construction, cadre de vie et croissance*, Presses Universitaires de France, Paris.
- Boyer, R. 1990, Les problématiques de la régulation face aux spécificités sectorielles, Perspectives ouvertes par la thèse de Pierre Bartoli et Daniel Boulet, *Cahiers d'économie et sociologie rurales*, 17, Paris.
- Briscoe, G. (1988) *The Economics of the Construction industry*, Mitchell, London.
- Campinos-Dubernet, M. (1984) *Emploi et gestion de la main d'œuvre dans le BTP, Mutations de l'après guerre à la crise*, Dossier N°34, Centre d'Études et de Recherches sur les Qualifications, Paris.
- Campinos-Dubernet, M. (1996) Le BTP secteur spécifique ? Une comparaison européenne. In *L'innovation en chantiers*, Plan Construction et Architecture, Paris La Défense, pp. 15-24.
- Carassus, J. (1987) *Économie de la filière construction*. Presses de l'École Nationale des Ponts et Chaussées, Paris.
- Carassus, J. (1998) Production and management in construction, An economic approach (bilingual). *Les Cahiers du CSTB,* 395, Paris.
- Carassus, J. (1999) Construction system : from a flow analysis to a stock approach. In *Macroeconomic issues, models and methodologies for the construction sector* (edited by L. Ruddock), CIB, Publication 240, Rotterdam pp. 17-29.
- Carassus, J., 2000. A meso-economic analysis of the Construction Sector. In *CIB W 55-W 65 Joint Meeting Proceedings.* The University of Reading.
- Carassus, J., 2001, Innovation and Construction industry Meso-system Analysis. In *CIB Innovation to aid performance Proceeding.* April. Wellington.
- Carassus, J., 2002, Construction sector system and innovation in stock management. In *Construction Innovation and Global Competitiveness,* Uwakweh, Ben O., Minkarah, I.A., CIB 10th International Symposium, CRC Press. USA.
- Carassus, J., 2002, *Construction : la mutation. De l'ouvrage au service*. Presses des Ponts et Chaussées. Paris.
- Chemillier, P. (1977) *Les techniques du bâtiment et leur avenir*, Éditions du Moniteur , Paris.
- CIB (1997) *Future organisation of the building process*, W 82 Report, International Council for Building Research Studies and Documentation, 172, Rotterdam.
- Cole, A.H. (1968) Mesoeconomics : A contribution from Entrepreneurial History. *Explorations in Entrepreneurial History,* Second series, 6, 1. University of Wisconsin, pp. 3-33.
- de Bandt, J. (1989) Approche méso-économique de la dynamique industrielle *Revue d'Economie Industrielle* , 49, Paris.
- de Bandt , J. (1991) La filière comme méso-système. In *Traité Economie Industrielle* (edited by Arena et al.), pp. 232-238.
- du Tertre, C. (1989) *Technologie, flexibilité, emploi, Une approche sectorielle du post-taylorisme*, L'Harmattan, Paris.
- du Tertre, C. (1991) Procès de travail de type chantier et efficacité économique : le cas du BTP français. In *Europe et chantiers, Le BTP en Europe : structures industrielles et marché du travail*, Plan Construction et Architecture, Paris La Défense, pp. 119-137.

- du Tertre, C. (1995) La dimension sectorielle de la régulation. In *Théorie de la régulation, L'état des savoirs* (edited by R. Boyer and Y.Saillard). La Découverte, Paris, pp. 313-322.
- Egan J.(1998) (Chairman of the Task Force). *Rethinking construction*, Department of the Environment, Transport and the Regions, London.
- Finkel, G. (1997) *The Economics of the Construction Industry*, M. E. Sharpe, New York.
- Gilly, J. P. (1997) Dynamiques méso-économiques et régulation macro-économique : quelques pistes de réflexion. In *Firmes et économie industrielle*. (edited by Christian Palloix and Yorgos Rizopoulos), L'Harmattan, Paris, pp. 39-54.
- Hillebrandt, P.M. (1985) *Economic Theory and the Construction Industry,* Macmillan, London.
- Holland, S., 1987. *The Market economy, From Micro to Mesoeconomics*. Weidenfeld and Nicolson, London.
- Hollingsworth J. R. et al. (1994) *Governing Capitalist Economies, Performance and Control of Economic Sectors.* Oxford University Press, New York.
- Ive, J. and Gruneberg, S.L. (2000 A) *The economics of the modern construction sector,* Macmillan. London.
- Ive, J. and Gruneberg, S.L. (2000 B) *The economics of the construction firm,* Macmillan.
- Latham, M. (1994) *Constructing the Team, Industry Review of Procurement and Contractual Arrangements in the UK Construction Industry,* HMSO, London.
- Lipietz, A. (1974) *Le tribut foncier urbain*, Maspero, Paris.
- London, K. and Russell K. (1999). Client's role in construction supply chains : a theoritical discussion. In CIB W55 P W65 Joint Triennal Symposium, *Customer satisfaction : A focus for Research & Practice,* Bowen P. & Hindle, R.
- Manser, J. E., (1994) *Economics : a foundation course for the built environment*, E. & F.N. Spon, London.
- Marchesnay, M. (1983) Où en est la méso-analyse ? In *Economie Industrielle*. Association pour le développement des Etudes sur la Firme et l'Industrie (ADEFI), Economica, Paris, pp. 11-20.
- Morvan, Y. (1991) *Fondements d'Economie Industrielle*, Economica, Paris.
- Parkin, M. *et al.*(2000) *Economics.* Addison Wesley Longmann, Harlow.
- Perloff, J.M. (2001) *Microeconomics.* Addison Wesley Longmann, Harlow.
- Peters, H.R (198 *Mesoeconomic Theory of Structural Policy in the New Political Economy*. Wirtschaftdienst 1981, p.230
- Porter, M. E. (1980) *Competitive strategy*, The Free Press, Macmillan.
- Preston, L.E. (1984) *A Perspective on Meso-economics*. Discussion Papers University of Maryland.
- Ruddock, L. (1999) Optimising the construction sector, A macroeconomic appraisal. In *Macroeconomic issues, models and methodologies for the construction sector* (edited by L. Ruddock), CIB, Publication 240, Rotterdam, pp. 68-80.
- Saillard, Y. (1995) Globalisation, localisation et spécialisation sectorielle. Que deviennent les régulations nationales ? In *Théorie de la régulation, L'état des savoirs* (edited by R. Boyer and Y. Saillard), La Découverte, Paris, pp. 285-292.
- Vincent, M. (1986) *La formation du prix du logement*, Economica, Paris.

- Winch, G. (2000), Construction business systems in the European Union, *Building Research and Information,* 28 (2), pp. 88-97.

CHAPTER II

MESO-ECONOMIC ANALYSIS OF THE AUSTRALIAN BUILDING AND CONSTRUCTION INDUSTRY

Gerard de Valence
University of Technology
Sydney – Australia

INTRODUCTION

A meso-economic analysis of the building and construction industry takes a wide view and includes the closely linked sectors of property and real estate, facility management and building materials. This chapter reviews the Australian industry and identifies its size, scope and scale and economic contribution.

Australia is in the southern Asia Pacific region covering an area of 7.7 million square kilometres, approximately the same size as mainland United States of America (excluding Alaska) or the continent of Europe. In spite of its size, Australia's population is less than 20 million people. In the past agriculture, mining and a protected manufacturing industry were the major industries. However, the removal of import tariffs by successive governments since the mid 1980s has transformed the Australian economy, and today the tourism, financial and other service sectors now account for 70% of the economy. As an advanced industrial economy the role of the construction industry is shifting from a preponderance of new work to increasing amounts of refurbishment, repair and maintenance and management of the built environment. This follows the pattern identified in Bon and Crosthwaite (1999).

This chapter starts with construction industry activity in Australia, and the three main sectors of the industry (engineering, residential building and non-residential building). Building planning and approvals in Australia are outlined before ownership of housing stock, non-residential building and infrastructure and engineering works is estimated. Next the size and scope of the Australian building and construction industry is shown, based on data from three construction industry surveys done over 15 years in Australia. Data on consultant and subcontractor organisations is included. The scope of the Australian building and construction (B&C) industry is estimated with consultant services, subcontractor organisations and the building materials and products industry also included, based on a 'map' of the B&C cluster. The building materials and products industry is outlined. This starts with the inputs into construction before the materials and products industries are profiled. Australian expenditure on both residential Repair and Maintenance (R&M) and non-residential R&M are estimated. This is followed by a

summary of Australian regulations and institutional actors. The Conclusion sums up the state of the industry.

CONSTRUCTION INDUSTRY ACTIVITY IN AUSTRALIA

The construction industry in Australia accounted for just over 6% of GDP and nearly 8% of total employment in 2002-03, under the Australian Bureau of Statistics (ABS) industry classification. The output of the construction industry is composed of three distinct industry sectors. These sectors are engineering construction, non-residential building, and residential building. They are not closely related, having their own distinguishing characteristics, and the well-known volatility of the industry cannot be equally distributed across them. Table 1 shows activity levels in these different industry sectors.

Engineering

The engineering construction sector is divided into six major components. Road and bridge construction is the largest industry sector. Other engineering comprises electrical generation, transmission, water and sewerage, processing plants including oil and gas pipelines, and miscellaneous engineering construction, which includes railways, harbours, recreational facilities and pipelines. Nearly 80% of all engineering construction work is for urban infrastructure, the balance carried out for the mining and heavy industries. Over the 1990s to 2003 the value of engineering work done rose steadily to record levels.

Residential Building

The housing construction share of GDP is around 3%, but its volatility has a significant impact on the wider economy and contributes to cyclical patterns in other industries, such as consumer durables and building materials. The growth in construction industry output after 2000 was mainly due to an upsurge in housing activity as Australia, like a number of other countries such as the UK, Netherlands and Ireland, underwent a housing boom. Demand factors affecting the residential sector include: growth in household formation numbers and changes in household types; interest rates; interstate mobility; and the level of net immigration the national and state level, and the age of the housing stock. More recently the demands of an aging population have led to changes in residential building types and locations, with support requirements like health and community services also affected.

Housing construction levels across Australia average around 135,000 dwellings per year, a 2.0% annual increase in the housing stock. The public sector now accounts for under 4% of the stock, down from a high of over 11% in the mid 1980s, due mainly to successive governments policies of continuing to shift public housing responsibilities on to the private sector, with the government providing financial aid to individuals where required. Private sector residential building is demand driven and has, in the past, been related to economic prosperity, demographic changes and the cost of finance. Over the

1990s, there was a shift in emphasis in the housing market away from separate houses to medium and high density developments. In and around the central business districts of Sydney and Melbourne there was a major shift to high-rise residential building, which saw the population of these areas significantly increase.

Non-residential Building

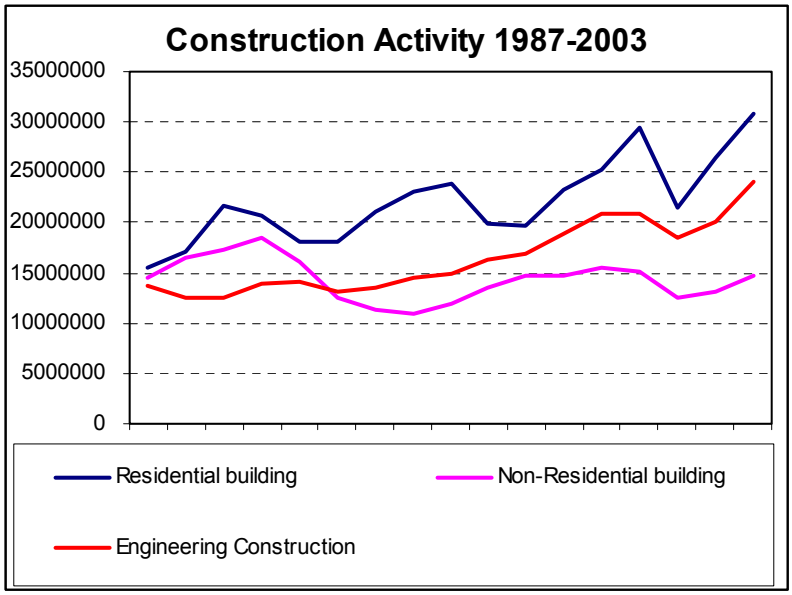
In non-residential building, private sector activity dominates commercial construction in offices, hotels, factories, shops and other business premises. The office construction area is particularly volatile. Other business premises encompasses a wide range of structures including warehouses, terminals, service stations and car parks, telephone exchanges, studios and so on. Public sector activity is mainly educational, health and recreational buildings. General economic activity and urban and employment growth are the main determinants of demand in this area. Activity levels have yet to regain the heights of a CBD office building bubble in the late 1980s.

Table 1. Construction Activity, Chain Volume Measures: Reference Year 2001-2002, Australia, (AUD$ billion per annum).

Period	Residential Building	% of Total	Non-residential Building	% of Total	Engineering Construction	% of Total	Total Construction
1986-87	15.5	*35.6*	14.4	*33.0*	13.7	*31.4*	43.7
1987-88	17.0	*36.9*	16.4	*35.7*	12.6	*27.4*	46.1
1988-89	21.7	*42.2*	17.3	*33.5*	12.5	*24.2*	51.5
1989-90	20.8	*39.1*	18.4	*34.8*	13.8	*26.1*	53.0
1990-91	18.0	*37.4*	16.1	*33.3*	14.1	*29.2*	48.2
1991-92	18.1	*41.5*	12.5	*28.6*	13.0	*29.9*	43.6
1992-93	21.1	*46.1*	11.3	*24.7*	13.4	*29.2*	45.9
1993-94	23.1	*47.4*	11.0	*22.7*	14.6	*29.9*	48.7
1994-95	23.9	*47.0*	12.0	*23.6*	14.9	*29.3*	50.8
1995-96	19.8	*40.0*	13.4	*27.1*	16.3	*32.9*	49.5
1996-97	19.6	*38.4*	14.7	*28.7*	16.8	*32.9*	51.1
1997-98	23.3	*40.9*	14.7	*25.9*	18.9	*33.3*	56.9
1998-99	25.2	*41.0*	15.5	*25.1*	20.9	*33.9*	61.5
1999-00	29.4	*44.9*	15.1	*23.0*	21.0	*32.0*	65.4
2000-01	21.6	*41.0*	12.5	*23.8*	18.5	*35.1*	52.6
2001-02	26.5	*44.3*	13.2	*22.1*	20.0	*33.6*	59.7
2002-03	30.8	*44.3*	14.7	*21.1*	24.0	*34.5*	69.6

Source: ABS Construction Activity: Chain Volume Measures, Australia, Cat. No. 8782.0.

Figure 1.



Source: ABS *Construction Activity*, Cat. No. 8782.0. Chain volume measures based 2001-2002 in Australian dollars '000.

BUILDING PLANNING AND APPROVALS IN AUSTRALIA

Urban planning and management in Australia is under the control of the state governments, however they have delegated responsibility for the approvals process to local governments, the third tier of government. Local councils have zoning and development control powers, typically exercised through town planning and land use schemes. This means that the great majority of development decisions are made at the local level, the main exceptions being transport infrastructure projects that cross many local government boundaries. For some major developments that are seen as economically or politically important, state governments will centralize planning processes when local planning powers might threaten the outcome (Dawkins and Searle 1998:429). State planning controls may also compel local councils to approve developments of regional or state significance, such as higher density housing to reduce urban expansion, or to refuse developments that threaten important environments.

Each state has its own planning, development and environmental protection legislation that the local governments operate under, and these acts vary considerably between the six states. One of the areas that differentiates states is the appeals process. When a developer has a building proposal rejected an appeal can be made to the state's planning and environment court, where the two sides argue the case. In some states this is very legalistic, in others it is less formal. Only in a few cases does the public get involved in development applications, with varying provision for community consultation in the legislation. For some high-profile projects, usually on historically significant sites, there can be considerable public controversy about a proposed development. On the other hand there are provisions for significant public input into the plan preparation itself.

The national (Commonwealth) government's role is limited. There are no national standards applied to the built environment, nor are there national policies on urban planning and governance. Occasionally there will be a national government inspired debate about the generally poor quality of the urban environment, and design competitions are often used for important public projects to get a striking contribution to the built environment. This is more common at the state level. Some national governments have taken an active role in urban development (1972-75 and 1983-96), but these have been the exceptions.

OWNERSHIP OF HOUSING STOCK

In Australia, private sector ownership accounts for 70% of the total housing stock, nearly 40% of these owned outright. This is one of the highest levels of home ownership in the world. A comparison by the Reserve Bank of Australia (RBA 2001: 2) comparing home ownership rates found this similar to Italy and the US (68%), the UK (69%) and New Zealand (71%). Canada (63%), France and Sweden (56%) and Germany (43%) had lower rates of ownership. The form of ownership in Australia varies, as shown in Table 2 Private rental property, owned by real estate investors, accounts for 20% of total stock and public rented accommodation another 5%. Other renters pay rent to a relative in the same building, an employer, a caravan park, a church or a community group. Around 5% of the Australian stock is public housing, but this share is in slow decline as the public sector spends less each year on new building. The great majority of dwellings are detached houses, with their own gardens. However the proportion of flats and apartments is increasing rapidly, particularly in the major cities of Sydney and Melbourne where there was been a sustained surge through the 1990s in the building of inner-city and near-CBD apartments on old industrial sites.

Table 2. Home Ownership

Ownership	1994	1999
Owner without mortgage	41.8%	38.8%
Owner with mortgage	28.3%	31.3%
Private tenants	19.0%	20.3%
Public tenants	6.2%	5.1%
Other renter	4.7%	7.2%
Total	100%	100%

Source: ABS *Australian Housing Survey 1999,* Cat. No. 4182.0

Table 3. Households by structure, tenure and landlord type, 1999-2000

Tenure and Landlord Type	Separate House '000	Semidetached/row or terrace house '000	Flat/Unit/ apartment '000	Total '000
Owner without a Mortgage	2,455.4	171.7	106.2	2,758.3
Owner with a Mortgage	2,094.9	134.8	78.8	2,315.7
Renter				
State/Territory	216.4	106.0	79.1	402.0
Private landlord	752.0	269.0	414.7	1,446.4
Total	1,040.5	394.7	510.9	1,962.8
Other tenure	106.6	7.7	29.8	151.4
Total	5,697.4	708.9	725.8	7,188.1

Source: ABS *Year Book Australia 2003,* Cat No. 1301.0

Table 4. Composition of Housing Stock

Residential type	1994	1999
Separate housing	83.8%	79.9%
Semi-detached, terrace or townhouses	9.2%	8.9%
Flats	7.0%	11.2%
Total	100%	100%

Source: ABS *Australian Housing Survey 1999,* Cat. No. 4182.0.

NON-RESIDENTIAL BUILDING OWNERSHIP

The non-residential building sector comprises a mixture of mostly publicly owned social infrastructure (schools, hospitals, libraries and community centres etc.), and largely privately owned commercial property (offices, shops, hotels and industrial buildings). Over time, the private share of the stock of education and health buildings is rising as the state and federal governments increasing rely on the private sector to provide these services. However, the existing base of public ownership in these sectors is very significant, and government in Australia has a responsibility to provide education and health services to people who cannot afford privately provided services. Public ownership of non-residential building is divided between the local councils, state and federal governments, reflecting the three tiered structure of government in Australia.

Private ownership of non-residential building is divided between corporate owner/occupiers and investors. The Australian stock market has a very large listed property trust sector, worth over $70 billion, around 8% of the world real estate investment trust or pooled fund total compared with a 1.5% share of global stock market capitalisation for the Australian market as a whole. When combined with property investment by insurance and pension funds this industry is one of the major owners (and

increasingly a developer) of commercial property. There are also some wealthy private investors with extensive property portfolios.

Exact estimates of non-residential building ownership are not possible from the data available in Australia. The approach taken is to look at the long run data for new building and use that as the basis of an estimate of sector ownership. The analysis looks at both the long-run and changes in the relative share of public and private building. The problem of equating the flow of building work done year-by-year with the stock of buildings is a major concern, however given the lack of data for this analysis the estimates based on building work done have to be taken as a workable, if approximate, guide to sector ownership.

Based on relative share in new building over 28 years 1975-2003, the break-up by building type would have public share at 30% and private at 70%. This is the extent of long-run data at the level of building type. Public sector non-residential building work, here taken as a proxy for ownership of non-residential building stock, is highest in education (73%), miscellaneous (61%, this category includes many social buildings such as libraries and community services) and health (60%). Offices and other business premises had 26% and entertainment 33% shares. In many of the other building types the public sector share is below 10%. Private sector ownership of non-residential building is well over 90% in hotels, shops and factories.

When the data is subdivided into shorter time periods, changes in the level of public and private shares of building work become apparent. These changes have significant implications for the eventual level of ownership. Table 5 shows trends in both non-residential building and engineering construction, with the same pattern found in both these industries. Over time the public sector share of non-residential building and engineering work has been in decline, and this decline has become a long-term secular trend, independent of short-run fluctuations in the overall level of activity.

Table 5. Trends in Non-residential Building and Engineering Construction

	Public %	Private %
Non-residential Building		
1974-1984	37	63
1985-1994	29	71
1995-2003	26	74
Engineering Construction		
1986-1991	71	29
1992-2003	60	40

Sources: ABS *Building Activity*, Cat. No. 8752.0 and *Construction Activity*, Cat. No. 8782.0.

There is a final consideration before estimating ownership levels. The asset sales programs by state and federal governments in Australia over the last two decades would have significantly increased the private sector share of ownership of commercial

buildings. This would particularly apply to offices and other business premises, because the government business enterprises such as airlines, banks, finance and insurance companies that have been sold were also significant owners and users of built assets. There have also been many sales and leaseback of office buildings formerly owned by governments. The 73% share of new build of offices and other business premises would now be a share of over 90% in private ownership as a result of these asset sales. Further analysis using the corporate and household sectors is not possible with the data available.

OWNERSHIP OF INFRASTRUCTURE AND ENGINEERING WORKS

The great majority of infrastructure assets in Australia are owned by the public sector. This is a legacy of the development push of the late nineteenth and early twentieth centuries, when the state governments were the only organisations with the financial resources and access to the capital required for building the railways, power stations, water and gas distribution systems and road networks for a rapidly expanding economy and population (Maddock and McLean 1987). The public sector accounts for over 80% of infrastructure assets. Until recently, privately owned infrastructure was only found in remote areas where there are large mines (iron ore, coal and gold). The power stations, railways and roads needed for these mines have usually been built and owned by the private sector companies that are the mine operators.

At the end of the twentieth century the role of the private sector became much more important. Some public assets were sold (for example, power stations in Victoria, water supply in South Australia, and by the Commonwealth airports, railways and telecommunications) and many of the remaining gas, water and electricity utilities have been corporatised (converted into government owned businesses separate from the public sector itself). There have been a number of significant Build-Operate-Transfer road and tunnel projects done under concessions (typically 25 or 30 years) in NSW and Victoria. A number of new transport projects are now coming on stream that will continue the growth of privately owned and operated public infrastructure. However, privately owned infrastructure is still a relatively small percentage, between 10 and 15% of the total.

CONSTRUCTION INDUSTRY SIZE AND CHARACTERISTICS

There have been four Construction Industry Surveys (CIS) done by the Australian Bureau of Statistics (ABS). The fourth and most recent was for 1996-97. Table 6 shows three CISs for 1984-85, 1988-89 and 1996-97, and the distribution of firms across the industry sectors. The doubling in the number of subcontracting firms is the most notable feature. This reflects the trend toward contract employment, which is cheaper than full-time employees, and is an outcome of low-bid tendering driving prices down across the industry.

Table 6. Private Sector Construction Establishments: Number ('000).

	1996-97	1988-89	1984-85
Total building construction	33.1	19.6	24.5
Total non building construction	3.1	3.9	3.4
Total general construction	36.3	23.5	27.9
Total special trade construction	158.0	74.5	77.0

Source: ABS Construction Industry Surveys, Australia, 1996-97, 1988-89 and 1984-85.

All four surveys have found the construction industry is overwhelmingly made up of small firms with under 20 employees, which contribute most of the industry's output and account for almost all of the total number of enterprises. Table 7 shows the numerical dominance of small firms in the construction industry. Businesses with employment of less than five accounted for 94% of all businesses in the industry, and over two-thirds of all employees. In contrast, less than 1% of businesses had employment of 20 or more. Businesses with employment of less than five accounted for slightly less than half the total income and expenses, whereas businesses with employment of 20 or more accounted for almost one-third of these items.

Almost three-quarters of construction industry profit before tax came from businesses with employment of less than five. Higher profit margins were reported by smaller businesses, so the numerical dominance of businesses with employment less than five drives the industry average above the profit margins reported by businesses with employment of five or more.

Table 7. Summary of Performance by Business Employment Size.

Selected indicators	Units	Employ less than 5	Employ 5 to 19	Employ 20 or more	All businesses
Operating businesses	'000	182	11.1	1.2	194.3
Employment	'000	332.2	85.9	66.0	484.1
Wages and salaries	A$m	3 221.7	2 309.8	2 648.3	8 179.8
Turnover	A$m	27 951.2	13 713.7	16 234.0	57 898.8
Total income	A$m	28 202.5	13 801.0	16 591.2	58 594.7
Total operating expenses	A$m	24 123.0	13 288.0	15 987.1	53 398.1
Operating profit before tax	A$m	4 066.5	616.4	781.7	5 464.6
Total assets	A$m	11 330.0	3 487.8	10 747.2	25 565.0
Total liabilities	A$m	6 731.7	2 344.8	7 542.6	16 619.1
Net worth	A$m	4 598.3	1 143.0	3 204.6	8 945.9
Capital expenditure	A$m	9 984.9	226.3	1 120.9	11 332.1
Industry gross product	A$m	8 657.2	3 582.2	3 941.9	16 181.2

Source: ABS Private Sector Construction Industry, Australia, 1996-97. Cat. No. 8772.0.

When the data on performance is converted to percentages (Table 8) the importance of the 0.62% of large firms can be appreciated. Their 13.6% of employees earn 32.3% of salaries and wages, generate over 14% of profits and nearly 25% of output.

Table 8. Percentage by Firm Size.

Selected indicators	Employment less than 5	Employment 5 to 19	Employment 20 or more	All businesses
Operating businesses	93.67	5.71	0.62	100
Employment	68.62	17.74	13.63	100
Wages and salaries	39.39	28.24	32.38	100
Turnover	48.28	23.69	28.04	100
Total income	48.13	23.55	28.32	100
Total operating expenses	45.18	24.88	29.94	100
Operating profit before tax	74.42	11.28	14.30	100
Total assets	44.32	13.64	42.04	100
Total liabilities	40.51	14.11	45.39	100
Net worth	51.40	12.78	35.82	100
Capital expenditure	88.11	2.00	9.89	100
Industry gross product	53.50	22.14	24.36	100

Source: Table 8.

Aligning the CIS data with the industry activity in Table 1 requires some balancing factor. The CIS gives figures for turnover in 1996-97 of $57 billion (Table 8, in 1996-97 dollars) and ABS construction activity was $47 billion (in 1999-2000 dollars). The difference in base year would account for around $4 billion of the difference and the rest can be attributed to sample composition and extent effects.

The 1996-97 CIS collected new data on the residential construction and trades sectors of the industry.

Table 9. Selected Indicators: Residential Construction and Construction Trades

Selected indicators	Units	Residential construction	Construction trades	Total
Operating businesses	‘000	31.0	158.0	189.0
Employment	‘000	70.3	356.9	427.2
Wages and salaries	$m	891.2	4 870.4	5 761.6
Turnover	$m	13 829.0	25 270.2	39 099.2
Total income	$m	14 108.5	25 532.9	39 641.4
Total operating expenses	$m	13 113.8	21 604.8	34 718.6
Operating profit before tax	$m	1 117.7	3 914.3	5 023.0
Total assets	$m	8 202.1	8 172.4	16 374.5
Total liabilities	$m	5 795.5	4 557.8	10 353.2
Net worth	$m	2 406.7	3 614.6	6 021.3
Capital expenditure	$m	2 012.0	8 198.6	10 210.6
Industry gross product	$m	2 642.6	10 132.1	12 774.8

Source: ABS Private Sector Construction Industry, 1996-97. Cat. No. 8772.0

Consultant Organisations

The flat pyramid effect seen with contractors and subcontractors can also be seen with consultants in their sectors. The number of firms (practices) in table 10 has fallen since 1993, as many have merged to form national practices and joined international firms (quantity surveyors like Rider Hunt and Davis Langdon Australia) or been taken over by overseas firms (engineering consultants CMPS&F and Kinhills, architects DCM). However, the structure of the consultant sectors is not greatly different.

Table 10. Consultant Organisations Profile

Consultant Type	No. firms	No. Employees
Consultant engineering services (2001)	10, 984	64,495
Includes all engineering, project management and quantity surveying services		
No. of engineers employed		26,680
Real Estate services (1999)		
Agency activities	6,219	
Property valuation9	429	
Conveyancing	463	
Other	481	
Total	6,216	52,079

Sources: ABS Consultant Engineering services, Cat. No. 8693.0 and Real Estate Services Industry Cat. No. 8663.0.

Subcontractor Organisations

The role of subcontracting is a distinguishing feature of building construction, and the number and diversity of subcontracting organisations reflects this. There are five broad classifications of the trades.

Table 11. Selected Indicators: Construction Trades

Trade Services	Operating businesses '000	Employment '000	Turnover $m	Gross product $m
Site preparation services	7.1	19.2	1,911.3	788.1
Building structure services	28.7	67.1	4,576.2	1,837.0
Installation trade services	38.9	114.0	10,145.3	3,480.3
Building completion services	70.1	125.7	6,635.4	2,890.3
Other construction services	13.2	30.9	2,062.0	776.4

Source: ABS. Private Sector Construction Industry, 1996-97. Cat. No. 8772.0

AEGIS' MAP OF THE B&C CLUSTER

This section extends the discussion of the structure of the building and construction industry (B&C) to a meso-analysis. The meso approach was applied to the building and construction industry by the Australian Expert Group on Industry Studies (AEGIS) and included industry sectors providing services before and after construction and identified the flow of services between clients and industry participants. This approach focuses on linkages and interdependencies between firms in a network of production.

The AEGIS classification divides the industries into five product-system segments: on-site services, client services, B&C project firms, building products and supplies, and building fasteners, tools, machinery and equipment manufacturing. Each of these is divided into four product/service classes. AEGIS argues that mapping the B&C product system in this way provides analytical advantages. Firstly, it provides a stepping-stone between traditional industry statistics based on hierarchical systems of classification and broader conceptual views of industry activity as depicted in clusters, chains and complexes. Secondly, it gives a perspective on the interrelations between segments of the industry, a view of the 'chain' of production and a framework on which to base a variant of cluster analysis (AEGIS 1999: 35-36).

The B&C cluster broken into five groups of firms is:

1. On-site services:
- building completion services –plastering, ceiling, carpentry, tiling, carpeting, painting, decorating, glazing and related construction services;
- installation trade services –plumbing, electrical, air conditioning, heating, fire and security systems installation services;
- site preparation and landscape services; and
- building structure services –concreting, bricklaying, roofing and related services.

2. Client services:
- real estate services – including real estate agent services;
- professional/technical services – including architectural, surveying, consultant engineering and related technical services;
- residential property services – including residential property operation services; and
- commercial property services –commercial property operator and developer services.

3. B&C project firms, divided into four major areas:
- house-building
- non-house residential building;
- non-residential building – including factory, shopping centre and office building –
- non-building (engineering) construction – road, bridge and engineering construction.

4. Building products and supplies:
- building products and supplies wholesaling and retailing;

- structural products – including such things as fabricated wood and wooden structures, concrete and aluminum products, structural metal, steel fabrications and pre-fabricated buildings; and
- B&C related products and supplies – including ply, veneer and wood products, glass, brick and ceramic products, cement, plaster, concrete, paint, plastics, metal piping and sheeting, electric cabling, etc.

5. Building fasteners, tools, machinery and equipment:
- tools and fasteners – including machine tools, hand tools – and fasteners;
- construction-related machinery and equipment wholesaling, hiring and leasing; and
- B&C related machinery and equipment – construction equipment, lifting and handling equipment, and commercial heating and cooling equipment.

When the data in Table 7 is compared to that in Tables 12 and 13, the size of the industry virtually doubles, both in total income (and therefore share of GDP) and employment. The data is grouped by the product-system sectors. The industry income in Table 7 of $58.6 billion, compares with total income of $110.4 billion in Table 12, so the effect of inclusion of materials manufacturers and services is clearly seen. A similar result for total employment is found, increasing from 484,100 to 682,000.

Table 12. Total B&C Income by Industry Segment 1995-96 ($ million).

Industry Segment	Total Industry Income ($m)	Input-Output Discounted ($m)
On-site Services (Trade Services)	21,898	21,898
Client Services (Engineering, Technical, etc.)	8,607	8,607
Building & Construction project firms	34,250	34,250
Materials and Products Supplies	41,352	18,608
Machinery and Equipment Supplies	4,312	2,803
Total	110,419	86,166

Data sources: ABS Private Sector Construction Industry 1996-97, Cat. No. 8771.0. Real Estate Agents Industry: Australia, 1995-96, Cat. No. 8663.0. Selected Technical Services: Australia, 1992-93. Consultant Engineering Services: Australia, 1995-96, Cat. No. 8693.0. Business Operations and Industry Performance: Australia, 1995-96, Cat. No. 8140.0. Manufacturing Industry: Australia, 1995-96, Cat. No. 8221.0.
Source: AEGIS (1999: 57).

Table 13. Employment in the B&C Product System by Segment 1995-96.

Industry Segment	***Total Employed***
On-site Services (Trade Services)	220,000
Client Services (Engineering, Technical, etc.)	102,000
Building & Construction	108,000
Materials and Products Supplies	222,000
Machinery and Equipment Supplies	30,000
Total	682,000,000

Data sources: As above.
Sources: AEGIS (1999: 58).

BUILDING MATERIALS AND PRODUCTS

The building materials and products industry covers a diverse range of manufacturing industries that provide inputs to the building and construction industry. This concentrates on industries that are major producers of building materials and products. Therefore service industries are not covered; although the transport, business services and communications industries are important providers of construction inputs. The objective is to develop a profile of the Australian building materials and products industry using data from the Australian Bureau of Statistics (ABS) manufacturing industry survey conducted each year. The analysis has three parts: inputs into construction; industry details –on employment, turnover and value added; and international trade by industry sector

Inputs into Construction

The building materials and products industry is defined as structural building products, construction materials and building products and supplies. This excludes building tools and fasteners, construction machinery and equipment. This study details those industries using the ABS data from *Manufacturing Australia 2000* and *Manufacturing Industry 1998-99*.

To identify the industries that are the most important providers of manufactured inputs into construction the Australian Input Output tables have been used. These show the flow of products between industries across the economy, and the major source industries for building products and materials are shown in the table. The construction industry's share of the source industry's output is also shown, and this identifies the most important inputs as non-metallic mineral products, wood and fabricated metals. For these industries construction is also the major source of demand.

Table 14. Construction Inputs

From industry	Construction inputs	Total industry uses	Construction as %
Mining	651	17,493	3.7
Wood products	2435	5545	43.9
Petroleum & coal	179	6,725	2.6
Chemicals	466	10,602	4.4
Rubber & plastic	333	5,940	5.6
Non-metallic mineral products	5,117	8,032	63.7
Basic metals	906	14,137	6.4
Fabricated metal	3,618	12,169	29.7
Miscellaneous mfg	111	1,686	6.6

Source: Input – Output Tables 1996-97, ABS Cat. No. 5209.0.

Materials and Products Industry Details

The main building materials and products industry sectors within manufacturing are detailed in Table 15. The table gives employment, turnover and value added for each industry sector. Industries are identified with their ANZSIC industry classification number. Two other industries are included in the table: commercial space heating and cooling equipment; and prefabricated buildings. These are clearly manufactured inputs into building.

Using the input-output percentages above, the employment generated by building materials and products totals nearly 100,000 persons. This is made up by around 20,000 for wood products, 2,500 in chemicals, plastics and rubber, 22,700 in non-metallic mineral products, 12,000 in fabricated metal, and 42,000 in structural and basic metals.

Table 15. Industry Details

Industry Subdivision (ANZSIC code)	Employment Number	Turnover $ million	Industry value added $ million
Wood and paper products (23)			
Log sawmilling & timber dressing (231)	12,529	2,355	982
Other wood product mfg (232)	30,896	4,245	1,389
Paper & paper products (233)	17,293	5,062	1,924
Total	60,718	12,201	4,295
Petroleum, coal, chemical & associated prod. (25)			
Petroleum refining (251)	4,050	7,191	1,259
Petroleum & coal products (252)	451	268	66
Basic chemical mfg (253)	12,882	5,092	1,692
Other chemical product mfg (254)	35,240	12,328	3,790
Rubber products (255)	7,575	1,477	595
Plastic product mfg (256)	35,779	6,507	2,399
Total	95,976	33,233	9,801
Non-metallic mineral products (26)			
Glass and glass products (261)	4,932	1,106	460
Ceramic mfg (262)	7,157	1,394	627
Cement. lime, plaster and concrete (263)	16,281	6,090	1,856
Non-metallic mineral products nec. (264)	6,221	1,271	458
Total	34,591	9,862	3,402
Metal product manufacturing (27)			
Iron & steel mfg (271)	29,125	10,708	2,843
Basic non-ferrous metal mfg (272)	15,157	10,753	2,297
Non-ferrous metal products (273)	6,565	2,356	532
Structural metal product (274)	40,213	6,974	2,220
Sheet metal product (275)	17,071	3,121	1,007
Fabricated metal product mfg (276)	39,779	5,012	2,016
Total	147,910	38,923	10,915
Commercial space heating & cooling equip (2867)	2,079	387	132
Prefabricated building mfg (291)	2,814	577	193

Source: ABS Manufacturing Industry, Australia, 1998-99, Cat. No. 8221.0.

The other industry that produces significant inputs for construction is the mining industry. The subdivision Other mining has 410 business units the Construction materials industry, with quarrying and aggregates production, employees 4,961 people.

International Trade in Materials, Products and Services

For many of the manufactured products for the building sector there is little trade, and the sector is generally recognized as part of the non-traded goods part of the economy. Therefore the trade performance of the industry sectors is modest compared to other parts of the Australian economy. That said, imports tend to exceed exports across the sectors. For construction materials, unlike the rest of Australia's mining industry, exports and imports are negligible.

Trade in construction services totalled AUD$85 million in 2002-03. This was down on the AUD$101 million in 2001-02, but a large increase from earlier years (ABS Cat. No. 5368).

AUSTRALIAN INDUSTRY R&D

Much of the R&D done by the Australian construction industry is more in the nature of problem solving, and is specific to a particular project or a new technology imported from the materials or equipment manufacturers (Table 18 below shows the level of construction R&D expenditure by industry sector). Because of the nature of this work it is not recognized as R&D, however in building and construction this may be the most important component of research and innovation. Because it is difficult to collect data on this type of activity the real level of R&D in the construction industry is probably significantly understated.

Research has shown that the level of R&D within building and construction in Australia, at 0.05% of annual industry value added, is at the lower end of the scale when compared to other countries such as Norway, Finland and France (at 0.2% or more) (Hampson and Manly 2001). Further, the spending on R&D by the industry has been falling, a report by Building Research and Development Review Committee (BRDAC 1987) found R&D in relation to value added in 1986-87 was 3.9% for agriculture, 3% for manufacturing, 1% for mining and 0.13% for construction. The Department of Industry, Science and Resources found little change a decade later, stating the industry "does not spend enough on R&D. The nature of the industry also influences it to continue to use traditional methods of construction, rather than take the risk of innovating." (DISR 1999: 52).

The BRDAC report described the construction industry as having a negative attitude towards R&D at an enterprise level. The reasons for this were said to be the predominance of small businesses, low capitalisation, low operating surpluses and low productivity. The industry's sensitivity to cyclic variations in the economy and the transient nature of various groups within the industry were also identified as factors contributing to the low level of R&D. These factors still operate to create an

environment which deters building and construction companies from investing in innovation without a clear short-term return.

In their analysis of construction innovation in Australia Hampson and Manley (2001) start with this description of the industry:

> Australia's construction sector operates against a background of industry fragmentation, intense competition, falling profits and new challenges including IT advancements, increasing public interest in environmental protection, increasing demand for packaged construction services, and moves toward private-sector funding of public infrastructure (2001: 31).

In Australia, around 60% of construction R&D is funded by the public sector through the Federal Government (25%), State Government (6%) and universities (28%). These sectors also provide most of the research personnel. Expenditure by source is shown in Table 19. The business spend on construction R&D is concentrated in the manufacturing industries, with the machinery and equipment suppliers being the most research intensive sector as shown in Table 19. Contractor spending in 1996-97 was 0.011% of income.

Table 16. R&D Expenditure on Construction, 1992-93 to 1996-97 (A$mn)

Expenditure by:	1992-93	1994-95	1996-97	Person years 1996-97
Business	25.7	34.0	45.1	384
Government (Commonwealth)	28.5	24.3	28.9	264
Government (State)	10.2	6.8	7.0	50
Higher education	38.5	27.7	32.3	648
Private non-profit organisations	0.3	1.3	0.7	9
Total	103.3	94.0	113.9	1,355

Source: AEGIS, 1999: 153

Table 17. R&D Expenditures Across Building and Construction Product System, 1996-97 (A$mn)

Industry Segment	Share of total R&D %	R&D expenditure ($m)	R&D expenditure as a % of income
On-site Services (Trade Services)	1	0.65	0.003
Client Services (Engineering, Technical)	7	2.91	0.034
Building and Construction	9	3.80	0.011
Materials and Products Supplies	72	31.87	0.077
Machinery and Equipment Supplies	11	4.74	1.110
Total	100	44.0	0.040

Source: AEGIS, 1999:62.

AUSTRALIAN EXPENDITURE ON R&M

With a stock of built assets equivalent to 1.3 times GDP, Australian spending on maintenance and management of these assets is significant.

Residential R&M

The ABS collects data on alterations and additions to houses, but only for work valued at $10,000 or more. These are mainly kitchen and bathroom replacements. This is a significant share of residential spending and amounts to around 25% of new building. In 2002-2003 this was $4.6 billion. To get an estimate of total spending on house renovations, upgrades and maintenance, a large proportion of the $8.3 billion sales of hardware shops can be added to this. A final estimate of residential spending on upgrades and R&M comes to over $13 billion a year.

Non-residential R&M

Estimate of expenditure on maintenance and management of non-residential building assets are not available through the ABS collections on building or business activity, despite the fact that this is a major expense for the owners of these assets. Some major refurbishments or conversions (to apartments) of office blocks are included in the building activity statistics, but only when a building approval is needed for the work.

In 1999, the Facility Management Association of Australia (FMA) commissioned Arthur Anderson to undertake a survey of the FM industry in Australia and to establish the services provided and the size of the industry. This survey produced three reports on the market, operating costs and service delivery and efficiency drivers. There were four service categories used in the first report *Market Overview* (Arthur Anderson 1999a): communications (postal, telecommunications, printing); utilities (gas, electricity, water, waste); maintenance (air conditioning and heating and electrical); and miscellaneous (cleaning, security and moving).

The total turnover of the Australian facility management industry was estimated to be in excess of $35 billion, with an Industry Gross Product of approximately $17.9 billion (Arthur Anderson 1999a). This represents 4.1% of Australia's Gross Domestic Product. The Arthur Anderson (1999a) report showed the square metres and cost of various facility types in Australia, with educational facilities ranking second by size and fourth by spend. The average value of facility management consumed per square metre was $141.88. However, if the share of cost is given as a ratio to the share of space, education ranks last, which is reflected in the condition of many public schools (ie. those funded by government).

Table 18. Facility Space and Cost in Australia

Type	Size in millions of Square meters	Size as % of total	Share of cost %	Ratio of Cost and Size Percentages
Industrial	155.0	62.9	35.2	0.56
Educational	41.4	16.8	5.3	0.32
Office	16.1	6.6	36.5	5.53
Retail	12.1	4.8	11.9	2.48
Hotel	11.9	4.8	3.2	0.67
Health	10.0	4.0	4.0	1.00
Total	246.3	100	100	

Source: Arthur Anderson (1999a: 7 and 8), except column 5.

The turnover of the Australian facility management industry has been estimated to be around $35 billion, with an Industry Gross Product of $17.9 billion (Arthur Anderson 1999a). This represents 4.1% of Australia's Gross Domestic Product. The size of the FM industry could be considerably more, if the Facility Management Association of Australia study done by Arthur Anderson (1999) operating cost benchmarks are multiplied by the total stock of space for all facility types. This gave an estimate for FM industry turnover of approximately $62 billion. The Arthur Anderson (1999a) report showed the square metres and cost of various facility types in Australia, with educational facilities ranking second by size and fourth by spend. The average value of facility management services consumed per square metre was $141.88.

Table 19. Facility Space and Cost in Australia

Type	Turnover $mn	Industry gross product $mn
Industrial	12,319	5,825
Educational	1,863	1,041
Office	21,777	6,824
Retail	4,154	2,219
Hotel	1,126	552
Health	2,735	1,470
Total	34,974	17,931

Source: Arthur Anderson (1999a: 7)
Note: Total turnover (expenditure on FM) and industry gross product include estimates for residential and other buildings.

An estimate of expenditure on non-residential R&M can be taken from the second report *Facility Operating Cost Benchmarks* (Arthur Anderson 1999b). This report was on service category costs per square metre, with maintenance services accounting for 19.8% of total facility costs. These costs included: building maintenance; mechanical

maintenance; electrical maintenance; environmental monitoring; grounds maintenance; planting maintenance; and other maintenance. The service costs were given for office, educational, health and industrial buildings.

Table 20. Facility Space and Maintenance Services Cost

Type	Size in millions of Square meters	Cost per square metre$	Total Cost $bn
Industrial	155.0	66.10	10,245.5
Educational	41.4	38.46	1,592.24
Office	16.1	35.05	564.31
Health	10.0	13.79	137.9
Other	24.0		1,881
Total	246.3	34,974	14,420.95

Source: Arthur Anderson (1999a: 7 and 1999b: 10)

Taking the size and cost data from the two Arthur Anderson reports gives an estimates based on building types of $12.5 billion for R&M expenditure on non-residential buildings. Assuming that hotels and retail add another 15% to the total cost (based on their share of cost in the first table) this would add another $1.8 billion. The final estimate for non-residential FM is $14.4 billion.

The value of major repair and refurbishment works done each year in commercial buildings is the other component of non-residential R&M expenditure. Major rebuilding of retail buildings typically involves significant extensions and additions, and is thus included in the data for new work. Similarly, the public sector assets of hospitals are often rebuilt rather than repaired. This leaves office buildings. The Property Council of Australia (PCA) biannual surveys on office space vacancies and returns includes data on space withdrawn from the markets while being refurbished. In 2001-2002 there are over 200,000 square metres of office space in Sydney and Melbourne being refurbished. At an average cost of over $2,000 a square metre this adds another $500 million to the total.

The estimate for non-residential expenditure of FM and R&M comes in at $15 billion. This is likely to be a conservative estimate because there would be a lot of inhouse costs not collected. There are three main reasons for this: those cases where organisations employ their own maintenance staff will not register on the FM surveys, this will apply to a lot of industrial buildings; office space outside the major CBD areas and business parks are not always included in the PCA surveys; and, refurbishments that do not affect the site use or footprint of the building will not be recorded. Therefore, a final estimate of this expenditure could be up to $20 billion a year in Australia, however there is no data available that can be used to support such a figure.

AUSTRALIAN REGULATIONS AND INSTITUTIONAL ACTORS

The building, and construction industry in Australia, and most countries, has a complex multi-faceted regulatory structure. Due to the federal political system in Australia responsibility for different aspects of the built environment are given to a range of Commonwealth, State and Local Governments and organisations. The five major areas of regulation are the Building Code for materials and products, the planning and approvals process for building and construction work, the quality assurance framework from Standards Australia, the OHS&R system, and the licensing, accreditation and membership requirement of governments, clients, industry and professional institutes and associations. The activities that are subject to regulation include workplace relations, building control and planning, standard setting and accreditation, technical regulation, economic, environmental and social regulation.

Table 20. Australian Industry Institutional Features

	Buildings and materials			Firms			Environment of the firms		
Regulations / Institutions	Construction permits	Rules concerning structures	Rules concerning materials	Professional rules and firms standards	Safety/security and personnel management	Agreements on price and quality of products and services	Competition and procurement systems	Financing Taxation	R & D support Education
International institutions				X			X		
Government		X	X	X			X	X	X
Regional and local authorities	X	X			X			X	X
Client, industrial, professional organisations				X			**X**		**X**
Trade unions					X				
User Associations	X								

Table 21. Regulatory Bodies and Institutions in Australia

Workplace health and safety bodies
Employer/Industry Associations
Industrial Organisations (eg. Unions)
Various Commonwealth, State and Territory portfolios:
Education and training
Workplace relations
Corporate and consumer affairs
Trade and competition policy
Industry development
Public works
Other professional and trade accreditation bodies
Australian Procurement and Construction Council (APCC)
Local Government
Builder's Licensing Authorities
Australian Building Codes Board
Standards Australia
Joint Accreditation System of Australia and New Zealand
National Association of Testing
Authorities Australia
Australian Building Systems Appraisals Council

Source: RCBCI (2002: 10). Based on ISR 1999, p.40

CONCLUSION

This chapter has presented data on the structure, size and scope of the Australian building and construction industry, the ownership of property and the contribution of the building materials industry. The starting point was construction activity and construction industry structure. An extended framework that includes suppliers and manufacturers was applied to the Australian building and construction industry by AEGIS, and this produced data that extended the scale of the construction industry, doubling the share of GDP and employment. Estimates for work done on repair and maintenance were also made. When all building and construction work is added together the total value of work done in Australia is in the region of $105 billion (in Australian dollars for 2002-03).

Table 22. Total Building and Construction in Australia, 2002-2003

	Value AUD$ billion	Percentage of Total
Residential building	30.8	30.1
Residential repair & maintenance	13.0	12.6
Non-residential building	14.7	14.4
Non-residential repair & maintenance	15.0	14.6
Engineering construction	24.0	23.4
Engineering repair & maintenance	5.0	4.8
Total	102.4	100.0

The ownership of the built environment was estimated by private and public sectors. It is not possible to get a breakdown by the household and corporate sectors. Nevertheless the data shows that Australia has a very high level of private home ownership (70%) and a commensurately low level of public housing (5%) of the total stock). There has been a significant trend away from public ownership of non-residential buildings over the past two decades, resulting in public ownership concentrated in health and educational buildings. This trend is now appearing in engineering and infrastructure, where the private sector share of new work has doubled in the 1990s. Along with these estimates of ownership an attempt was made to estimate the expenditure on repair and maintenance of the built environment.

It appears that defining the size and scope of the construction industry depends on the definition of industry products or markets adopted and the sectors of the industry that are to be included. The importance of this finding has implications in two key policy areas. Firstly, in competition policy administered by the Australian Competition and Consumer Commission, and counterparts overseas, determinations of anti-competitive behavior are based on the definition of 'market' and 'industry' used. From the data in this paper it is clear that the definition of the industry is far from being a settled issue. Both narrow (sector based) and broad (cluster based) definitions are appropriate in certain circumstances. For example, some building materials are widely used (concrete, plasterboard) while others are not (scaffolding, lifts). Some services are common (surveying), other are specialised (design, cost and engineering consultants). Therefore, the appropriate definition of the 'industry' for competition policy will depend on the specific 'market' under consideration.

Secondly, the building and construction industry and related supplier and property industries can be depicted in a variety of ways, but a model showing how the built environment is created and maintained is the most representative. The number and range of participants, from the suppliers to the end users, the number of stakeholders is extraordinarily large. The complexity and number of activities involved in these inter-related and complex has, to date, prevented a coherent view of their linkages developing. This has, in turn, made efforts to improve the performance of the built environment industries largely ineffectual, in part due to structural characteristics of these industries and the processes used to deliver buildings and structures, and partly due to their project based nature, where a sequence of projects is the focus rather than the production process itself. The meso approach attempts to solve this problem.

REFERENCES

AEGIS, 1999. *Mapping the Building and Construction Product System in Australia*, Australian Expert Group on Industry Studies, Department of Industry, Science and Resources, Canberra.

Arthur Andersen, 1999a. *Facility Management in Australia: A Market Overview,* Facility Management Association of Australia Limited (FMA Australia), Melbourne.

Arthur Andersen, 1999b. *Facility Management in Australia: Facility Operating Cost Benchmarks and Facility Management Service Delivery and Efficiency Drivers,* FMA.
Bon R. and Crosthwaite, D., 1999. *The Future of International Construction*, Thomas Telford, London, 1999
Dawkins, J. and Searle, G. 1998. "Sydney: Current and Future Directions for Metropolitan Planning and Governance", in *Metropolitan Governance and Planning in Transition: Asia-Pacific Cases*, UNCRD, Nagoya, pp. 417-38.
Hampson, K. and Manly, K. 2001. "Construction Innovation and Public Policy in Australia", in Manseau, A. and Seadon, G. (Eds.) *Innovation in Construction: An International Review of Public Policies*, Spon Press, London.
ISR, 1999. *Building for Growth: An Analysis of the Australian Building and Construction Industries.* Department of Industry, Science and Resources, Canberra.
Maddock, R. and McLean I.W., 1987. *The Australian Economy in the Long Run*, Cambridge University Press, Cambridge.
RBA 2001. "City Sizes, House Prices and Wealth", *Reserve Bank of Australia Bulletin*, December, pp. 1-6.
RCBCI 2002. *Overview of the Nature and Operation of the Building and Construction Industry*, Royal Commission into the Building and Construction Industry, Discussion Paper 2, Melbourne.

CHAPTER III

THE CONSTRUCTION INDUSTRY CLUSTER IN CANADA STILL BLURRY AND DIFFICULT TO ASSESS[2]

André Manseau
National Research Council of Canada
Montreal - Ottawa

In several industrialized countries, the share of new construction activity in the economy has fallen in the last decades. However, operation, improvement and maintenance of existing stock are becoming central, particularly in Western Europe (Carassus, 1999). This evolution appears slower in North America, as replacement is often preferred than renovate. In Canada, official statistics show that managing existing stock is important for residential and institutional buildings, but still appears a marginal activity in industrial buildings and civil engineering works. However, "in-house" construction activities within private firms, as well as construction related activities in the real estate sector are not very well captured by official statistics, and some evidences suggest that managing existing construction stock is underestimated.

Many authors have also stressed that construction of complex products such as building, manufacturing plants or hospitals involves integrative capabilities across a large range of technical and industrial fields. Growing demand for turnkey projects and for new public/private build/operating arrangements is blurring the traditional boundaries between manufacturing, design, construction and service sectors (Gann & Salter, 2000; Miller and al., 2000).

This evolution has to match a change in the economic analysis of construction sector that shall consider a broader perspective comprising construction operations, rehabilitation and maintenance. The concept of construction industry cluster is being proposed for taking into consideration these changes in the industry.

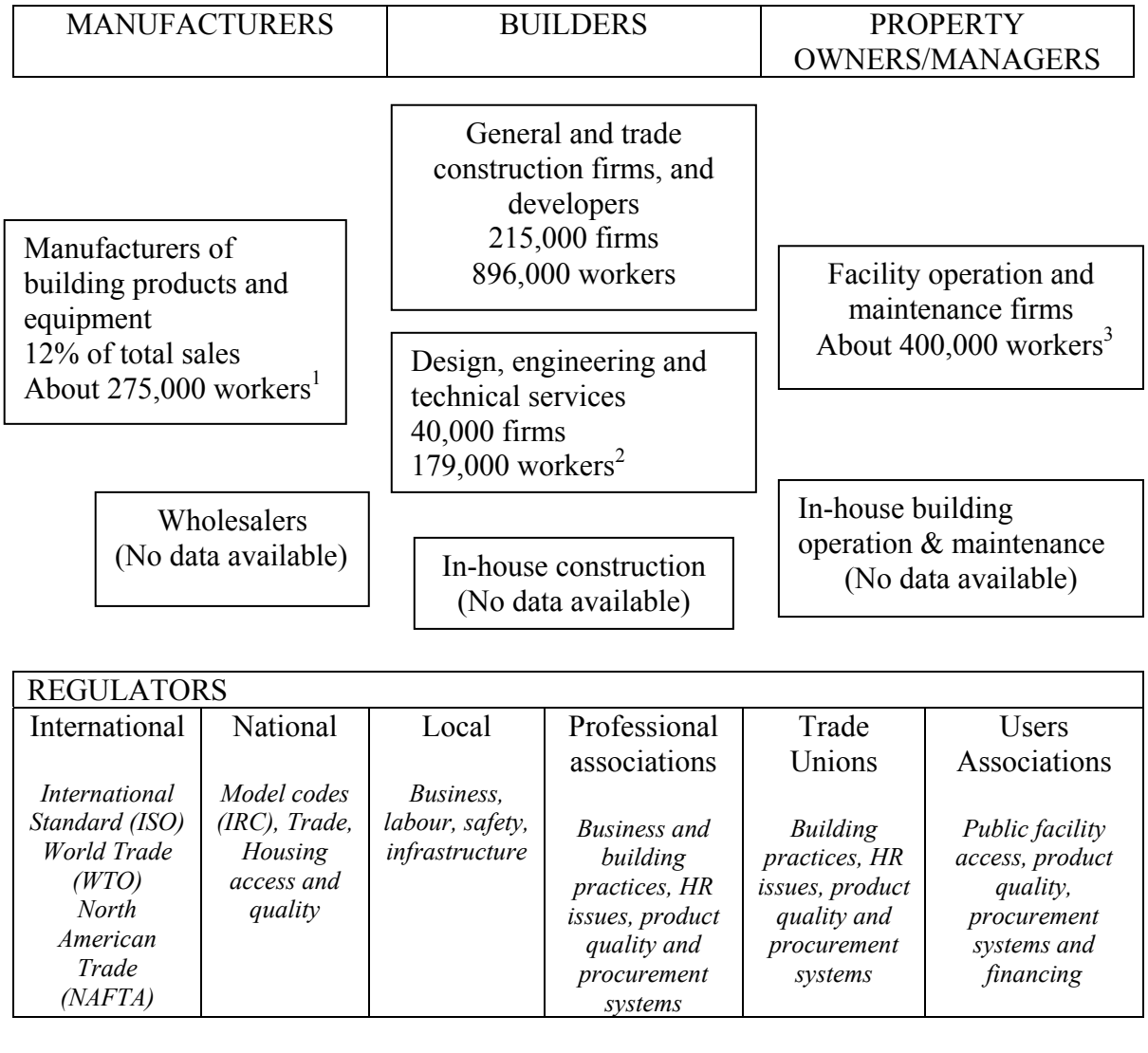
SCOPE AND MAIN ACTORS OF THE CLUSTER

Figure 1 presents main sub-sectors or actors of the Canadian construction cluster and their relative size in terms of number of firms and work force.

[2] This paper could not have been possible without the dedicated and crucial support of Edward Nock, Brian Preston, Paul Labelle and Bruno Pepin from the Manufacturing, Construction and Energy Division, Statistics Canada. A special acknowledgement is also addressed to the Institute for Research in Construction of the National Research Council Canada for its general support, and particularly to Denis Bergeron and John Archer for the section on regulations.

It is estimated that the cluster employed near than 1.8 million workers in 2000. In addition to about 900,000 workers in the traditional construction category, which includes general and trade contractors and developers, there are about 180,000 workers in the design and engineering services sector, 275,000 in the building products and equipment manufacturing sector, and about 400,000 workers in firms providing facility services.

Figure 1: Main Actors of the Canadian Construction Cluster



Sources:

1. Statistics Canada, the Innovation Survey 1999 indicated that building products accounted for about 12% of total manufacturing sales. Estimating total sales is proportional to employment, 12% of 2.3 millions employees is about 275,000.
2. Statistics Canada, Labour Force Survey 2000. Architectural and engineering services (NAICS code 5413) include services such as structure design, drafting, building inspection, landscape

design, surveying and mapping, laboratory and on-site testing, and interior, industrial, graphic and other design services.

3. Idem 2: Facilities support services (NAICS code 5612) comprise firms providing janitorial, maintenance, security, logistical support, reception, laundry and related services to support facility operations (500 workers, but probably not well captured), Services to Buildings and Dwellings (NAICS 5617) include exterminating and cleaning related to buildings, and landscaping (214,000 workers). Finally, NAICS 531, Real Estate Services account for 184,200 workers in 2000.

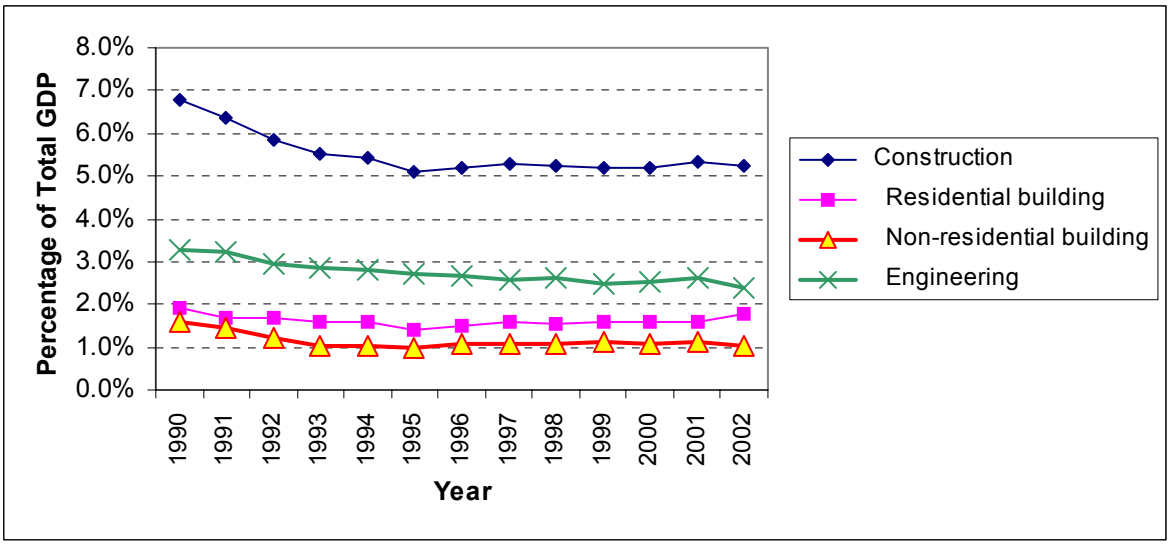
We may say that the construction cluster is even larger than the above evaluation, as both wholesalers and in-house construction activities are not taken into consideration – statistical data are not available for these sectors. A number of public and private organizations often have significant construction activities within their organization – these activities could be construction of new or renovation as well as building operation and maintenance. Industry Canada estimated (1998) that in-house construction activities could represent roughly one-third of total construction.

WEIGHT OF THE CLUSTER IN THE ECONOMY

The Canadian construction cluster is estimated to account for about 10-12% of total GDP, excluding construction activities performed in-house or inside organizations. This is a rough estimation, exact and complete statistical data for related sectors are not available. The only firm value is the share of the traditional construction sector (general and trade building contractors) to the economy, which is 5.2% in 2002 (Statistics Canada, 2003). A recent national statistical survey of the manufacturing sector (Survey of Innovation 1999) indicated that building products account for about 12% of total sales. As all manufacturing accounts for 18% of GDP, the manufacture of building products and construction equipment would represent about 2% of GDP. The size of services in construction is very difficult to assess. It comprises design, engineering and technical services provide by architects, engineers and various professionals, estimated to about 2% of GDP. Services also include project management as well as firms involved in building/infrastructure operation and maintenance that we estimate to another 2% of the national GDP.

As in many industrialized countries, the share of the construction industry to total GDP has decreased in Canada (Figure 2).

Figure 2: Construction added value in GDP (%)



Source: Statistics Canada (2003) CANSIM Table 379-0019, Gross Domestic Product at basic prices

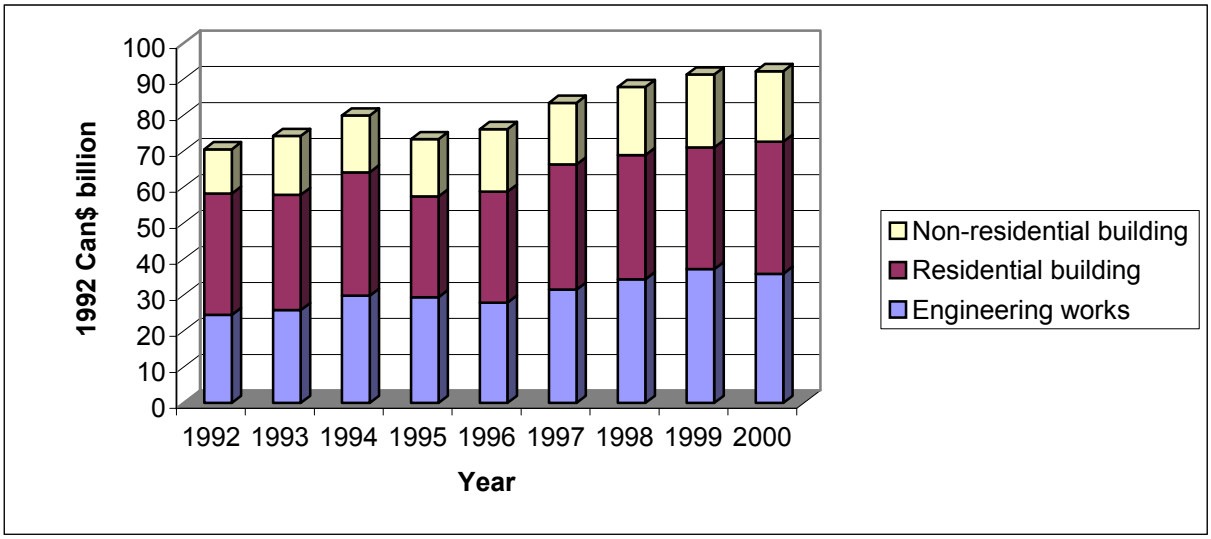
The work force has followed a similar pattern than the GDP one; the share of the construction labour force in total national labour force having slowly decreased from 6.7% in 1990 to 5.3% in 2000.

MAIN CHARACTERISTICS OF THE INDUSTRY

As we may see in Figure 2, the relative importance of each major market sector has not changed in the 90s; the residential building sector accounts for about 33% of total construction, the non-residential building for about 20% and the engineering sector for 47%. Only in 2002, residential building has modestly increased it share.

Economic activities for the overall sector have appeared rather stable in the last decade. Construction capital expenditures on construction represent a significant total investment for all industries, accounting for 105 billion Canadian dollars in 2000 (about 73.5 billion US$). This investment had a low peak in 1994 and another in 2000 (Figure 3: dollars are modified in constant dollar value of 1992 to show the real grow, without price inflation).

Figure 3: Capital Expenditures on Construction

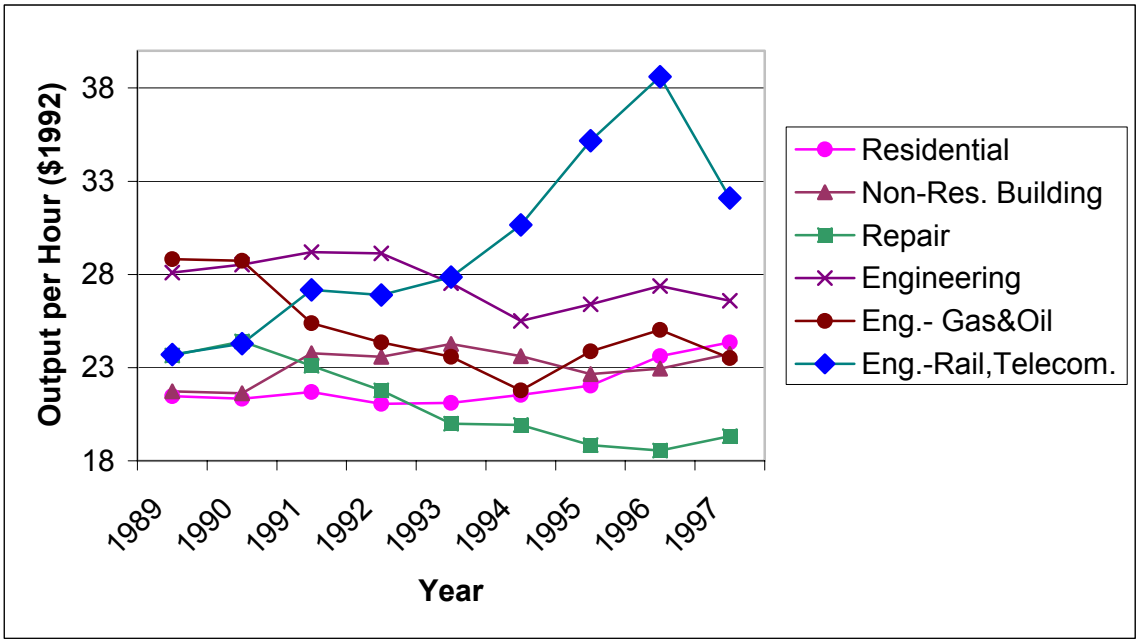


Source: Statistics Canada (2003), CANSIM Tables 029-0002 for 1992-1997 (terminated) and 029-0040 for 1998-2000, Capital expenditures on Construction, modified from current to constant 1992 dollar

However, a deeper analysis raises significant differences between the various sub-sectors of the construction market.

Figure 4 shows significant different productivity levels and trends among construction sub-sectors. The output per hour worked has steadily decreased in repair construction from 1989 to 1997 (last year of available data). Labor productivity has also decreased in Engineering – Oil & Gas, but at a lesser level. On the contrary, Engineering works in Railways and Telecommunications have experienced an important productivity increase during this period, with the exception of 1997. Finally, we can see that productivity in Engineering is in general higher that in Residential and Non-residential Building Construction.

Figure 4: Levels of output per hour in the construction for selected market sectors



Source: Statistics Canada, Productivity Measures, 2001

There is no consensus for explaining these differences. Some observers would say that it is due by a higher degree of complexity in engineering projects, with comparison to building construction. Some others, with another perspective, would rather suggest that engineering works are more integrated, offering design-build solutions or turn-key projects, as well as benefit from having more sophisticated clients.

Another very important characteristic of industry is the dominant presence of small – even very small – companies. In 2000, the sector comprises about 215,000 firms (general and trade contractors) that employed a total of 896,000 workers. The average number of workers per firm is 4.2 and about one third being firms of only one person. In 2003, 95.6 % of all firms had annual revenue under $2M (or US$1.4M) and only 0.3% of those had revenue above $20M (or US$14M). Table 1 also shows that large firms, although limited to a very few, have a significant weight in the market. Indeed, a worker often works for a number of different firms.

Table 1: Size of firms and economic weight in Construction

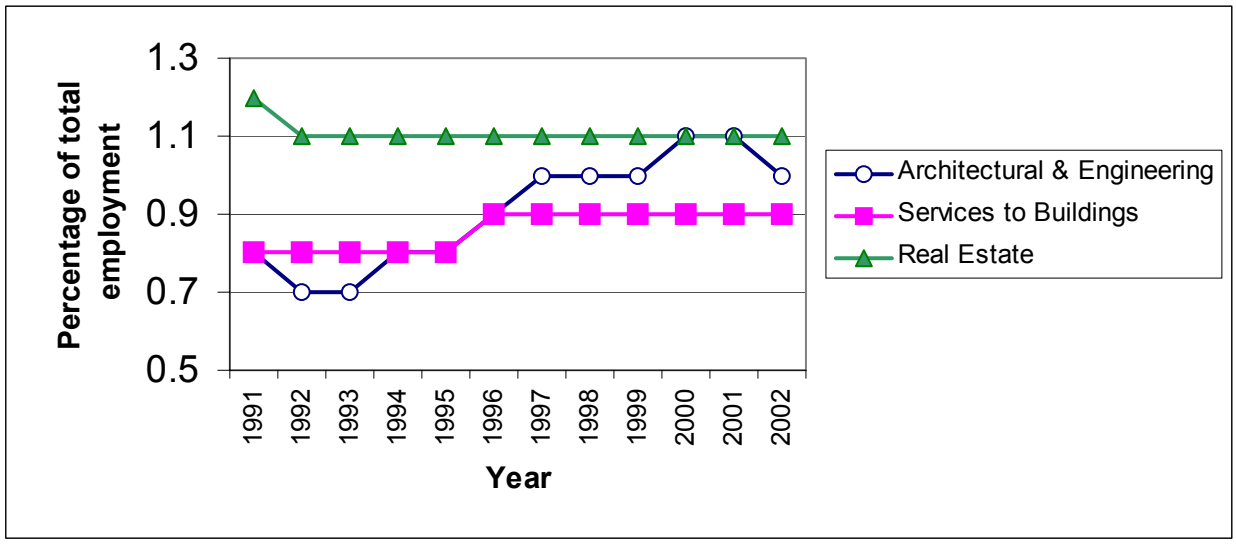
Size of firms In term of annual revenue	**% of total industry firms**	**% of total industry revenue**
Less than 2M of $Can	95.57	32.55
Between 2 and 20 M$Can	4.14	40.22
More than 20M of $Can	0.29	27.23

Source: Statistics Canada (2003), Business Register

As previously mentioned, data on other related construction sectors are barely available, particularly on the manufacturing side. Concerning construction services, it has been possible to gather some information. As we observed in construction – general contractor and specialty trade – we also identified different characteristics between sub-sectors in services.

While the relative importance of employment in the Real Estate sector (NAICS 531) and in Services to Buildings and Dwellings (NAICS 5617) has been rather stable in comparison to the total employment in the country, employment Architectural and Engineering (NAICS 5413) has slowly become more significant (Figure 5). In 2002, employment in Services to Buildings accounted for 0.9% of total national employment, Architectural & Engineering for 1.0%, and Real Estate for 1.1%. Therefore, employment in services related to construction represented of 3% of the total national employment in 2002. The services sector is becoming as much as important than the general and trade contractors one (with about 4.5%).

Figure 5: Employment in Architecture & Engineering, Services to buildings, and in Real Estate in percentage of total national employment, in annual persons



Source: Statistics Canada (2003), CANSIM Table 281-0024, Employment in annual persons

MANAGING EXISTING STOCK OR REPLACING OLD FACILITIES

In Canada, we don't have strong evidence that supports the increasing importance of managing existing stock, as it is the case in many European countries. As shown in Table 2, the share of major repairs and renovations in total construction expenditures has been rather stable in the 90s, at about 24%. Unfortunately, data for a longer period of time are not available.

However, looking at the share of major repairs and renovations in each construction category of Table 2, we can see a steadily increase in all sub-sectors, except of engineering works. Managing existing stocks appears particularly important in residential buildings (accounting for about 40% of total construction) as well as in institutional buildings (with a 30%).

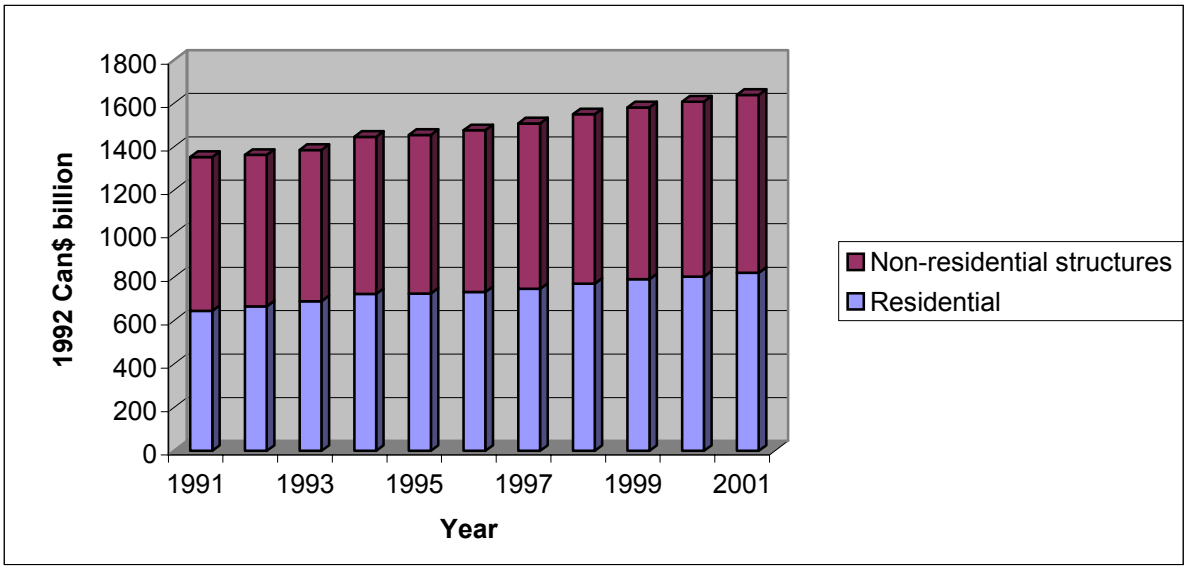
Table 2: The share of major repairs and renovations in total construction expenditures, by category of construction, from 1992 to 1997

Category	Share of repairs and renovations by category, in %					
	1992	1993	1994	1995	1996	1997
Total Construction	23	24	24	23	25	23
Residential building	37	39	40	44	44	41
Non-residential bldg.	16	20	18	15	20	20
Industrial building	5	7	8	6	11	10
Commercial building	17	22	18	17	17	22
Institutional building	23	24	24	20	34	31
Engineering works	7	8	7	6	7	5

Source: Statistics Canada (2003), CANSIM Table 029-0003 (terminated in 1997)

Although repairs and renovations expenditures don't reach a level such as we can find in some European countries, existing construction stock is important in Canada and has a significant impact on construction activities. Figure 6 shows that total construction assets have slowly increased by an average of 22 billion dollars per year from 1990 to 1998, and essentially due to residential construction. Therefore, annual expenditures for new constructions in non-residential and engineering works, which accounted for more than 50 billion dollars per year, are essentially for replacing old facilities.

Figure 6: Total Construction Assets



Source: Statistics Canada (2003), National Balance Sheet, modified from current to constant 1992 Canadian dollar.

MAIN REGULATIONS AND ACTORS

In Canada, provincial and territorial governments have constitutional responsibility for building regulations. Each province or territory regulates businesses, safety issues, and many aspects related to human resources and training. Moreover, they might delegate some responsibilities, such as construction permits, fire risks regulations, urban infrastructure construction and maintenance, and real estate taxes to an incorporated municipality. Provinces and territories can also stimulate construction activities with community development projects or by providing business support to firms.

Very few construction specific aspects are regulated by international institutions. Some construction firms are registered ISO, and some construction technical standards are being developed. International trade agreements like the North American Financial and Trade Agreement (NAFTA) or through the World Trade Organisation (WTO), have rules that prohibit product standards and codes from being used as barriers to trade. Bi-lateral agreements between USA and Canada governments also regulate access by firms from both countries to all major public procurement projects.

The national level is responsible for facilitating trade across the country as well as for international trade agreements. Model building and fire codes, based on the best information collected in an independent, participatory process, are developed by a national organization, the Institute for Research in Construction. These model codes are reviewed, modified if required, and adopted by provincial governments as mandatory

minimum requirements. Generally, provincial legislation delegates to municipalities responsibility for the day-to-day enforcement of codes. Model codes are also used or referred to in voluntary standards. Standards certification and quality assurance falls under the National Standards System of Canada, which comprises various accredited standards-writing organisations, certification agencies, accredited laboratories and quality-assurance organisations. Certification has become the norm for certain product areas such as electrical and plumbing. Finally, the federal government, through Canada Mortgage and Housing Corporation (CMHC), looks for improving housing access and quality to Canadians as well as promoting the export of Canadian housing products and expertise. CMHC ensures a competitive housing mortgage system as well as promotes housing quality standards.

Professional associations have codes of practice and ethics that both affect building and business practices, as well as product quality. In agreement with provincial or territorial regulations, many of these associations limit practice to members in their jurisdiction, and that has an effect on procurement and sub-contracting systems. For instance, works must be offered to members of a trade union, before opening to other workers.

Trade unions also serve an important role in the construction industry, with approximately 35-40% of the construction industry labour force claiming union affiliation. Union, like professional association, have codes of practice that affect construction processes, human resources management, product quality and sub-contracting systems. In most provinces, union-employer joint training boards or similar organisations administer apprenticeships in the unionized portion of the industry. In addition, the provinces and territories, with assistance from the federal government, have established a program of mutual recognition of trade qualifications – the Interprovincial Standards Program. This program, in conjunction with organized apprenticeship training, helps create a highly skilled and mobile work force in Canada. Finally, in many jurisdictions, safety measures and procedures are jointly managed, between the union and an owner association.

Real estate or facility managers associations are becoming much more active in promoting product and service quality, as well as effective procurement systems. They have developed quality standards in operating costs, services and energy efficiency, as well as they have promoted best practices in procurement systems. These standards are essentially voluntary. A part from these professionals, there is a very weak involvement of consumers associations in building design and construction. A few associations promote disable access to public buildings and facilities case by case. The Canadian Human Rights rulings take precedent in that situation. Finally, credit unions and some housing coops are organized to assist their members in purchasing of and/or operating dwellings.

Figure 7 summarizes our discussion on construction regulations and institutions. A check mark indicates that a type of actors is involved in one field of construction regulations.

Figure 7: Main Institutions and Field of Regulations

Regulations / Institutions	Buildings and materials			Firms			Environment of the firms		
	Construction permits	Rules on structures	Rules on materials	Professional rules and firms standards	Safety & security and HR management	Agreements on price and quality of products and services	Competition and procurement systems	Financing Taxation	R & D support Education
International				X (ISO)		X (standards)	X (trade)		
National Government		X (model codes)	X (model codes)			X (standards)	X (trade)	X (housing)	X
Regional and local authorities	X	X	X	X	X		X	X	X
Professional organisations		X		X	X	X	X		X
Trade unions		X				X	X		
User Associations			X			X	X	X	

MAJOR ISSUES AND TRENDS

The Canadian construction industry is still highly fragmented, composed of numerous very small firms. Moreover, construction related activities are dispersed among many different economic sectors including manufacturing, engineering and design, contracting, and a series of services for managing existing facilities. This fragmentation constitutes a very important challenge for developing new standards or for facilitating adoption of innovations, as these processes require effective knowledge flows throughout the industry.

This paper made an attempt to assess the overall construction cluster in Canada. However, many economic activities of the cluster are not captured by official statistics. Manufacturing of building products or equipment is not a specific category. Another statistical limitation relates to the design and engineering services that include non-construction activities (i.e. industrial engineering, manufacturing processes). Furthermore, construction is a very pervasive activity undertaken by almost every residential owners and firms, and these "in-house" construction activities are only partially captured by official statistics.

We have seen that data on expenditures in major repairs and renovations certainly underestimated the importance of managing existing stock in Canada. Facility operation and construction maintenance non-capital costs are not included in these expenditures. For instance, infrastructure repairs are not accounted as construction capital expenditures by municipalities. We also saw that essentially all new constructions in non-residential and engineering works have replaced existing stock in the 90s.

Do we have sub-systems within this wide construction cluster? This question is very difficult to answer with existing data, but we provided some partial information that indicates significant differences between some sub-sectors. Productivity levels are quite different from one sector to another, being particularly high in the engineering sector in comparison with residential as well as repair construction. We also stressed that repairs and renovation are marginal activities in industrial buildings and engineering works.

These partial data certainly provide some evidences of sub-systems. It appears that engineering works constitute a sub-system characterized by a strong focus on new construction and high added-value projects. Another sub-system would be residential construction that produces lower value-added products and much more involved in repair activities. Somewhere in between, non-residential building appears to be associated in a cluster with a number of construction services and owners having their in-house construction maintenance and repair capabilities. However, these conclusions are still quite tentative and much more information would be required to better identify each major construction sub-systems. A recent study (Seaden, 2003) stresses that firm's size could be a more important factor than sub-sector for explaining distinct characteristics such as market strategies, business practices, human resources management and innovation focus.

REFERENCES

CARASSUS, J. (1999) *Construction System: From a Flow Analysis to a Stock Approach*, Working Paper presented to CIB TG31 Workshop, Cape Town, 9 September.

GANN, D. M., SALTER, A. J. (2000) *Innovation in project-based, service-enhanced firms: the construction of complex products and systems*, Research Policy, 29, pp. 955-972

INDUSTRY CANADA (1998) *Sector Competitiveness Frameworks Series – Construction, Changing Conditions and Industry Response*, Government of Canada

INUSTRY CANADA (1996) *Sector Competitiveness Frameworks Series – Consulting Engineering, Overview and Prospects*, Government of Canada

MILLER, R., LESSARD, D. R., MICHAUD, P., FLORICEL, S. (2000) *The Strategic Management of Large Engineering Projects: Shaping Institutions, Risks and Governance,* MIT Press, Cambridge, USA

SEADEN, G (2003) *Measuring Canadian Construction Innovation,* Report prepared for the Institute for Research in Construction, National Research Council of Canada, May.

STATISTICS CANADA (2003) CANSIM Table 379-0019, Gross Domestic Product at basic prices

STATISTICS CANADA (2001) *Canada Year Book*

STATISTICS CANADA (1990 to 2000) Labour Force Survey

STATISTICS CANADA (1999), *Capital Expenditures by Type of Asset, 1997*, Cat. No. 61-223-XIB

CHAPTER IV

THE DANISH CONSTRUCTION SECTOR IN THE 1990S

Niclas Andersson
School of Civil Engineering
Lund - Sweden

INTRODUCTION

As part of a market economy, the Danish construction sector is influenced by upturns as well as recessions of the national and international economy. Historically, the Danish construction sector has played an important role in the Danish economy and has often been used by the government as a tool to regulate the level of business activity. For example, the government can decide to initiate large infrastructure projects in times of over-capacity in the construction industry. To prevent overheating in the national economy the government diminishes the business activity by reducing the financial building support and by deferring civil-engineering projects. (Bonke and Levring 1996)

The construction sector's proportion of the total gross value added reached a peak in 1972 at 9.9 percent, but was reduced continuously until 1983 (Statistical Yearbook 2001). But, in the 1990s the significance of the construction sector in the overall Danish economy has decreased. In 2000 the construction valued added in GDP reached 3.8 percent.

The Danish construction sector has a long tradition of producing high quality buildings in terms of architecture, handicraft as well as building materials manufacturing. Thus, Danish buildings and constructions are of high standards. At the same time, building costs in Denmark are high in an international comparison. The high level of building costs can be explained by a limited productivity development over the last 30 years, high costs for building materials and too high level of defects in new buildings. Building materials constitute about 60 percent of the total building costs and 15 – 20 percent of new buildings show grave defects after 5 years. (Byggepolitisk Task Force 2000)

The Danish construction industry is to a large extent a domestic market industry and one of the largest industry sectors in Denmark. The entire construction employment was about 330 000 full-time in 1999 when including contractors, professionals, real estate and property management firms and, building material related firms.

Objectives

The objective of this study is to give an overall picture of the Danish construction sector and its development in the 1990s. The paper describes the structure of the construction sector by its activities, main regulations as well as industrial and institutional actors

from a meso-economic approach. The data is presented in a descriptive and principally quantitative format in order to constitute a basis for comparison with construction industries of other countries.

Information Sources

The principal technique used to collect data on the construction sector for this study is literature studies, mainly provided by official statistical data, annual reports and market analysis made by trade association and official authorities. The single main source of information has been Statistics Denmark, which is the official statistics office in Denmark. This office has the central responsibility to co-ordinate all statistics concerning Denmark and the Danish society. Interviews with client representatives, architects and consultant have been another source of information, especially to gain qualitative data on the Danish construction sector system, its institutional actors and rules and regulations.

Statistics Denmark is on the Internet with a web-site (www.dst.dk) containing a wealth of information about Statistics Denmark and its products. The cornerstone of Statistics Denmark's information service on the web is a comprehensive databank, StatBank Denmark, with online access to almost all statistics produced in-house. (Statistics Denmark)

Statistics on Danish national accounts give a detailed overall picture of the economy within the framework of a system of coherent definitions and classifications. The national accounts are in accordance with the definitions in the European System of National Accounts, ESA95, valid since April 1999 in all member states of the European Union. ESA95 is a compatible accounting framework for systematic and detailed description of a total economy, its components and its relations with other economies.

Denmark participates in a binding agreement on the compilation, preparation and, dissemination of statistics as a member of the European Union. Statistics on Danish enterprises contain information on each enterprise presented in a 6-digit activity class named DB93, which is based on the internationally comparable 4-digit activity classification named NACE Rev.1[3]. This system was adopted in order to establish a common statistical classification of economic activities within the European Community in order to ensure comparability between national and community classifications and hence national and community statistics. (EuroStat)

The DB93 has been used as the basis for the description of the Danish construction sector in this study. Construction companies are classified in DB93-code 45, i.e. construction, and constitutes the basis for data presented in Table 2, Table 3, Table 4, Table 5, Table 6, Table 8 and, Table 9 in this paper.

[3] Nomenclature Générale des Activités Economiques dans les Communautés Européennes. Statistical classification of economic activities in the European Community

Table 1: Classification of Group 45 Construction, NACE Rev.1

45	Construction		
45.1	Site preparation	45.4	Building completion
45.11	Demolition and wrecking of buildings, earth moving	45.41	Plastering
45.12	Test drilling and boring	45.42	Joinery installation
45.2	Building of complete constructions or parts thereof, civil engineering	45.43	Floor and wall covering
45.21	General construction of buildings and civil engineering works	45.44	Painting and glazing
45.22	Erection of roof covering and frames	45.45	Other building completion
45.23	Construction of highways, roads, airfields and sport facilities	45.5	Renting of construction or demolition equipment with operator
45.24	Construction of water projects	45.50	Renting of construction or demolition equipment with operator
45.25	Other construction work involving special trades		
45.3	Building installation		
45.31	Installation of electrical wiring and fittings		
45.32	Insulation work activities		
45.33	Plumbing		
45.34	Other building installation		

(Statistics Denmark)

Monetary values in the paper are stated in the European currency Euro, expressed with the currency code EUR. (1 EUR = 7.4383 DKK by 15th of August 2001, except in Table 4, Table 5 and Table 6 where 1 Euro = 7.45 DKK).

CONSTRUCTION AS PART OF DANISH NATIONAL ECONOMY

In the 1990s, the Danish economy has moved from an initial period of stagnation and falling employment to a period of economic boom and a return to the previous employment levels. The lean years in the early 1990s showed an average annual economic growth of less than 0.6 percent (based on GDP[4] in 1995 reference prices). This development was turned around at the end of 1993 when a strong economic recovery began. The average annual growth in GDP was 3.4 percent from 1994 to 2000 (see Table 2). The construction sector followed the movement of the nation al economy and reached the lowest level of added value[5] in 1993. Construction value added levelled out at about 6 percent of GDP in the second half if the 1990s.

[4] GDP – Gross Domestic Product. The total value added or net output of all firms in an economy is called the Gross Domestic Product (GDP). The GDP estimate is based on the returns that firms provide. These returns are based on selling prices, which relate to new goods that immediately begin to depreciate. The term domestic refers to output or product made within the national borders of an economy (Ive 2000).

[5] The "value added" is defined as the difference between the value of inputs (excluding immediate labour and fixed capital, which are not treated as inputs) and the value of outputs. (Ive 2000).

Table 2: GDP, Value Added and Total Gross Fixed Capital Formation (Billion EUR, 1995 Reference Prices)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
GDP	123.1	124.5	125.3	125.3	132.1	135.8	139.2	143.3	146.8	150.7	155.1	157.3	159.8
Gross value added, total	106.8	107.8	108.2	108.3	113.6	117.1	119.8	123.2	126.1	130.0	134.5	136.7	138.9
- Manufacturing Industry	19.1	18.8	18.6	17.7	19.6	20.7	19.8	21.4	21.5	21.9	22.7	23.7	23.8
- Construction (DB 45)	5.8	5.5	5.5	4.9	5.3	5.5	5.8	5.6	6.1	6.5	6.6	6.2	6.2
Construction in GDP (%)	4.7%	4.4%	4.4%	3.9%	4.0%	4.1%	4.2%	3.9%	4.2%	4.3%	4.3%	3.9%	3.9%
Total Gross Fixed Capital Formation	23.3	22.5	22.0	21.2	22.8	25.4	26.5	29.3	32.3	32.8	35.6	36.3	36.3
Building and Construction	12.3	11.0	11.0	10.9	11.0	11.9	13.1	13.8	14.4	13.7	14.7	13.8	13.9
- Residential	4.7	4.2	4.2	4.5	4.9	5.3	5.6	6.0	6.3	6.2	6.8	5.9	6.1
- Non-residential	4.1	3.7	3.7	3.0	2.9	3.4	3.9	4.3	4.7	4.8	5.3	5.3	5.1
- Civil Engineering	3.4	3.0	3.0	3.4	3.2	3.2	3.6	3.4	3.4	2.7	2.6	2.6	2.7
Building and construction in Total Gr. Fixed Cap. F.	53%	49%	50%	52%	48%	47%	50%	47%	45%	42%	41%	38%	38%

(Statistics Denmark 2003)

CONSTRUCTION EMPLOYMENT

The construction employment (DB93 code 45) was 9.4 percent of the total Danish workforce in the 1970. Since then, it has developed in parallel to the decreased share of construction added value in GDP, and was continuously reduced until 1983. From the mid-1980s, construction employment recovered moderately until 1987. In the 1990s, the lowest construction employment level occurred in 1993, after which it increased slowly during the second part of the decade and made six percent of the total workforce in 2000, see Table 3.

Table 3: Danish Construction Employment in the 1990s (in Thousands)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
National Employment	2 794	2 792	2 802	2 805	2 808	2 796	2 773	2 769	2 778	2 789	2 786	2 800	2 803
Construction Employment	171	162	154	140	140	152	154	157	161	165	168	174	173
Construction /Total	6.1%	5.8%	5.5%	5.0%	5.0%	5.4%	5.6%	5.7%	5.8%	5.9%	6.0%	6.2%	6.2%

(Statistics Denmark 2003)

MAIN CHARACTERISTICS OF CONSTRUCTION WORKS

The development of the construction sector over the last decades has influenced the relation between new construction and repair/maintenance. In 1970, new building construction occupied 47 percent of the total number of construction employees and 23 percent were involved in building repair and maintenance works. In 1997, the corresponding figures on building employment distribution show that 32 percent were doing new construction and 38 percent were involved in repair and maintenance. The

development of an increasing impact of repairs and maintenance works is also apparent in terms of production output, see Table 4.
Information presented in this section of the paper origins from Euroconstruct 2001.

Table 4: New Construction and Repair/Maintenance for Building and Civil Engineering Works (Billion EUR in 2000 Reference Prices, 1 Euro = 7.45 DKK)

Construction (taxes excluded)	1996	1997	1998	1999	2000
Total production output	16.57	17.15	17.79	17.26	17.70
Residential, total	5.41	5.80	6.02	6.12	6.47
- New	2.03	2.51	2.72	2.68	2.36
- Repair and Maintenance	3.38	3.30	3.31	3.45	4.11
Non-Residential, total	5.14	5.51	5.90	6.01	6.12
- New	2.91	3.17	3.49	3.51	3.44
- Repair and Maintenance	2.23	2.33	2.41	2.50	2.68
Civil Engineering, total	6.02	5.84	5.86	5.13	5.11
- New	3.90	3.78	3.82	3.14	3.04
- Repair and Maintenance	2.13	2.05	2.05	1.99	2.07

(Euroconstruct 2001)

Both residential and non-residential construction has shown a similar and stable upturn in the second half of the 1990s. In 1996 residential and non-residential construction constituted 33 and 31 percent of total production output. In 2000, the same measures were 37 and 35 percent. Civil engineering works has declined in the second half of 1990s, not only in relation to residential and non-residential construction but also in actual production output. Civil engineering works dropped from 36 percent of total production output in 1996 to 29 percent in 2000. In terms of investments, civil engineering dropped from EUR 3 432 million in 1998 to EUR 2 811 million in 1999. Part of this sudden drop can be explained by the fact that the bridge between Sweden and Denmark, and the roadwork done in connection with this, were completed in 1999.

Characteristics of Residential Construction
In the second half of the 1990s, there has been a price increase on one-family houses in major city areas of Denmark. This trend is particularly explicit in the capitol area of Copenhagen. As prices increase, new construction becomes more favourable compared to buy on the existing housing market. Another factor that supported new construction was high energy costs that made running expenses in new and well-insulated houses lower than in old ones.

A requirement for new residential buildings is that local authorities permit attractive building sites to be developed. Local authorities can have an ambiguous attitude towards this. New buildings can involve new taxpayers but the cost for extended public services and infrastructure systems can also be considered too high. In general, young families are attracted to new housing developments and they require services such as kindergartens and schools, which will burden the existing local taxpayers. In the 1990s, the state support was reduced and the municipalities had to take a greater responsibility for subsidies and as a consequence, general subsidised housing were on a declining

trend by the end of the decade. Dwellings built by private companies, developers, pension funds etc. are, however, not subsidised.

The house price development in the second half of the 1990s has strengthened the disparities of prices on the market of single-family houses. Increased prices are concentrated to central parts of Copenhagen, coastal villages or other attractive locations in Denmark and consequently, this are the areas where the main parts of new building activities take place. Small towns or villages in less attractive areas have faced a stagnated building activity in the 1990s.
Above the new production of flats and one-family houses in Copenhagen, there are a large number of existing rented flats. Many of these rented flats are subject to rent restrictions and hence, have a low rent. These flats are rarely available on the free market and consequently, will not damp the demand for owner-occupied flats or single-family houses.

Characteristics of Non-residential construction
Non-residential construction can be divided into industrial buildings, office buildings and other non-residential buildings such as commercial, agricultural or buildings for public services (see Table 5). In the second half of the 1990s the production of new office buildings has been expansive, especially in Copenhagen as were the case for new residential production. The extend need for offices is connected with increased employment in the service sector in the 1990s. The existing stock of office buildings in central Copenhagen is full up, which intensifies the need for production of new office premises. (Euroconstruct, 2001)

Table 5: Production output of Residential, Non-Residential and Civil Engineering Works (Billion EUR in 2000 Reference Prices, 1 Euro = 7.45 DKK)

	2000	
Construction, total output[6]	17.70	100%
Residential	6.47	37%
Non-residential	6.12	35%
Industrial Buildings	0.61	
Office Buildings	1.02	
Other non-residential	1.81	
Repair and Maintenance	2.68	
Civil Engineering	5.11	29%

(Euroconstruct 2001)

Industrial buildings constitute 16 to 17 percent of new non-residential building in terms of production output. This makes industrial building a smaller segment in comparison to office buildings, which in 2001 constituted almost 30 percent of new non-residential production. However, production of industrial buildings showed an upward trend in the second half of the 1990s, except from a small decline in 2000.

The increased production of industrial buildings can be related to the general upturn in European economy in the late 1990s, which lead to increased Danish export. Biotech is

6 Production output includes repairs and maintenance. Taxes are excluded.

a good example of a growing industry sector that adds fuel to the increased demand for new industry premises. Mature industry sectors on the other hand tend to focus on rationalisation. Their investments mainly concern new machinery and equipment in order to gain automated production processes. This trend moderates the future need for new production of industry buildings.

The segment of other non-residential buildings holds commercial and agricultural buildings as well as buildings for public services. Production of new commercial buildings is damped by bans on mega-shopping-centres and the Danish law restricting opening hours. Agriculture is an important industry sector in Denmark and accordingly, agricultural construction is an important part of the construction sector. The mad-cow decease have indirectly influenced new agricultural building through the political and public discussion on ethical and ecological animal standards, which has led to rising building activity in order to increase indoors living spaces for animals.
Buildings for public services are to a large extent a political matter. On the current political agenda, on the eve of national as well as local elections in 2001, construction of schools and other measures visible to taxpayers are favoured. These types of building investments are to be financed by local authorities, but recently changed regulation has made it possible for local authorities to build schools etc. through external financing or other arrangements. In the second half of the 1990s a few local municipalities made arrangements with private sector facility management companies that build, owns and operates school buildings and the like.

Characteristics of Civil Engineering Construction
Danish civil engineering construction has experienced a number of very large infrastructure projects in the 1990s. The Great Belt Bridge, connecting the Danish island of Zealand (where Copenhagen is situated) and Funen, was completed in 1998. Another great bridge project was the Øresund Bridge between Copenhagen and Malmö in the south of Sweden. This bridge was completed in spring 2000. These major projects, and their related civil engineering works, contributed to a strong civil engineering activity in the 1990s. But, when these projects were completed in 1999, the new civil engineering activity declined by almost 18 percent (see Table 4). One very large infrastructure project still under construction (in 2001) is the Copenhagen Metro system.

Characteristics of Repair and Maintenance
Building repair and maintenance works has showed a moderate increase tendency in the second half of the 1990s. But in 2000, repair and maintenance of residential buildings suddenly increased by almost 20 percent (see Table 4). This sharp increase is connected with a storm in late 1999, the worst storm that hit Denmark in the 20th century. The damages were seen all over Denmark and caused total damages equivalent to about 1 percent of GDP. The largest share of the damages was concentrated to buildings, especially residential buildings but also, to some extent, agricultural buildings.

Table 6: New and Repair/Maintenance of Building and Civil Engineering Works (Billion EUR in 2000 Reference Prices, 1 Euro = 7.45 DKK)

	1996	1997	1998	1999	2000	
Construction, total	16.57	17.15	17.79	17.26	17.70	100%
New Construction Building	4.94	5.68	6.21	6.18	5.80	33%
Repair & Maintenance Building	5.60	5.63	5.71	5.95	6.79	38%
New Construction Civil Engineering	3.90	3.78	3.82	3.14	3.04	17%
Repair & Maintenance Civil Engineering	2.13	2.05	2.05	1.99	2.07	12%

(Euroconstruct 2001)

The storm in late 1999 did not influence non-residential buildings to the same extent as were the case for residential buildings. Non-residential damages were mainly concentrated to agricultural buildings. Instead, employment growth in the service industry and need for repair and maintenance in school buildings are the driving forces in non-residential repair and maintenance works.

Value of the Building Stock

In January 2001, the total Danish population was 5 330 000 of which 50 percent lives in one-family houses and less than 30 percent live in multi-dwelling blocks. The total number of dwellings in Denmark is 2.7 million of which approximately 90 percent are raised in the twentieth century. The largest share (17 percent) of the existing building stock is built in the 1960- and 1970s, which implies that every third person of the Danish population live in a house from this period. The highest production rate was attained in 1973 when 56 000 dwellings was built. As a consequence of the recession of the national economy in the 1980s, only 10 percent of the existing building stock comes from this decade. In the period from 1990 to 1998 the corresponding figure was 5.4 percent, which is even lower.

The total value of the Danish building stock can be estimated by using the real estate valuation that is executed on yearly basis. The valuation is used as a basis for property taxes. As presented in Table 7, the value of the Danish building stock was about EUR 269 billions in 2000, with all assessment buildings included except for real estates (land values).

Table 7: Value of the Danish Building Stock in 2000 (Million EUR)

	Total Value	Buildings	Real Estates	Units (No.)
Total Value of Stock (tax assessment value)	347 248	269 769	77 479	1 930 563
Residential	241 842	188 179	53 663	1 570 065
Non-residential	52 449	39 961	12 488	228 660
Industry, including farming	52 957	41 629	11 329	131 838
Value of Stock in GDP (in 2000)	2.24			

(Statistical Yearbook 2001)

SEGMENTS IN THE DANISH CONSTRUCTION MESO-SYSTEM

In 1994, construction activities involved approximately 30 000 companies of which about 5 000 were contracting firms with a total turnover of EUR 5.7 billion. Of these contracting firms only about 100 had turnovers exceeding EUR 13.4 million and less than 20 firms had turnovers of more than EUR 67 million. Accordingly, the largest category in terms of turnover was general contractors, which size reflects the extensive use of subcontractors in Denmark. The largest category in terms of number of companies is joineries. In 1994 there were more than 7 000 joinery firms with a total turnover of EUR 1.9 billion (Bang et al. 2001).

The structure of construction companies, i.e. general contractors and specialised contractors, showed in 1998 that small firms represented a majority of the number of companies. Companies with less than 20 employees represented 96 percent of the number of companies and almost 50 percent of the total production.

The following tables, Table 8 through Table 12 presents different segments in the Danish construction sector system and are based on data from Statistics Denmark. Note that the tables do not give the number of companies but the number of work places. A company is legally and financially responsible for the operation of its business unit or units. Each company consists of one or a number of work places. A work place is a defined part of a company situated at a given address, which produces one, or mainly one, type of goods or service. Thus, work places are the sites where physical production of goods or services takes place.

The number of working places and number of companies are likely to be equal for small companies. A company with only a few employees is probably organised as a single unit, geographically oriented in the same location, and accordingly constitutes a single work place. A large company, on the other hand, is likely to be organised in a number of work places at different locations.

Table 8: Contractors[7] by Number of Work Places and Employees (November 1999)

Size of work places (by number of employees)	Number of work places	% of Total	Number of Employees	% of Total
1	2 810	38.6%	2 810	4.2%
2-4	1 838	25.3%	5 112	7.7%
5-9	1 200	16.5%	7 972	12.0%
10-19	733	10.1%	9 778	14.7%
20-49	481	6.6%	14 628	22.0%
50-99	140	1.9%	9 567	14.4%
100+	72	1.0%	16 504	24.9%
Total	7 274	100.0%	66 371	100.0%

7 Contractors correspond to DB93-codes 45.1 through 45.2.

Table 9: Specialised Construction[8] by Number of Work places and Employees (November 1999)

Size of work places (by number of employees)	Number of work places	% of Total	Number of Employees	% of Total
1	7 052	38.3%	7 052	6.2%
2-4	5 018	27.2%	13 993	12.4%
5-9	3 334	18.1%	21 931	19.4%
10-19	1 977	10.7%	26 135	23.2%
20-49	841	4.6%	24 144	21.4%
50-99	146	0.8%	9 800	8.7%
100+	48	0.3%	9 795	8.7%
Total	18 416	100.0%	112 850	100.0%

Specialised construction firms generally act as subcontractors doing electrical, plumbing, ventilation or other service installation works. The number of work places and employees in this category is about the double compared to contractors. The figures in Table 8 and Table 9 show that the structure of Danish construction firms (DB93 code 45) is fragmented with a large number of small business units and few large companies. The category of construction professionals includes architects as well as construction engineers, see Table 10.

Table 10: Professionals[9] by Number of Work Places and Employees (November 1999)

Size of work places (by number of employees)	Number of work places	% of Total	Number of Employees	% of Total
1	3 309	56.8%	3 309	8.2%
2-4	1 233	21.1%	3 281	8.2%
5-9	590	10.1%	3 959	9.9%
10-19	363	6.2%	4 847	12.1%
20-49	225	3.9%	6 722	16.7%
50-99	52	0.9%	3 764	9.4%
100+	58	1.0%	14 260	35.5%
Total	5 830	100.0%	40 142	100.0%

Real estate actors can, in an overarching perspective, be divided into the two major groups of real estate firms and property management firms. Real estate firms are basically defined as estate owners while property management firms provide real estate related services. In this context there is no distinction made between property management and facilities management firms. Denmark Statistics, the main information source in this study, does not present specific information on facilities management firms. Table 11 presents information on real estate, property management firms and estate agents as one group, defined by DB93-codes 702010-702040, 701100-701200 and 703110-703220. The business trade of estate agents focuses on the selling process of real estates including advertising, domiciliary visits, inspections, contract documents etc.

[8] Specialised construction firms are defined by DB93-codes 45.3 through 45.5.
9 Professionals are defined by DB93-code 74.20.10 through 74.30.90.

Table 11: Real Estate, Property Management and Estate Agents by Number of Work Places and Employees (November 1999)

Size of work places (by number of employees)	Number of work places	% of Total	Number of Employees	% of Total
1	8 661	59.3%	8 661	20.6%
2-4	4 150	28.4%	10 754	25.5%
5-9	1 148	7.9%	7 362	17.5%
10-19	431	3.0%	5 675	13.5%
20-49	167	1.1%	4 907	11.7%
50-99	41	0.3%	na	na
100+	8	0.1%	na	na
Total	14 606	100%	42 105	89%

Table 12 consists of building material manufacturers of various kinds and Table 13 presents building material wholesale and retail trades. The structure and disparity of the material manufacturing industry and wholesale trades makes it difficult to distinguish the construction activities from other industry sectors. For example, manufacturers of wood fibreboards do not only supply the construction sector but also cabinet-makers, boat builder or others. This category is part of the construction but also other industry sectors. The information in Table 12 includes the DB93 codes 201010 - 205200, 263000 – 268290 and, 281100 – 285200. Table 13 is based on DB93 code 515310 through 515320.

Table 12: Building Material Manufacturers by Number of Work Places and Employees (November 1999)

Size of work places (By number of employees)	Number of work places	% of Total	Number of Employees	% of Total
1	1 265	29.8%	1 265	2.1%
2-4	962	22.6%	2 720	4.5%
5-9	745	17.5%	4 989	8.2%
10-19	580	13.7%	7 861	13.0%
20-49	441	10.4%	13 314	22.0%
50-99	163	3.8%	11 141	18.4%
100+	92	2.2%	19 277	31.8%
Total	4 248	100.0%	60 567	100.0%

Table 13: Building Wholesale Trade by Number of Workplaces and Employees (November 1999)

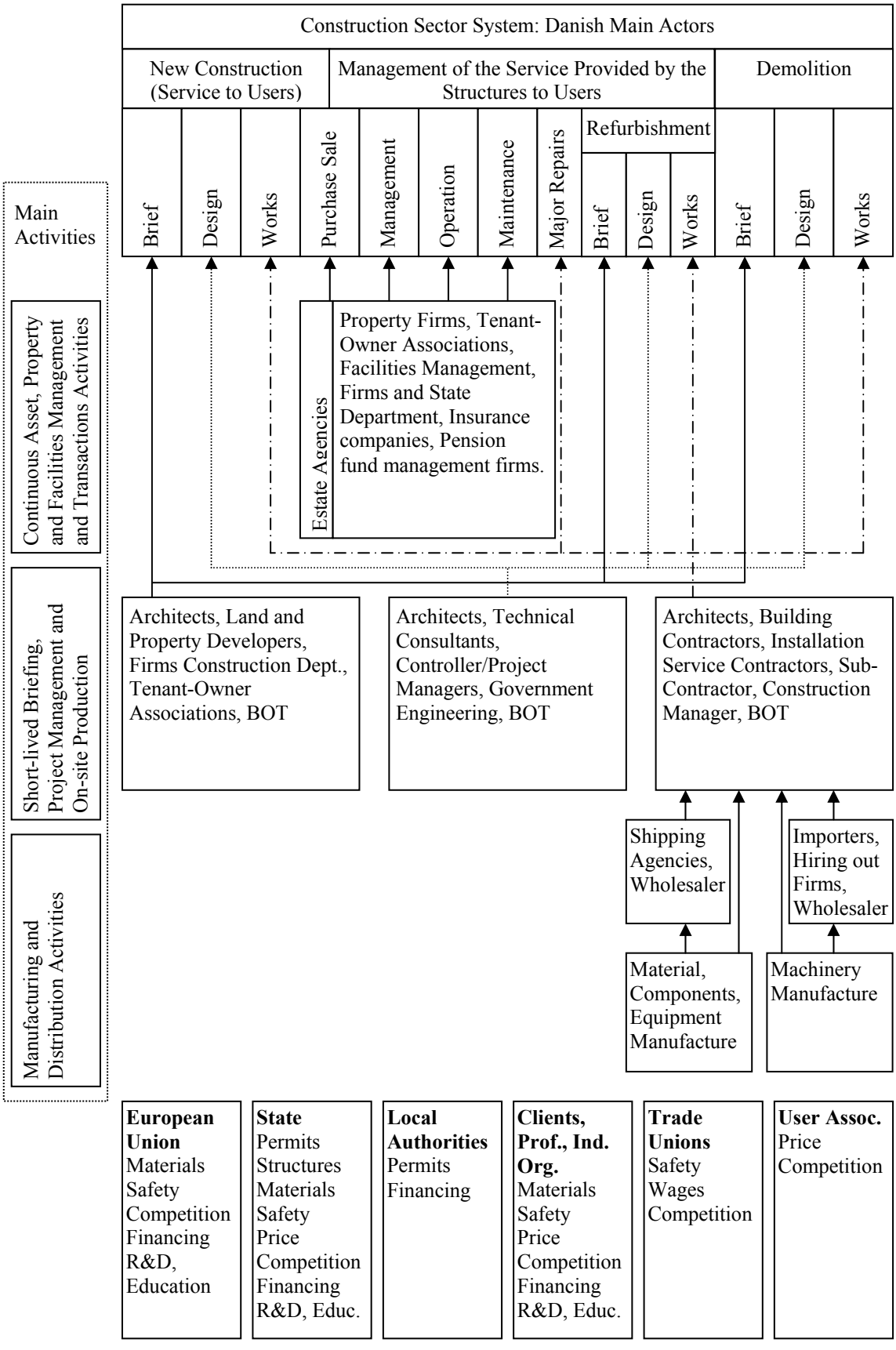
Size of work places (By number of employees)	Number of work places	% of Total	Number of Employees	% of Total
1	250	5.9%	250	1.9%
2-4	248	5.8%	702	5.4%
5-9	166	3.9%	1 126	8.7%
10-19	159	3.7%	2 159	16.7%
20-49	155	3.6%	4 590	35.5%
50-99	47	1.1%	3 147	24.4%
100+	8	0.2%	947	7.3%
Total	1 033	24.3%	12 921	100.0%

THE DANISH CONSTRUCTION SECTOR SYSTEM

The history of the Danish construction sector system, see Figure 1, shows that the Danish government has had significant impact on industry development. In the post-war period a number of political actions from the Danish government has influenced the construction sector. After the Second World War the need for dwellings was urgent in Denmark due to high birth rates, urbanisation and a long period of low production output during the wartime. At this time the building industry, mainly constituted by craft-based companies, was incapable of rapidly upgrading the quantity and quality of production. The early legislative actions, executed by the Danish Ministry of Housing, were then focused on production industrialisation as a means to enhance productivity. The Danish government introduced addressed financial support, standards for building components, tax legislation and unified construction rules and regulations.

During the last two decades, the public policy approach has become more decentralised and market oriented. Local and regional authorities set the levels of local and regional taxes and control the majority of public service facilities such as hospitals, health care, service and housing for elder or disabled people, schools etc. A considerable part of local and regional spending is, however, determined by national laws, by Central Government regulations and by agreements with the Ministry of Finance on minimum standards, local and regional tax levels etc. (Euroconstruct, 2001)

Figure 1: The Danish Construction Sector System



DANISH MAIN REGULATIONS AND INSTITUTIONAL ACTORS

The main construction policy instruments of the 1990s were categorised by a series of development programmes that dealt with technical themes of current interest along with technical regulations that affected the building product and procurement regulations. The Ministry of Building and Housing was engaged in the harmonisation process towards European market integration. This process included areas such as the tendering procedures, public procurement, and technical standards on design as well as building materials. Consequently, the Ministry of Building and Housing involved other Ministries in the policy approach on the Danish building sector.

Table 14 presents an overview of institutional actors and their corresponding regulations that characterise the Danish construction sector. (The main information sources for this section of the paper are Bang et al. 2001 and Bonke and Levring 1996).

Table 14: Regulations and Institutional Actors on the Danish Construction Industry

Regulations / Institutions	Buildings and Materials			Firms			Environment of the Firms		
	Construction Permits	Rules Concerning Structures	Rules Concerning Materials	Professional Rules and Firms Standards	Safety/Security and Personnel Management	Agreements on Price and Quality of Products and Services	Competition and Procurement Systems	Financing Taxation	R&D Support Education
International institutions		X	X		X		X	X	X
Government	X	X	X	X	X	X	X	X	X
Regional and local authorities	X							X	
Client, industrial, professional organisations		X	X	X	X	X	X	X	X
Trade Unions					X	X	X		X
User Associations						X	X		

Construction Permits

In Denmark, construction permits are needed for new buildings, constructions as well as for major rebuilding projects. The client is obligated to submit a written application describing the purpose of the building, the structural design, the site location etc. to the local authorities. Permits are accorded by local authorities and are regulated by the detailed development plan. In case of minor works or renovations of flats, it is sufficient for the client to notify the local authorities before commencing the work. The authorities must react within a certain time if they intend to stop the work.

The Danish Building Act, which is in force nationwide, controls among other things the interaction of new buildings and existing buildings.

Rules Concerning Structures

The Building Act (Byggeloven) is the general Danish law on buildings and constructions. The principal aim of the Building Act is to ensure that building and

construction are satisfactory performed and established in terms of fire safety, security and health. The Building Act contains of two basic regulations; Bygningsreglementet BR95 for residential and non-residential buildings and BR-S98, which specifically comprise one-family houses. These building regulations contain technical directions for the property, application of the building, structural design, building materials, fire safety, insulation, installations etc.

Danish rules and regulations on structural matters are regularly amended to comply with the various directives adopted by the European Union.

Rules Concerning Materials
All major categories of materials are covered by control on a European, governmental and/or industry level. National controls are conducted by internationally recognised Technical Institutes, independent of the material manufacturers. Building materials with a European Union certificate get immediate access to all markets within the European single market without having to go through new certification procedures for every new country.

On an industry level Danish manufacturers have established their own control organisation managed by the independent Technological Institute. For example, the industrialised production of windows is manufactured according to specifications of the Danish Window Control.

Professional Rules and Firms Standards
Beside national rules and regulations, the parties of the construction industry have agreed on a common set of building and legal conditions called AB92, General Conditions for Works and Supplies for Building and Civil engineering Works. AB92 covers a substantial part of all contracts between client, contractor and suppliers in construction works and it regulates matters of payments, time extensions and delays, defects, disputes etc. ABR89 is the corresponding condition regulating the relation between client and consultants. In 1993 the Ministry of Building and Housing introduced the ABT93, which covers the contractual relations in design and build contracts.

In Denmark there is legitimate claim on qualifications for professionals to carry out certain works. For example a special licence is needed to work as an electrician or for certain building services installations.

Safety/Security and Personnel Management
The overall framework for safety and security matters in construction is the Danish Working Environment Act. On basis of this act, the Ministry of Labour and the Working Environment Service formulate detailed administrative regulations. A general position in the regulations imposes the building actors to choose procurement system, materials, machinery etc. in order to minimise risk on health and safety matters. A detailed security plan describing the organisation of the building site, a project schedule, identification of high risk working areas etc., must be made in every building project exceeding a certain size or duration.

Clients have a formal responsibility for safety matters of their respective building or construction projects. Normally, this responsibility is transferred to the architect or main contractor. A safety organisation including the client, one employee and one representative of each employer has regular meetings during the production phase of a project. The safety organisation continuously updates the health and safety plan of the project.

Danish rules and regulations on working environmental matters are regularly amended to comply with the various directives adopted by the European Union.

Agreements on Price and Quality of Products and Services
The Danish Ministry of Housing initiated the so called "quality assurance and liability reform" in 1986 as an attempt to establish formal procedures to improve the quality of the construction industry output. The reform applied to all governmental financed building activities, but the ambition was that principles and concepts would also spread into private building activities as well as civil-engineering projects. Later, the reform was included in the General Conditions for Building Works, AB 92. As part of the reform, the Ministry of Housing also initiated an independent, non-profit, insurance institution called the Building Defects Fund, Byggeskadefonden, which is an insurance pool against defects in all state financed or subsidised building activities.

The Danish law "Lejelovgivningen" puts a limit on the maximum building production cost per square meter in order for non-profit tenant co-operative societies to grant public financial support. In apartments with public financial support the rent level is adjusted to prime costs.
On a company level, particularly among some of the larger general contractors and producers of building materials, the ISO-9000 standard has been implemented to manage the quality process.

Labour wages are decided on supply and demand basis of the labour market. Thus, there is no upper limit to the wages whereas the minimum level is negotiated by the parties' organisations. Blue-collar wages are either based on an hourly payment or on a contract rate. The wages are fixed as a result of a partly central negotiation process between the employer and employee organisations and a partly local agreement directly between the employer and the site workers.

Danish trade unions have high member rates and are well organised. The unions take care of the interests of their members in matters of wages, working conditions etc. The grouping of different trades in unions has emphasised the division of building activities between occupational groups. However, the tendency in recent years develops towards more centralised labour market organisations.

Competition and Procurement Systems
The Danish government and other official authorities follow the European Union regulation on public purchase of goods, services and building contracts for investments

over a specified value. Invitation to tender must be handled and published by the office of European Union official publications.

The Danish tender process is regulated by the Act on Competitive Tenders (Licitations-loven). The purpose of the act is to ensure free and open competition for building and civil engineering works as well as prevent the client from forcing down the bid after the tender. The act contains conditions for bids from two or more parties, bidding at the same time and location, bids are subject to equal conditions and information, bids must be written and are binding and bids are opened and announced in the presence of the bidders.

Financing and Taxation

Public subsidised housing can be divided into a general category, administered and owned by non-profit housing associations, and the special category, which is administered by municipalities. The latter are housing for elderly or disabled people and student accommodations. It is the local municipalities that make the approvals of general subsidised housing. For many years rules have strictly limited total costs (building site plus construction cost) on new general public subsidised housing and a maximum rent level was adjusted to prime costs. In the 1990s, these rules have been eased. Dwellings build by private companies, developers, pension funds etc., are not subsidised.

Governmental taxation and financial support to the Danish construction industry take various forms. For example, the government offers remissions of interest rates for building finance, gives directs subsidies to tenants when renovating or improving dwellings or houses. The general Danish added value tax (including buildings) is 25 percent.

R&D support and Education

The Ministry of Education handles qualification matters related to the technical education in the construction industry as well as matters of basic research conducted within the framework of teaching institutions. The Ministry of Culture handles the education and the training of architects. The educational system related to the construction industry consists of institutions for higher education, technical schools, schools for labour market training and in service training. In general, education in Denmark is considered a public task principally performed by the educational institutions.

The employers' association of contractors financially contribute to a business development fund that supports research and development for the building industry. The trade union acts in councils for vocational training programmes together with the government and employers' association.

CONCLUSION

The analysis of the Danish construction sector presented in this paper puts focus on industry structure and development in the 1990s. This was a decade, characterised by an

initial national economic downturn until 1994, when a period of economic recovery begun. The economic development, besides political policies of diminishing governmental involvement in the construction sector, influenced the construction sector in the 1990s.

The construction industry followed the national economic decline in the early 1990s and reached the lowest construction added value of the decade in 1993. The construction industry lost ground relative to the development of other industrial sectors as well as the national GDP. The changed conditions for the construction sector implied a redistribution of construction works. In the 1990s, investments in residential construction increased by almost 50 percent and non-residential investments increased by almost 30 percent, while investments in civil engineering dropped by fully 25 percent. Further, the importance of repair and maintenance was apparent and reached 50 percent of total production output, including all categories of construction works, in 2000.

The paper presents the structure of contractors, and other actors of the Danish construction sector, as fragmented. Danish construction companies are represented by an obviously large number of very small companies, few middle-sized and, few very large and dominating contractors. The general fragmentation of Danish contractors reflects the characteristics of construction works, which range from very specific repair and maintenance work to major infrastructure projects such as the domestic Great Belt Bridge and the Øresund Bridge between Denmark and Sweden. Other professions, e.g. specialised contractors, real estate firms, property managers, etc. show fragmented structures similar to those of contractors. Fragmentation does not necessarily have to be a problem in itself. However, it indicates the division of construction work into a large number of specialised occupations and accentuates the need for coordination of all actors in the construction process. Traditionally, the Danish architect has a central role in the construction process, especially in the early stages of the process.

REFERENCES

Bang, H. *et al.* 2001. *Innovation in the Danish Construction Sector: The Role of Public Policy Instruments, in Innovation in Construction*. An International Review of Public Policies, Ed. Manseau A. & Seaden G., CIB. SPON Press, London and New York

Bonke, S. and Levring, P., 1996. *The Contracting System in Danish Construction: Pinning Down Autonomy.* Bartlett Research Papers, London & Plan Construction et Architecture, Paris

Byggepolitisk Task Force, 2000. *Byggeriets Fremtid – Fra tradition til Innovation*. Copenhagen: By- og Boligministeriet and Erhvervsministeriet

Euroconstruct Denmark 2001, *51st Euroconstruct Conference – Construction in Europe 2001 – 2003*, Country report edited and formatted by The Copenhagen Institute for Future Studies

Ive, G.J. and Gruneberg, S.L., 2000. *The economics of the modern construction sector*.

Macmillian Press Ltd., London.
Statistical Yearbook 2001. *Copenhagen:* Statistics Denmark

Internet

Statistics Denmark www.dst.dk (2003-06-11)
EuroStat www.forum.europa.eu (2001-11-14)

CHAPTER V

FRANCE : A DIFFERENTIATED AND FLEXIBLE CONSTRUCTION SECTOR SYSTEM

Jean Carassus
Centre Scientifique et Technique du Bâtiment
Paris - France

In France, as indicated in chapter I, economic studies have tended to deal not only with the construction industry but also with the construction production chain. This construction production chain analysis is focused on production and does not deal with services and stock management. The construction sector system approach allows a comprehensive overview of construction activities including services and stock.

The French construction sector system

Taking up the approach proposed in chapter I, based on the services rendered by structures, their life cycle, segments, the three groups of activity and the participant institutions. Figure 1 describes in a simplified form the French construction sector system.

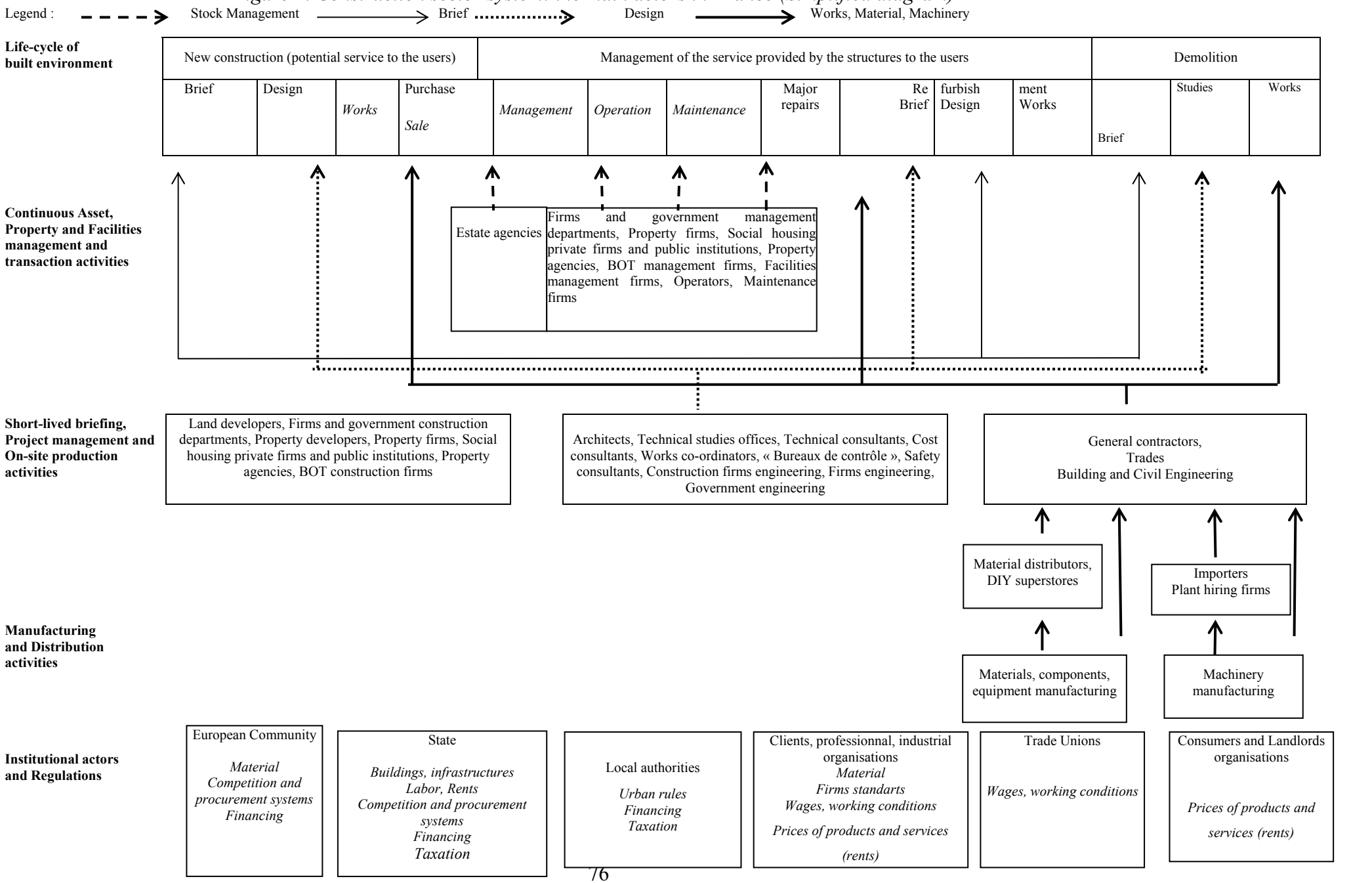
The first group of service activities, related to real-estate management and transactions, are carried out by property and facilities managers and real-estate agents.

In the second group of activities, services involving procurement, design, co-ordination and control are carried out by developers, clients, project managers, designers (architects, engineers, surveyors). The activities of site preparation, implementation of materials, installation of equipment, finishing and, subsequently, repair on site are carried out by general or specialised construction firms.

The third group of activities - industrial production and distribution - are performed by producers and distributors of construction materials, components, equipment and plant.

The main participant institutions are the international institutions (principally the European Community), central government, regional and local authorities, industrial and professional organisations, trade unions and user associations (tenants' associations, consumer groups).

Figure 1. Construction sector system: the main actors in France (Simplified diagram)



The importance of the sector system in the economy

Around 2001, the sector system employed 2358 000 persons, without taking into consideration the firms and government construction, design and maintenance departments and including the construction materials sector in the strict sense of the word (Cf. Figure 2). Downstream services employ some 402 000 people: 271 000 developers, property and facilities managers, real-estate agents; 61 000 architects, quantity surveyors, land surveyors, 70 000 for private technical engineering. At the centre, construction firms employ some 1 599 000 people: 1 222 000 employees, 263 000 craftsmen, 114 000 temporary workers. Upstream, the industry employs 567 000 people: 222 000 in the materials and plant industry, 135 000 in materials and equipment distribution.

In 2000, the added value of construction firms, excluding materials and real-estate services, was 4.3% of GNP against 9.6% in 1970. This evolution must be seen as a part of a global economic shift over this period, characterised by the decline in industrial output (including energy) from 29.5% to 22.1% and the growth of commercial services from 41% to 53%. The share of employment of construction firms is 6.6 % against 7.6% in 1990.

Table 1 – Share of construction industry added value and employment in French GDP and total employment (1990-2000)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Added value	6.2%	6.2%	6.3%	5.7%	5.5%	5.4%	5.1%	4.5%	4.3%	4.3%	4.3%
Employment	7.6%	7.6%	7.4%	7.0%	6.9%	6.8%	6.6%	6.5%	6.5%	6.5%	6.6%

Source : INSEE

Figure 2. Employment in the French construction sector system in 2001

Total = 2 358 000 persons

Developers. property and facilities managers. real estate agencies**
271 000

Architects. quantity surveyors. land surveyors **
61 000

Private technical engineering*
70 000

Construction firms 1 599 000		
Self employed	Employees	Temporary workers
263 000	1 222 000	114 000
including:		
	Engineers and executives	
	96 000	
	Technicians. supervisory managers. employees	
	219 000	
	Skilled workers	
	601 000	
	Unskilled workers and trainees	
	306 000	

Building materials **
210 000

Plant for construction***
12 000

Wholesale trade in construction materials **
121 000

Wholesale trade in construction plant **
14 000

Unit: worker

* 1995 ** 1999 *** 2000

**** firms with at least 20 employees only

Not included :

- Firms and government construction. design and maintenance departments

- Construction suppliers other than building materials and ceramic products

Sources: Ministry of Public Works, Transportation and Housing, Ministry of Economy, Finance and Industry, INSEE.

The size of the existing stock of built structures

The characteristics of the housing stock are well-known, which is not the case for the stock of non-residential buildings and civil engineering infrastructure. In the latter case, the Institut National de la Statistique et des Etudes Economiques *INSEE* (National Statistics Institute) has to proceed by estimating the value of the stock, with a tendency to underestimate. Civil engineering infrastructures are taken into account only if they are included in civil service capital accounts, the value of the land with non-residential buildings is estimated by agreement at 12% of the value of the construction, the land value of the civil engineering infrastructures is incorporated into accounts at zero value and national heritage monuments are not included in accounts (Banque de France and INSEE, 1994).

In 2000, this stock is estimated at 4 502 billion Euros, i.e. 3, 2 times the GNP (Moreau, 1998). Households own the majority of these assets, before companies and local and central government.

Table 2. Estimation and ownership of the stock of building structures in France in 2000

	(€) Amount	%
Households and individual companies	2 565	57
Companies	1 198	27
Local authorities and central government	739	16
Total	4 502	100

Source :INSEE

The weight of households is due to the fact that in France they possess the major part of the housing stock which itself represents 66% of the total estimated stock of structures.

Table 3. Estimation and ownership of the housing stock in France in 2000.

	(€ bn) Amount	% share
Households and individual companies	2 449	82
Companies	484	16
Local authorities and central government	46	2
Total	2 979	100

Source : INSEE

The stock of non-residential buildings and civil engineering infrastructures is mainly owned by local authorities, with a significant part belonging to the State-controlled companies (railways. Electricity, etc).

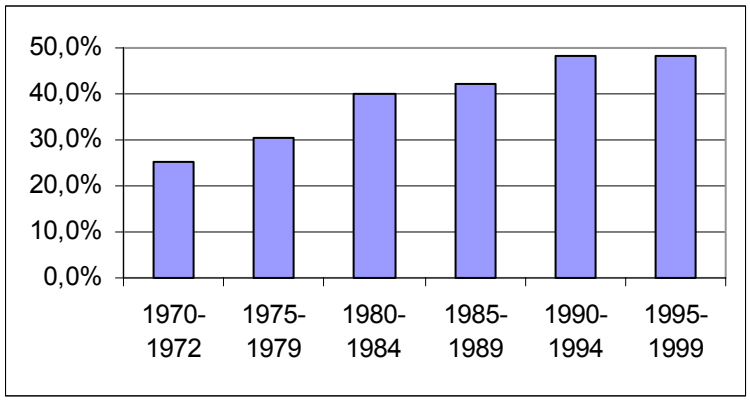
Table 4. Estimation and ownership of the stock of non-residential buildings and civil engineering infrastructures in France in 2000

	(€ bn) Amount	% share
Local authorities and central government	694	45
Companies	713	47
Households and individual companies	116	8
Total	1 523	100.0

Source : INSEE

In 2000, with the revival of new construction projects, improvement-maintenance activities represented 46 % of declared construction work (49 % in building, 35 % in civil engineering). Taking into account household self-production and undeclared work, we can estimate this percentage at 50% (53 % in building). This percentage tends to increase over a longer period of time (cf. figure 3).

Figure 3. - Share of improvement-maintenance in declared construction works in France (1970-1999)



Average per period *Source : Ministry of Public Works, Transportation and Housing*

A differentiated sector system with four big construction companies

When we analyze clients, works and construction firms on the domestic market in 2002 (see figure 4), households, individual companies and developers represent 35 % of declared work ordered by clients, companies 40 %, local authorities 23 % and central government 2 %. Housing represents 43 % of the total amount, non-residential buildings 35% and civil engineering 22%.

The weight of atomised orders from households explains the differentiation of construction companies. Companies employing between 0 and 10 people cover 41 % of net subcontracting work, with the four largest construction companies 12 % (direct works only, sub-contracts not included).

However, exportation included, if the works made by those four companies are evaluated as 9 % of the building market, they represent 45 % of the civil engineering market. The controlled part of the building market is more important, if controlled works through subcontracts were taken into account.

Figure 4 - The construction sector system in France in 2002 (domestic market) : clients. works. companies. 125 billions Euros = 100%

Clients

Households, individual companies and developers T = 35%	Companies T = 40%		Administrations T = 25%	
	private T = 32%	public* T = 8%	Local authorities T = 23%	Central Government T = 2%
B = 31% CE = 2%	B = 30%	CE = 10%	B = 16%	CE = 11%

Works

Housing		Non-residential buildings		Civil engineering	
T = 43%		T = 35%		T = 22%	
N = 21%	RM = 22%	N = 20%	RM = 15%	N = 14%	E = 8%

Companies

Companies with 0 to 10 employees	Companies with 11 to 20 employees	Companies with 21 to 50 employees	Companies with 51 to 200 employees	Companies with at least 200 employees	Four largest construction companies **
T = 41%	T = 11%	T = 17%	T = 13%	T = 7%	T = 10%
B = 38% CE = 3%	B = 10% CE = 1%	B = 13% CE = 4%	B = 8% CE = 5%	B = 3% CE = 4%	B = 5% CE = 5%

* Electricity, railways, airports, canals, mail.
** Vinci, Bouygues, Eiffage, Spie.

Direct works. sub-contracts not included T= total. B = building. CE = civil engineering. N = new constructions. RM = repair and maintenance

Source : Ministry of Public Works, Transportation and Housing
Estimations from the Direction of Economic and International Affairs – September 2003

Let us examine more closely the fragmentation of the construction sector system.

Services (stock management, transaction, development and design) are often dispersed

Real-estate management as an activity is relatively dispersed and estate transaction activity is very fragmented.

Table 5 House renting companies in 1999

Turnover	Workforce	Companies number
19 248 M€	84 102	6 248
Workforce part in companies with:		Part of the first 10 companies in the turnover
0 to 9 employees	at least 100 employees	
6%	70%	12%

Source: Y*early company survey* INSEE

Table 6 Property managers in 1999

Turnover	Workforce	Companies number
3 802 M€	39 863	5 487
Workforce part in companies with:		Part of the first 10 companies in the turnover
0 to 9 employees	at least 100 employees	
41%	22%	25%

Source: *Yearly company survey* INSEE

Table 7 Estate agencies in 1999

Turnover	Workforce	Companies number
6 871 M€	84 332	33 365
Workforce part in companies with:		Part of the first 10 companies in the turnover
0 to 9 employees	at least 50 employees	
69%	2%	4%

Source: Y*early company survey* INSEE

However, we can see that, as far as property and facilities management is concerned, within there dispersed professions, some large companies manage real-estate assets amounting to several tens or hundred thousand dwellings and parking lots.

Real-estate development is also a dispersed profession.

Table 8 Real-estate developers in 1999

Turnover	Workforce	Companies number
9 828 M€	25 476	10 579
Workforce part in companies with:		Part of the first 10 companies in the turnover
0 to 9 employees	at least 50 employees	
51%	13%	13%

Source: *Yearly company survey* INSEE

Design (architects, quantity surveyors and land surveyors) is highly fragmented.

Table 9 Architects, quantity surveyors and land surveyors in 1999

Turnover	Workforce	Companies number
4 487 M€	60 781	27 171
Workforce part in companies with:		Part of the first 10 companies in the turnover
0 to 9 employees	at least 30 employees	
83%	4%	2%

Source: *Yearly company survey* INSEE

Statistics do not distinguish between construction engineering and industrial engineering. Construction engineering is a rather dispersed activity, especially in building.

Notwithstanding some exceptions, companies specialising in real estate management, transaction, development and design are principally local professionals participating in the local market, in response to local demand. Analysis would be different if firms and government management and design departments were taken into account.

Construction companies: diversified fragmentation

At the heart of the construction firms sector, considerable differences exist between building and civil engineering. In civil engineering, orders are less dispersed and the technical level higher than in construction, resulting in lesser dispersion in this sub-sector.

Table 10 Building and Civil Engineering Firms in 2000
Construction (Building and Civil Engineering) Firms

Production	Workforce	Companies number
116 552 M€	1 448 106	293 539
Workforce proportion in companies with:		Proportion of executives, technicians, supervisory agents and employees in the workforce*
0 to 19 employees	at least 200 employees	
62%	13%	20%

Building firms

Production	Workforce	Companies number
90 017 M€	1 244 631	276 721
Workforce proportion in companies with:		Proportion of executives, technicians, supervisory agents and employees in the workforce*
0 to 19 employees	at least 200 employees	
69%	9%	18%

Civil engineering firms

Production	Workforce	Companies number
26 535 M€	243 475	16 818
Workforce proportion in companies with:		Proportion of executives, technicians, supervisory agents and employees in the workforce*
0 to 19 employees	at least 200 employees	
24%	34%	28%

Source: Y*early company survey*, Ministry of Public Works, Transportation and Housing

* 1996

However, it is necessary to analyse the sector more closely by splitting it into 32 activities[10]. This analysis calls into question the distinction between structure fabric and finishings, shellwork being considered – wrongly - as less dispersed. The study has enabled us to distinguish 4 highly differentiated categories of construction activities. Table 12 shows four activities representative of each of these categories.

[10] These activities are defined by the Nomenclature d'Activités Française (NAF), in cohesion with the Nomenclature d'Activités de la Communauté Européenne (NACE).

Table 11 Construction companies: representative examples of the four categories in 2000

11.1. A relatively concentrated activity: general construction companies

Production	Workforce	Companies number
9 872M€	97 658	4 634
Workforce share in companies with:		Share of executives, technicians, supervisory agents and employees in the workforce
0 to 19 employees	at least 200 employees	
20%	29%	28%

11.2. A specialised activity of civil engineering: maritime and river work companies

Production	Workforce	Companies number
352 M€	3 026	210
Workforce share in companies with:		Share of executives, technicians, supervisory agents and employees in the workforce
0 to 19 employees	at least 200 employees	
19%	n a	61%

11.3 A finishing and high-technology activity: electrical installation companies

Production	Workforce	Companies number
14 263 M€	182 488	32 502
Workforce share in companies with:		Share of executives, technicians, supervisory agents and employees in the workforce
0 to 19 employees	at least 200 employees	
51%	25%	29%

11.4 A finishings and low-technology activity: joinery companies (wood and plastics)

Production	Workforce	Companies number
6 926 M€	96 256	26 889
Workforce share in companies with:		Share of executives, technicians, supervisory agents and employees in the workforce
0 to 19 employees	at least 200 employees	
81%	n a	13%

n a: not available due to confidentiality (there are less than 3 companies in this category)

Source: *Yearly company survey*, Ministry of Public Works, Transportation and Housing

The first category of activities covers the main part of civil engineering companies and building general contractors. It represents 26 % of the building sector production in 2000. This is the most concentrated part of the sector: The proportion of companies employing over 200 employees is high, the technical level is high, companies and public administration form the major part of their clientele. The percentage of improvement-maintenance activities, which in general is not very large, can however be strong for certain activities (i.e. railways and roads).

The second category of activities, of lesser size (6 % of production), is mainly made up

of very specialised, high-technology civil engineering companies mostly employing between 50 and 200 employees, with a client base made up of companies and public administration.

The third category is made up of high-technology finishings activities where large and small companies coexist. Their principal clients are companies and there is an important percentage of technical equipment maintenance. This category represents a significant proportion of the sector: 21 % of the building sector production.

Finally, the fourth category concerns the major part of shellwork activities and low technology finishings activities. This category is dominated by companies employing under 20 people and includes a high proportion of craftsmen. Households and individual companies are the principal clients and the proportion of improvement-maintenance work is high. This category is most representative of the sector, covering 48 % of the production.

A more concentrated yet heterogeneous materials industry

Table 12 gives some indication of the construction materials (in its narrowest sense) and plant producers, materials and plant distributors.

Table 12 Producers and distributors of building materials and plant in 1999 and 2000
*Ceramic products and building materials in 2000**

Turnover	Workforce	Number companies
14 272 M€	79 206	692
Workforce share in companies with:		
20 to 49 employees		at least 500 employees
16%		40%

*Construction and extraction plant in 2000**

Turnover	Workforce	Number companies
3 191 M€	12 330	80
Workforce share in companies with:		Part of the first 4 companies in sales
20 to 49 employees	at least 500 employees	
11%	53%	56%

Wholesale trade in construction materials in 1999

Turnover	Workforce	Number companies
30 284 M€	120 930	9 478
Workforce share in companies with :		
0 to 19 employees		at least 100 employees
33%		36%

Wholesale trade in construction plant in 1999

Turnover	Workforce	Number companies
4 829 M€	14 189	1 223
Workforce share in companies with :		
0 to 19 employees		at least 100 employees
33%		29%

* companies with at least 20 employees

Source: *Yearly company survey*, INSEE

As regards production, only companies employing more than 20 people are analysed, which does not allow a real comparison with the construction companies[11]. Globally, the materials sector is more concentrated than the construction sector and less concentrated than the plant sector. It is in the middle range of the industry for intermediate goods. Distribution of materials and plant is more dispersed.

The materials sector is in fact very heterogeneous. A simplified analysis enables us to identify 3 categories of activities. Table 14 shows three representative activities of each category.

[11] Indeed, the importance of small companies is far from negligable. In 1997, in construction materials, ceramic, glass and chemistry industries, companies employing 0 to 15 employees had a turnover of 5 billion Euros.

*Table 13 Building materials companies: representative examples of the three categories in 2000 **

Table 13.1 A very concentrated activity: the cement industry

Turnover	Workforce	Number companies
2 165 M€	5 355	5
Workforce share in companies with:		Part of the first 5 companies in sales
20 to 49 employees	at least 500 employees	
0%	94%	100%

Table 13.2 A relatively concentrated activity: ceramic tiles producers

Turnover	Workforce	Number companies
436 M€	3 673	26
Workforce share in companies with:		Part of the first 4 companies in sales
20 to 49 employees	at least 500 employees	
6%	42%	50%

Table 13.3 A scattered activity: concrete elements producers

Turnover	Workforce	Number companies
2 586 M€	19 659	229
Workforce share in companies with:		Part of the first 4 companies in sales
20 to 49 employees	at least 500 employees	
25%	27%	21%

* companies with at least 20 employees

Source: Y*early company survey*, Ministry of Economy, Finance and Industry

The first category concerns very concentrated, high-technology and capital-intensive activities. Such activities are often oligopolies: cement, fibre cement, plaster and ceramic sanitary equipment. The second category covers relatively concentrated activities with high market power of the main companies of the activity: ceramic tiles, tiles, mortar and dry concrete. The third category is made up of dispersed activities requiring, in general, lower technology and investment: bricks, ready-to-use concrete, concrete elements and stonework.

Five construction sub-systems

The extraordinary heterogeneity and fragmentation of the construction mesosystem enables us to envisage the existence of sub-systems which, without being totally independent, may be clearly differentiated. By taking into account four criteria – the type of structure, the degree of complexity, the type of market (international, national, local) and the size of the construction companies, it seems possible to distinguish five main types of sub-system[12].

Firstly, the international sub-system covering the production and management by big companies of large, complex civil engineering and building works forms the minority part of construction subject to global competition.

Secondly, national sub-system covering the production and management of road works appears to form an autonomous type of sub-system focused on roadwork companies which are often quite large in size and are present on both the new construction market and the maintenance market. Thirdly, national and local sub-system centered on the production and management of non-road civil engineering works and networks (new construction and maintenance) forms the third type of sub-system.

Fourthly, the national and local sub-system is dealing with production and management of buildings ordered by firms and government (non-residential buildings and multi-family blocks of flats - new construction and maintenance -) where large and medium size companies may have a strong position. Fifthly, local sub-system involving the production of buildings ordered by households and personal companies (especially individual houses - new construction and maintenance -) is mainly dominated by smaller companies and self-employed.

Table 15 Weights of the five construction sub-systems in 2002

Construction sub-system	€ bn	%
Global	19	13 %
Road works	8	6 %
Non-road civil engineering works	20	14 %
Buildings ordered by firms and government	55	38 %
Buildings ordered by households	42	29 %
Total	144	100 %

Source: Ministry of Public Works, Transportation and Housing

Diversified operational configurations of players

The high level of fragmentation of the construction sector system may be reflected in the operational configurations of players producing and managing structures using relatively divergent processes or, on the contrary, this fragmentation may be contained thanks to the clear leadership of one of the participants.

As regards production, the operational configurations of players may range from the very fragmented to the very integrated. Configurations may be fragmented with the separation of design and build and the absence of a real leader. But they may also be

[12] This assumption, while similar to that of Geoffrey Briscoe differentiating five types of construction markets (Briscoe, 1988), can be distinguished by the fact that the typology is different and takes into consideration not only the characteristics of demand but also the characteristics of supply.

placed clearly under the responsibility of one of the participants (client, project manager, main contractor). Design and build may be grouped together, as may design, build and maintenance. The most integrated operational configuration is build-operate-transfer (BOT), where funding, design, construction and management are carried out under the responsibility of a single participant[13].

As regards real estate management, the operational configurations of players may be relatively dispersed with a large number of companies participating on behalf of the manager. This configuration may be integrated into the technical domain with a "multi-technical" contract granted by the manager to a single facilities management company, or a "multi-services" contract granted to a single company responsible not only for technical management and repairs, but also for care-taking, security and logistics (reception, photocopying, car fleet, travel, etc.)[14].

Institutional rules under the responsibility of central government and professional organisations

The system of regulations of the French construction sector system is very complex. The following table – although schematic – summaries, in the form of a simplified matrix, the statutory domains of institutional participants according to the type of rule.

Table 16 Statutory domains of Institutional participants according to the type of regulation (schematic presentation) B.

	Buildings and materials			Firms			Environment of the firms		
Regulations / Institutions	Construction permits	Rules concerning structures	Rules concerning materials	Professio-nal rules and firms standards	Safety/ security and personnel management	Agreements on price and quality of products and services	Competition and procurement systems	Financing Taxation	R & D support Educa-tion
European Community			X		X		X	X	X
Government		X	X		X	X	X	X	X
Local authorities	X							X	
Clients. industrial. professional organisations			X	X	X	X	X		X
Trade unions					X				
User Associations						X			

The French system is characterised by the important role played by central government and professional organisations, and the relatively small role played by trades unions and

[13] The BOT system has been used in France since the 16th century. It was first used by the King to build and manage public canals.

[14] This Facilities management activity is expanding. The profession is getting organised. The French Facilities Managers Federation is recent : it was created in March 2000.

user associations. The role of two participant institutions in particular has become more important in the recent period : the European Community and local authorities.

Conclusion

In France, the share of repair and maintenance is nearly a half of all construction works because of the importance of the stock built after a Second World War. The construction sector system is made up of four very big firms, Smes and self-employed. The fragmentation of the sector system allows a high flexibility in cyclical situations. The sector system is so heterogeneous that several construction sub-systems can be analysed. The influence of central government on the institutional regulations remains high.

CHAPTER VI

THE GERMAN CONSTRUCTION SECTOR A DECADE AFTER THE REUNIFICATION

Niclas Andersson and Jörge Clobes
School of Civil Engineering
Lund - Sweden

INTRODUCTION

After the German reunification in 1990, the eastern part of Germany (referred to as the New Länder in this context) has undergone a transition from a totalitarian command economy to a democratic market economy. The constitutional shift was associated with rapid and fundamental changes in the political, social, economic, and technological conditions. Consequently, the German construction industry experienced dramatically changed market conditions in the 1990s.

The German unification constituted an unprecedented strain on the West German (referred to as the Old Länder) economy and resulted in de-industrialisation in the East. Companies in the New Länder suddenly had to compete with western firms on both, price and quality, a problem that was reinforced by a clear preference of Old Länder consumers for western products. The public objective of improving eastern living standards to converge with the Old Länder subsequently necessitated real economic efforts by the state.

The German government provided generous state subsidies to the New Länder and decided to move the government from Bonn to Berlin. Tax benefits animated domestic and foreign companies to invest in the new Länder, where the market situation gave great opportunities for new investors. The housing standards and infrastructure conditions in the New Länder and the city of Berlin offered great opportunities for growth and expansion for the construction industry. In the 1990as, the construction project, “Potsdamer Platz”, in Berlin became the largest construction site in Europe and major infrastructure projects were initiated.

Consequently, the German construction industry faced a prosperous market in the early 1990s. The business upturn was based on the need for infrastructure improvements in the new Länder and the demand on residential and non-residential construction increased. Further, large numbers of workers in the neighbouring countries and regions in eastern and central Europe were suddenly available. After the fall of communism, entire industries in Eastern Europe were closed down with increased unemployment as a consequence. In addition, the simultaneous added impetus in the efforts to promote the European common market, with liberalisation and a free movement of capital, goods, labour, and the abolition of technical trade barriers, were important factors.

The result was immigration of foreign workers and firms to the German market. The increased competition and the effect of falling prices seriously affected German firms. Foreign firms were often in a position to submit more competitive bids on account of the lower costs of hiring foreign workers. Large German groups of companies tried to

cope with the new situation by assuming control of the entire building and construction process, while delegating the actual work to foreign sub-contractors. (Lubanski 1999)
In 1995, the boom began to subside. Major investments in the new Länder could not prevent economic stagnation in the country as a whole and in 1996 a decline in construction activity occurred for the first time since the reunification. Construction employment decreased by 300 000 jobs and 3 700 firms were declared bankrupt in 1995, mainly due to the delegation of work to foreign sub-contractors (Lubanski 1999).

Objectives

The objective of this study is to present a descriptive analysis of the German construction sector in perspective of the reunification of West and East Germany in 1990 and the introduction of the European single market in 1993. The paper describes the characteristics of the German construction sector, its segments, activities, and regulations, based on a meso-economic approach.

Information Sources
Statistical classifications belong to the basic instruments without which statistical data cannot be compiled. In order to produce internationally comparable statistics, it is necessary not only to use uniform statistical definitions but also to harmonize the classification used. Economic classification can be divided into the two categories of economic activities and products. Classifications of economic activities cover all economic activities, from agriculture to services, and form the basis for compiling statistics on output, the production factors entering into the production process, capital formation or financial transactions. The outputs of the economic entities are termed products and are generally divided into goods and services and are classified in product classifications.

ISIC Rev.3[15] is the hierarchically structured classification of economic activities drawn up by the United Nations. NACE Rev.1[16] is the classification of economic activities corresponding to ISIC Rev.3 at a European level, which consequently applies to the national classification systems of the member states of the European Union. The NACE Rev.1 regulation allows the member states to use a national version derived from NACE Rev.1 for national purposes. However, such national versions must fit into the structural and hierarchical framework laid down by NACE Rev.1. WZ93 (Wirtschaftszweige) is the German version of NACE Rev.1 and it presents a uniform coverage of the economic activities of enterprises, local units and other statistical units in all German official statistics. (Stat. BA 2001)

German national accounts are composed in accordance with the European System of Accounts, ESA95, valid since April 1999 in all member states of the European Union. ESA95 is a compatible accounting framework for systematic and detailed description of a total economy, its components and its relations with other economies. (Stat. BA 2001)
The central source of information in this study has been the German Federal Statistical Office (Statistisches Bundesamt) via the official homepage, www.destatis.de, from where the main parts of the data were collected. Additional data was gained by direct contact with staff members of the German Federal Statistical Office, either by e-mail or by telephone interviews.

The WZ93 has been used as the basis for the description of the German construction sector segments and its numbers of companies and employees in this context. Usually

[15] International standard classification of all economic activities
16 Statistical classification of economic activities in the European community

two categories of construction activities are used in German literature and statistical databases. Groups 45.1 and 45.2 cover the main trade category (Bauhauptgewerbe) while the finishing trade (Ausbaugewerbe) includes groups 45.3 through 45.5, seeTable 1.
Monetary values in the paper are stated in the European currency Euro, expressed with the currency code EUR. (1 EUR = 1.95583 DEM).

Table 1 Classification of Group 45 Construction, NACE Rev.1

45	Construction		
45.1	Site preparation	45.4	Building completion
45.11	Demolition and wrecking of buildings, earth moving	45.41	Plastering
45.12	Test drilling and boring	45.42	Joinery installation
45.2	Building of complete constructions or parts thereof, civil engineering	45.43	Floor and wall covering
45.21	General construction of buildings and civil engineering works	45.44	Painting and glazing
45.22	Erection of roof covering and frames	45.45	Other building completion
45.23	Construction of highways, roads, airfields and sport facilities	45.5	Renting of construction or demolition equipment with operator
45.24	Construction of water projects	45.50	Renting of construction or demolition equipment with operator
45.25	Other construction work involving special trades		
45.3	Building installation		
45.31	Installation of electrical wiring and fittings		
45.32	Insulation work activities		
45.33	Plumbing		
45.34	Other building installation		

(Stat. BA 2001)

THE WEIGHT OF THE MESO-SYSTEM IN THE GERMAN ECONOMY

German Economy in the 1990s
Like other EMU[17] countries, Germany ended the 1990s experiencing an economic upturn. In 2000, the German economy grew by the highest rate since the reunification. On basis of the favourable economic environment in the world economy, export became a driving force behind the German economic upturn. The market situation was supported by the powerful economic situation in the United States and expansion in Germany's trading countries. Additional instigator came from the reduction of the real exchange rate of the Euro. (IFW 2001)

The lowest German employment rate of the 1990s occurred in 1996. The employment rate recovered as from 1997 and the situation of the labour market became successively better by the end of the decade (see Table 2). Between 1999 and 2000 the total employment increased by 600 000 persons reaching a total of 38.5 million people engaged in economic activity. However, the individual Länder benefited to highly differing degrees from the employment growth. In fact, the increase was limited in the old Länder (+2.1 percent), while employment in the new Länder (exclusive of Berlin) was down 1.7 percent one year earlier (Stat. BA 2001).

[17] EMU: Economic and Monetary Union. On January 1, 1999, the Euro was introduced in 12 of the 15 EU member states (Belgium, Germany, Finland, France, Greece, Ireland, Italy, Luxembourg, The Netherlands, Austria, Portugal and Spain.). On January 1, 2002, Euro coins and bills will go into circulation, and the Euro will supersede the currencies of these nations. The adoption of the Euro is the final step in the EU's plan for the Economic and Monetary Union.

Table 2: German Population, Total Workforce and Unemployment

Year	Population (1 000)	Total workforce[18] (1 000)	Unemployment (1 000)	Unemployment-rate* (%)		
				Total	Old Länder	New Länder
1997	82 053	41 019	3 888	11.4%	10.0%	18.0%
1998	82 030	41 162	3 687	11.2%	9.5%	17.5%
1999	82 087	41 310	3 428	10.6%	8.9%	17.5%
2000	82 127	41 714	3 245	9.6%	7.7%	17.2%
*Related to dependent civilian employment						

(Stat. BA 2001, Arbeitsamt 2001)

After the collapse of the German Democratic Republic and the adaptation to the monetary union, the New Länder's economy rapidly gained momentum. The overall output expanded strongly by 9.5 percent per year during the first half of the 1990's. Even the labour market was dominated by new recruitment in the mid-1990s. However, in the second half of the 1990s, the GDP[19] of the New Länder increased at an annual rate of 1.4 percent and thus lagged behind the economic growth in the Old Länder. Thus, the process of levelling out the living standards was detained by the end of the decade. (DIW 2001)

CONSTRUCTION ADDED VALUES IN GDP

The German GDP increased by 2.6 percent between 1999 and 2000 and reached a level of EUR 2 026 billion in 2000. The highest growth rates between 1999 and 2000 were achieved in the field of manufacturing industry (+6.6 percent) and in the field of financial, renting and other business activities. Particularly the field of trade and transport achieved good results in 2000 and even the GDP in public and private services had positive results (+1.2 percent). The construction industry was the only sector that presented a negative development of its contribution to the GDP (-4.9 percent) in 2000 (ZDB 2001).

18 The total workforce consists of persons engaged in economic activity and people unemployed. Persons regarded as engaged in economic activity are all persons who, either as a main or as a secondary occupation, perform work that is paid. Unemployed persons are all those who are not employed and, according to their own statements, make efforts to find a job, irrespective of whether they are registered with a local labour office. (Stat. BA 2001)

19 Gross domestic product, GDP, is defined as the value of total production measured in prices of a single year and includes only output or products produced within the national boarders of an economy. (Ive and Gruneberg 2000) In this context GDP is calculated by production (output) approach based on market prices.

Table 3: GDP, Value Added and Gross Fixed Capital Formation (Current Prices, Billion EUR)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GDP, at market prices	1 502	1 613	1 654	1 736	1 801	1 834	1 872	1 929	1 974	2 026
Value Added by Industry, total	1 411	1 516	1 552	1 621	1 685	1 718	1 757	1 809	1 840	1 888
- Manufacturing Industry (WZ 15-37)	387	391	367	376	382	383	392	408	410	437
- Construction Industry (WZ 45)	84	100	104	114	114	109	105	101	101	96
- Other (WZ 1-14, 40-41, 50-99)	940	1 025	1 081	1 131	1 189	1 226	1 260	1 300	1 329	1 355
% Construction Value Added in GDP	5.6%	6.2%	6.3%	6.6%	6.3%	5.9%	5.6%	5.2%	5.1%	4.7%
Gross Fixed Capital Formation, Total	357	388	381	401	404	399	401	413	426	438
- Machinery, equipment and other capital formation	166	164	144	143	145	149	155	170	181	197
- Buildings and constructions	191	224	237	258	259	250	246	243	245	241
% Buildings and constructions in Total	53%	58%	62%	64%	64%	63%	61%	59%	58%	55%

(Stat. BA 2001)

The added value of construction in GDP declined from 6.6 percent in 1994 to 4.7 percent in 2000. The development of construction must be perceived as a part of global shift from industrial output to commercial services and as a consequence of the development of the construction activities in the new Länder after the reunification in 1990. However, these figures do not take the manufacture of building components into account, nor the value of the professional services provided by architects, surveyors and others.

CONSTRUCTION EMPLOYMENT

In 2000, the German construction industry (WZ 45) had about 2.76 million employees, which corresponds to 6.6 percent of the total workforce. The construction employment rate in 2000 was the lowest since the reunification in 1990 (see Table 4).

Table 4: Construction Employment in Total Work Force (in Thousands)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total Workforce	40 689	40 460	40 448	40 583	40 524	40 692	41 027	41 233	41 431	41 769
Total Unemployment[20]	2 190	2 575	3 092	3 304	3 194	3 482	3 882	3 684	3 416	3 133
Total Construction (WZ 45)	2 796	2 914	3 025	3 165	3 227	3 126	2 999	2 901	2 851	2 761
Employees	2 536	2 628	2 728	2 849	2 887	2 757	2 631	2 520	2 453	2 356
Self-employed	260	286	297	316	340	369	368	381	398	405
Construction in Total workforce	6.9%	7.2%	7.5%	7.8%	8.0%	7.7%	7.3%	7.0%	6.9%	6.6%

(Stat. BA 2001)

Even though the number of construction employees has decreased by more than 450 000 from 1995 to 2000, construction was still a large industry sector in Germany.

[20] Unemployment is calculated according to definitions used by the International Labour Organization (ILO)

Table 5: Distribution of Employment by Trade in Total Number of Employees (2000)

Trade and transport	25%
Financial, renting and business activities	15%
Agriculture, forestry and fishing	3%
Manufacturing Industry, including energy	22%
Construction Industry (WZ 45)	7%
Other service activities	28%

(Stat. BA 2001)

Table 4 and Table 5 include the number of construction employees in the main and finishing trades (WZ 45). Thus, the number of employees does not include manufactures or suppliers of building materials, professionals, surveyors, real estate managers etc.

MAIN CHARACTERISTICS OF CONSTRUCTION WORKS

In 1999, the total construction production output was EUR 223 986 million, which corresponds to an increase of about 0.4 percent in comparison to 1998. Furthermore, the output of construction increased for the first time since 1995. The negative trend in the development of civil engineering construction works ceased in 1999, when investments increased by 5.9 percent in comparison with 1998, see Table 6.

Table 6 New Construction and Repair/Maintenance for Building and Civil Engineering Works (Million EUR in 1999 Reference Prices)

Construction (taxes excluded)	1995	1996	1997	1998	1999
Total production output	235 613	228 780	225 348	223 095	223 987
Residential, total	128 578	128 063	128 576	128 833	128 575
New	72 817	71 725	72 299	71 215	70 716
Repair and Maintenance	54 413	55 066	56 167	57 571	57 859
Non-Residential, total	71 136	66 797	63 323	61 930	61 125
New	51 872	48 345	45 348	43 942	43 063
Repair and Maintenance	19 221	18 433	17 972	17 972	18 062
Civil Engineering, total	36 122	34 027	33 516	32 377	34 287
New	27 680	25 881	25 364	24 374	25 715
Repair and Maintenance	8 131	7 854	7 854	8 011	8 572

(Euroconstruct 1999 and 2000)

New construction represented 62 percent, or EUR 139 500 million, in 1999 while the remaining 38 percent were repair and maintenance works. However, the trend for the last part of the 1990s showed a growing trend for repair and maintenance works, see Table 6.

Residential construction output represented the main part of construction works by EUR 128 575 million, which was more than half of the total construction production output. Residential repair and maintenance showed a growing trend in the second half of the 1990s while non-residential construction decreased continuously from 1995 through 1999.

Table 7: Construction Output by type of product (Million EUR, 1999 reference price)

	1999	
Residential	128 575	57%
Non-residential	61 125	27%
Civil Engineering	34 287	15%
Construction, total	223 987	100%

(Euroconstruct 1999 and 2000)

According to figures from the German Federal Statistical Office, private companies ordered 47 percent of the total value of constructions, 28 percent by the central government, local authorities, municipalities and non-profit organisations and the remaining part of 25 percent represents orders from private households (see table 8). The figures in Table 8, table 10 and Table 11 are based on WZ 45, construction, and origins from the Federal Statistical Office Germany.

Table 8: Value of Ordered Production by Type of Client in 2000

Type of Client	% Ordered Value[21]
Households	25%
Companies	47%
Central and local government	28%
Total	100%

(Stat. BA 2001)

Residential Building

The total number of dwellings in Germany in 1998 was about 37.5 million (see Table 9). The number of dwellings per 1 000 inhabitants amounted to 457 in 1998. While 450 dwellings were available per 1 000 inhabitants in the old Länder, the number amounted to 489 in the new Länder and Berlin-East.

Table 9: Existing Number of Dwellings (in Thousands)

Dwellings	1996	1997	1998
Germany	36 492	37 050	37 529
Old Länder	29 300	29 687	30 047
New Länder	7 193	7 363	7 483

(Stat. BA 2001)

The share of new constructed apartments by households was 67 percent in 1999, whereas companies (including real estate companies and tenant owner associations) provided 32 percent of the total number of new ordered apartments. The remaining part of 1 percent was represented by orders from the government, local authorities and non-profit organisations (see Table 10).

Table10: Ordered New Residential Buildings by type of Client (by value in 1999)

Households	67.1%
Companies	31.7%
Central and local government	0.6%
Non-profit organisations	0.7%

(Stat. BA 2001)

The number of dwellings produced showed considerable regional differences between the new and the old Länder (see Table 11). In the old Länder, the number of dwellings

[21] The shares of ordered production by type of clients are based on new production output limited to companies with more than 20 employees.

completed increased dramatically while a sharp decline initially was observed in the number of dwellings completed in the new Länder and Berlin-East. (Stat. BA 2001)

Table11: Completed Dwellings by Year

Year	Germany		Old Länder		New Länder	
	Number of dwellings produced	% Annual change	Number of dwellings produced	% Annual change	Number of dwellings produced	% Annual change
1993	455 451	18.0%	431 853	15.3%	23 598	105.6%
1994	572 883	25.8%	505 179	17.0%	67 704	186.9%
1995	602 757	5.2%	498 543	-1.3%	104 214	53.9%
1996	559 488	-7.2%	416 122	-16.5%	143 366	37.6%
1997	578 179	3.3%	400 350	-3.8%	177 829	24.0%
1998	500 690	-13.4%	372 243	-7.0%	128 447	-27.8%
1999	472 805	-5.6%	369 907	-0.6%	102 898	-19.9%

(ZDB 2001)

The rapid expansion of residential construction activities in the early 1990s was connected with tax benefits and favourable mortgage rates introduced by the German government after the reunification. These actions led to a noticeable relaxation on the housing market. However, vacancies and problems finding tenants continued in specific regions. This fact was significant for the New Länder where more than one million dwellings were vacant in 2000. The German number of unlet apartments corresponded to a vacancy rate of approximately 13 percent in 2000 (Euroconstruct 2000).

Repair and maintenance works of the housing stock have played a major role in the new Länder since the reunification in 1990. In the 1990s, nearly half of the seven million dwellings were been renovated or modernised, primarily with loans from the Bank of Reconstruction (Bank für Wiederaufbau) modernisation programme. Funds from this programme (EUR 40 billion) were exhausted by the end of January 2000. (Euroconstruct 2000)

Non-Residential Building

Company investments in new non-residential buildings amounted to a total of EUR 18 599 million and represented 71 percent of the total non-residential investments in 1999.

Table 12: Ordered New Non-residential Buildings by Value (1999)

Households	5.5%
Companies	70.9%
Central and local government	18.0%
Non-profit organisations	5.6%

(Stat. BA 2001)

In the Old Länder, public investment in non-residential buildings was reduced continuously to the end of 1990s. Investment activities in the New Länder also decreased steadily in the second half of the decade, despite that the Old Länder received money from the German Unity Fund since a reform of the federal fiscal equalisation system in 1995.

Table 13: Completed New Non-residential Buildings in 1994 to 1999

Year	Germany		Old Länder		New Länder	
	Non-Residential (1 000 m3)	% Change*	Non-Residential (1 000 m3)	% Change*	Non-Residential (1 000 m3)	% Change*
1994	222 548	1.0%	158 404	-9.3%	64 144	40.2%
1995	222 305	-0.1%	152 199	-3.9%	70 106	9.3%
1996	207 076	-6.9%	143 563	-5.7%	63 513	-9.4%
1997	212 828	2.8%	152 743	6.4%	60 085	-5.4%
1998	207 392	-2.6%	158 584	3.8%	48 808	-18.8%
1999	208 316	0.4%	167 107	5.4%	41 209	-15.6%
* to recent year						

(ZDB 2001)

Civil-Engineering Construction

Investments in railway systems accounted for a major portion of civil engineering construction in the 1990s. One specifically large infrastructure project was the high-speed rail link between Cologne and Frankfurt (Main). Other main infrastructure projects were concentrated to rail links and railways stations in the Berlin hub (e.g. Lehrte Station). These railway projects were part of the German unity programme, which was aimed at establishing or improving transport links between the Old and the New Länder.

The Deutsche Bahn made large annual investments in expanding and improving the German railway system in the 1990s. Most of these construction measures were for building of new high-speed stretches and modernising rail stretches for trains equipped with tilting-in-curve Technology (ICT). In addition, civil engineering construction projects also included the construction of 25 major stations, redesign of the existing buildings and placing tracks below ground level. (Euroconstruct 2001)

VALUE OF BUILDING STOCK

The territory of Germany has a geographical size of 357 022 km^2 and had 82 127 000 inhabitants in 2000. See the distribution of the German land use in TableTable 14 below.

Table 14: Distribution of German Land Use in 2001 (left) and Distribution of Built-up Land in 1997 (right)

Built-up land	12.2%
Forest	29.4%
Water	2.2%
Bog	0.5%
Agriculture	53.6%
Other	2.1%

Distribution of Built-up land:	
Land for housing	45.9%
Transport	36.6%
Construction sites, quarrying, refuse tip	3.2%
Park ground, sports field	5.4%
Industry	8.9%

(Stat. BA 2001)

In 2001, the majority (53.6 percent) of the German territory was used for agricultural purposes (including meadows and heath) and almost one third of German land was forest. Built up land represented 12.2 percent of the area, of which almost half was used as land for housing. These figures included the total area of house properties (e.g. gardens, playgrounds, parking lot, etc.) and not only the area of actual buildings. More than a third of the built-up land was used for transport constructions (e.g. streets, railway-systems, docks, etc.).

The net stock of building structures (residential and non-residential) was estimated at EUR 7 992 billion in 2000, see Table 15. The value of stock was about four times the German GDP in 2000. German households own 44.4 percent, private companies 35.8 percent, and central as well as local government own 16.2 percent of the net stock of building structures in Germany.

Table 15: Value of Building Stock and Distribution by Owner in 2000 (1995 Reference Prices)

	Value of Stock (Billion EUR)	% Total	% Residential and Non-residential
Total Value of Stock	7 993	100%	
Residential	4 183	52.3%	100%
Households	3 550	44.4%	84.9%
Companies	579	7.2%	13.8%
Central and local government	32	0.4%	0.8%
Others (private organisations)	22	0.3%	0.5%
Non-residential	3 810	47.7%	100.0%
Companies	2 229	27.9%	58.5%
Central and local government	1 262	15.8%	33.1%
Others (private organisations)	318	4.0%	8.3%

(Stat. BA 2001)

A majority of the existing dwellings were built during the post-war period of the Second World War (see Table 16). Especially in the Old Länder, the consequences of the Second World War dictated the building activity. Almost half of the existing dwelling stock was built between 1949 and 1978. (IFO 1999).

Table 16: Number of Dwellings in 1999 by Year of Construction

	Germany		Old Länder		New Länder	
Specification	Number (1 000)	%	Number (1 000)	%	Number (1 000)	%
Dwelling units, total	37 050	100.0%	29 687	100.0%	7 363	100.0%
Until 1900	3 441	9.3%	2 268	7.6%	1 173	15.9%
1901 - 1918	2 562	6.9%	1 773	6.0%	788	10.7%
1919 - 1948	4 972	13.4%	3 541	11.9%	1 431	19.4%
1949 - 1978	17 886	48.3%	15 860	53.4%	2 025	27.5%
1979 - 1986	3 971	10.7%	3 029	10.2%	942	12.8%
1987 - 1990	1 188	3.2%	849	2.9%	339	4.6%
1991 - 1993	909	2.5%	803	2.7%	106	1.4%
1994 or later	2 122	5.7%	1 563	5.3%	559	7.6%

(Stat. BA 2001)

SEGMENTS IN THE MESO-SYSTEM OF CONSTRUCTION

Construction Firms

In 2000, more than 2.7 million people were employed in more than 100 000 different companies within the main areas of the construction industry, i.e. the main trade and the finishing trade. More than 37 percent of construction employment was working in companies with less than 20 employees (Stat. BA 2001).

Table 17: Main Trade and Finishing Trade by Number of Employees (1999 and 2000)

	Construction (WZ 45)		Main Trade (WZ 45.1 - 45.2)			Finishing Trade (WZ 45.3 – 45.5)		
	Total)		Total	Old Länder	New Länder	Total	Old Länder	New Länder
Number of Firms by Size	2000		2000			2000		
1-19	84 737	79.9%	69 103	51 043	18 060	15 634	11 424	4 210
20-49	16 019	15.1%	8 386	5 732	2 654	7 633	5 577	2 056
50-99	3 616	3.4%	2 336	1 581	755	1 280	843	437
100-199	1 259	1.2%	948	654	294	311	226	85
200+	425	0.4%	339	252	87	86	75	11
Total	106 056	100.0%	81 112	59 262	21 850	24 944	18 145	6 799
Number of Employees by Size	2000		2000			2000		
1-19	619 291	37.4%	409 020	298 620	110 400	210 271	154 476	55 795
20-49	467 979	28.3%	248 500	169 784	78 716	219 479	159 877	59 602
50-99	245 032	14.8%	159 885	108 143	51 742	85 147	56 035	29 112
100-199	169 780	10.3%	127 739	88 414	39 325	42 041	31 166	10 875
200+	152 199	9.2%	124 374	94 849	29 525	27 825	24 950	2 875
Total	1 654 281	100.0%	1 069 518	759 810	309 708	584 763	426 504	158 259
Production by Size (Million EUR)	1999		1999			1999		
1-19	44 747	29%	29 244	22 031	7 214	15 503	11 844	3 659
20-49	39 789	26%	22 494	16 165	6 329	17 295	13 133	4 163
50-99	25 561	17%	17 822	12 393	5 430	7 739	5 487	2 252
100-199	21 506	14%	17 432	13 017	4 415	4 074	3 159	915
200+	20 984	14%	18 008	14 285	3 724	2 975	2 737	238
Total	152 587	100%	105 001	77 890	27 111	47 586	36 360	11 227

(Stat. BA 2000 and 2001)

Note that the total number of construction employees (WZ 45) in 2000, as presented in Table 17 differs from the number of construction employees in Table 4. This is due to different calculation methods. Table 17 is based on company reports and until recently (in 2001) companies with less than 20 employees were not obliged to report their actual number of employees to the statistical office in Germany. Still, many of the small companies did present figures on employees and accordingly, Table 17 is based on those companies.

The main trade was the most concentrated part of the construction industry. 0.4 percent of the number of companies employed 11.6 percent of the workforce and covered 17.2 percent of the total production of main trade activities, see table 18.

Table18: Main Trade Companies by Number of Firms, Employees and Production in 2000 (Production in Million EUR, in 1999)

Size by number of employees	Number of Companies	% Total Number	Number of Employees	% Total Number	Production	% Total Production
1-19	69 103	85.2%	409 020	38.2%	29 244	27.9%
20-49	8 386	10.3%	248 500	23.2%	22 494	21.4%
50-99	2 336	2.9%	159 885	14.9%	17 823	17.0%
100-199	948	1.2%	127 739	11.9%	17 432	16.6%
200+	339	0.4%	124 374	11.6%	18 008	17.2%
Total	81 112	100.0%	1 069 518	100.0%	105 001	100.0%

(Stat. BA 2001)

The 81 112 main trade companies produced more than two thirds of the total construction output of the entire construction industry in Germany in 2000. In 1999 the production was more than EUR 105 billion. More than 60 percent of the 1.1 million employees were employed in companies with less than 50 employees and 85 percent of the total amount of companies has less than 20 employees. Only 339 main trade companies have more than 200 employees, but contribute with 17.2 percent to the total production of main trade companies.

The category of installation and completion of buildings was dominated by companies with less than 50 employees, representing almost 70 percent of the total production. The total production in 2000 was EUR 48 million (see Table 19).

Table 19: Trade Companies by Number of Firms, Employees and Production in 2000 (Production in Million EUR, in 1999)

Size by number of employees	Number of Companies	% of Total Number	Number of Employees	% of Total Number	Production	% of Total Production
1-19	15 634	62.7%	210 271	36.0%	15 503	32.6%
20-49	7 633	30.6%	219 479	37.5%	17 295	36.3%
50-99	1 280	5.1%	85 147	14.6%	7 739	16.3%
100-199	311	1.2%	42 041	7.2%	4 074	8.6%
200+	86	0.3%	27 825	4.8%	2 975	6.3%
Total	24 944	100.0%	584 763	100.0%	47 586	100.0%

(Stat. BA 2001)

Professionals

In 1999, more than 120 000 engineering offices contributed with a production of nearly EUR 37 billions to the construction sector, see Table 20. The professionals were characterised by a large number of small firms. (Bundesarchitektenkammer 2001)

Table 20: Professionals by Number of Companies and Production in 1999 (Production in Million EUR)

Type of Activity	Companies	Production
Architecture	38 873	8 428
Construction, design	28 319	9 308
Installation, design	34 775	13 072
Quantity surveyors	2 695	1 100
Others	15 914	5 089
Total	120 576	36 996

(Stat. BA 2000)

Real Estate and Property Management Firms and Estate Agents

Real estate firms were, in this context, defined as estate owners while property management firms provided real estate related services. There was no distinction made between property management and facilities management firms.

Table 21: Number of Companies and Production in 1999 (Production in Million EUR)

	Companies	Production
Real Estate Firms	197 936	89 403
Property Management Firms	14 472	14 053
Estate Agents	29 435	9 087
Total	241 843	112 543

(Stat. BA 2000)

The segment of real estate firms was characterised by a large number of small firms,

generally one-man companies and firms with less than five employees. The business trade of estate agents focused on the selling process of real estates including advertising, domiciliary visits, inspections, contract documents etc.

Building Materials and Equipment
Construction materials, components and machinery represented the second largest part of the German construction meso-system. In June 2000, more than 930 000 people were employed in construction industry manufacturing. Even tough the numbers presented in Table 22 are likely overlapping with industries other than the construction industry, the size and importance of material, components and machinery manufacturers are significant. Especially companies producing ceramic, tiles, bricks, cement, lime, plaster concrete and mortars as well as producers of construction machinery were highly dependent on the construction business trends.

Table 22: Materials, Components and Construction Machinery in Numbers of Companies, Employees and Production in 2000 (Production in Million EUR)

Type of Activity	Companies	Employees	Production
Materials and components	11 772	893 664	121 090
Wood and products of wood and cork, straw and plaiting materials (excluding furniture)	756	54 187	6 688
Other non-metallic mineral products	3 749	248 112	39 631
Glass	443	65 349	9 316
Ceramics	230	36 878	3 844
Tiles	35	5 279	1 246
Bricks	200	13 516	561
Cement, lime, plaster, concrete and mortar	2 380	97 959	18 412
Other non-metallic mineral products	461	29 131	6 252
Fabricated metal products, except machinery/equipment	7 267	591 365	74 771
Construction machinery	258	40 066	7 051
Total	12 030	933 730	128 141

(Stat. BA 2001)

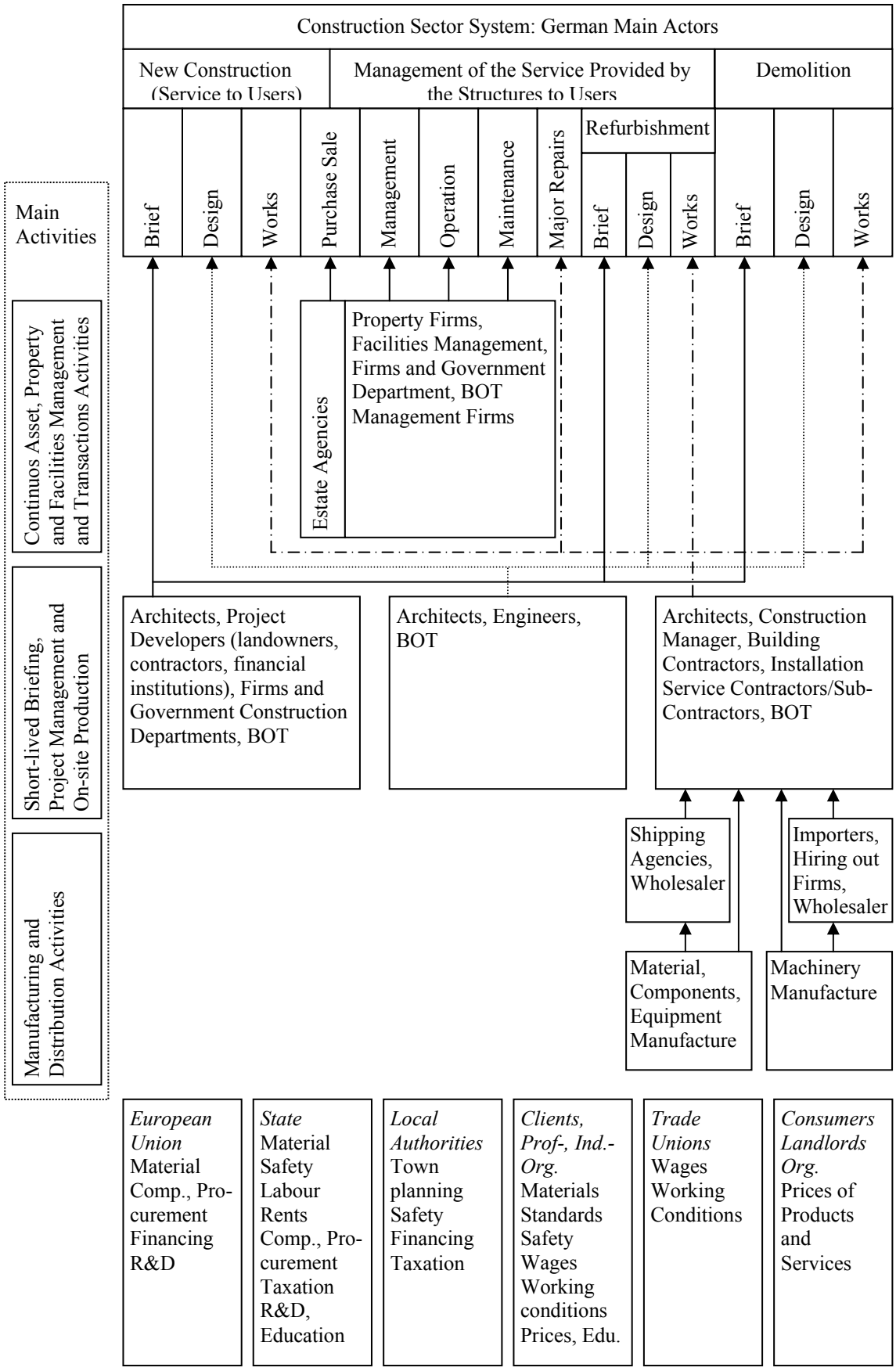
THE GERMAN CONSTRUCTION SECTOR SYSTEM

An overview of the German construction meso-system is presented in Figure 2. Segments of the construction meso-system are placed according the phases of the lifecycle of a building or construction and are described on basis of three main building activities. The first main activity is related to asset and real estate management, which in the German case are carried out mainly by property and facilities managers and real-estate agents. The second main activity covers the brief and design phase as well as production activities on site. In Germany mainly developers and professionals such as architects, engineers, quantity surveyors, etc. carry out the brief and design phase. Finally, producers and distributors of construction materials, components, equipment and machinery perform the manufacturing and distribution activities that constitute the third main activity in the meso-system.

A significant feature of the German construction meso system is the key role of the architect who has a central position in the brief and design phase as well as the on site construction works. The work of the architect (scope of work, remuneration etc) is regulated according to Honorarordnung für Architekten und Ingenieure, HOAI, which is a central document in agreements between the client and architect. Despite that the architect is still a key actor in a building and construction projects, the position of the architect, especially in large projects, is about to change. General contractors or project

developers have undertaken a growing number of projects in the 1990s. Contractors tend to expand their field of action by taking over tasks that traditionally were incumbent on the architect. A driving force for contractors to expand their project control is the possibility to gain higher profits. Another factor that supports this development is an increased need for specific skills and qualifications as building and construction projects become more complex. (Syben 1996)

Figure 2: The German Construction Sector System



GERMAN MAIN REGULATIONS AND INSTITUTIONAL ACTORS

The meso-system, see Figure 2, outlines the institutional actors, which play an important role in the construction sector as regulators as well as clients. Main institutional actors in Germany are the European Union, the German government, regional and local authorities, industrial and professional organisations, trade unions and user associations (e.g. tenants associations and consumer groups).

The German construction meso-system is mediated by institutional regulations. These regulations may concern building permits, construction standards, product and service certification, labour management, prices, procurement methods, funding, tax etc. They are defined and applied by a system of public institutions (international, national, regional, local) and private institutions (industrial, unions, consumer organisations).
The European Union has taken various initiatives in order to promote a European common market. The introduction of rules for public sector tendering commits the members of the European Union to open the inner market for non-national contractors. One example is the building materials directive that intends to remove technical trade barriers impeding the export/import of building materials (Lubanski 1999).

The matrix in Table 23 gives an overview of main regulations and institutional actors on the German construction industry.

Table 23: Main Regulations and Institutional Actors

Regulations / Institutions	Building and Materials			Firms			Environment of the Firms		
	Construction Permits	Rules Concerning Structures	Rules Concerning Materials	Professional Rules and Firms Standards	Safety/Security and personnel Management	Agreements on Price and Quality of Products and Services	Competition and Procurement Systems	Financing Taxation	R&D Support Education
International institutions			X		X		X	X	X
Government		X	X		X		X	X	X
Regional and local authorities	X	X			X			X	X
Client, industrial, professional organisations	X		X	X	X	X	X		X
Trade Unions					X	X			X
User Associations						X			

Construction Permits
Construction permits are needed for new building and construction projects in Germany. It is the architect or engineer who submits the application for the building permit. The information required in an application is detailed and extensive an may contain the following documents; site plan, architectural (and structural) drawings, specification of works, descriptions on the use of spaces, technical descriptions of heating system, kitchen equipment, building areas and volumes, fire safety calculations, list of building materials, sound insulation class, thermal insulation, safety and comfort aspects etc. (Vitt 1997)

A layman is not qualified to submit an application for construction permission. This has to be done by an authorize architect or engineer, i.e. an architect or engineer who is an

approved member of an architect or engineer chamber. Every federal state (Bundesland) has its own architect and engineer chambers.

Applications for building permits are handed in to the building supervising authority, which is a local authority that appoint an engineer (Prüfingenieur) to verify that the building documents is in accordance to the detailed development plan. The authorities decide about the construction permission when the engineer has given his/her approval. An upper building supervising authority, operating on a Bundesland level, gets involved for further investigations in case specific difficulties, appeals etc. (Vitt 1997)

Rules Concerning Structures and Materials
In Germany, two technical standards are basically used. These are the DIN (Deutsche Industrie Norm) standard that includes an annex with explanation guidance and numerical examples and secondly, the Eurocode that gradually will be introduced in construction works, and partly replace the DIN standards, as a result of the unification of Europe.

Public clients are obliged to follow the rules and regulations of Verdingungsordnung für Bauleistungen, VOB, for construction procurement. The directives on public procurement of the European Union is integrated in the VOB. Further, VOB is an integral part of the DIN system. Private clients on the other hand, are not compelled to use building materials approved by DIN.

A public supervising authority, Bauamt, is responsible for superintendence of general safety and standards matters in buildings. The Bauamt does neither represent the client nor the contractors.

Professional Rules and Firms Standards
All companies must been authorized to run business activities in Germany. Licence to a run business is applied for at Wirtschaftsministerium in each Bundesland. A business licence drawn up in one Bundesland authorizes the company to operate all over Germany, but not to establish a new branch office outside the Bundesland where the original business licence was given. Consequently, a company needs one business licence in every Bundesland where the company wants to establish branch offices.

Professionals, i.e. architects and engineers, must be members of a chamber of architects (architectkammer) or chambers of engineers (Ingenieurkammer) in order to operate in the German construction sector. An architect or engineer approved for membership in such a chamber is allowed to operate all over Germany.

The leader of a craftsmen business, that normally acts as subcontractors, must be registered in the Handwerksrolle, which is subordinate to the chamber of craftsmen (Handwerkskammer). When registered and approved by the Handwerksrolle, the craftsmen business is authorized to operate all over the country with the same restrictions as other companies about establishing new branches outside the initial Bundesland. An important requirement to get approval for running a craftsmen business is a so-called Meister degree, see
R&D Support and Education.

The Hochbaukosten Flächen Rauminhalte is a handbook based on the German DIN standard (DIN 276, 277 and 283). This handbook constitutes a template used for, among other things, the initial budget based on sketches in early stage of the design phase. Another handbook is used as a complement for the initial budget. This handbook is

named Arbeits- und Kontrollhandbuch zur Bauplanung, Bauausführung und Kostenplanung nach § 15 HOAI und DIN 276, and contains present cost data, comments on the DIN standards, guiding principles for structural design, building equipment etc. In this manual the project is categorised by three categories according to the quality level of the project, i.e. weather it is a standard or luxury project.

The HOAI-manual (Honorarordnung Für Architekten und Ingenieure) provides a basis for agreements between the client and architect or engineer on the level of remuneration. The HOAI-manual classifies the building project in five categories, describing the complexity level of the project. The complexity level and the budget estimate (by Hochbaukosten Flächen Rauminhalte) are used to find an interval for the minimum and maximum remuneration level for the architect or engineer for the specific project.

The basic document for the tender process, especially in the case of a public client, is the *Verdingungsordnung für Bauleistungen* (VOB). The VOB is a central document that has ruled the tender of construction processes in Germany for 70 years. It consists of three sections: Section A *(VOB/*A) regulates tender procedures; Section B *(VOB/*B) consists of detailed technical norms of work packages and the quality of materials to use. Section C *(VOB/C)* regulates contract conditions. As far as *VOB/B* and *VOB/C* are concerned, private clients have two possibilities to make construction contracts. Either they can do it on the basis of *Bürgerliches Gesetzbuch (BGB*), or they can make the *VOB/B* and *VOB/C* part of the contract, which offer a precise description of construction works. The difference between these two forms for the rights and duties of the parties is mainly a question of warranties, which is five years after completion according to *BG*B, two years after completion according to *VO*B.

Many private clients prefer contracts, which make in particular *VOB/B* a part of it. This is because the performance of construction works according to its norms, which are closely linked to the DIN-standards, guarantees a precise description of the level of performance that can be expected and also high quality standards of the work completed. *VOB/A* is of interest only for the public client and for construction firms, tendering for public construction orders. The *VOB* itself is not a law, but all public clients such as local and central government as well as public enterprises are obliged by order of the government to tender using *VOB/A* and parts B and C as well. This means to use open tender procedures and to obey the rules prescribed by *VOB/*A. Private clients whose construction projects are funded by public authorities to an extent of 50 percent and more are subject to the same rule (Syben 1996).

Safety and Security

The German construction workers' compensation associations (Bau-Berufsgenossen-schaften) play a major part in safety and security questions. Their main priority is to ensure safety and health at the workplace. They have adopted an overall approach in with the basic elements are the technical inspection services, expert committees and test and certification bodies as well as guidance provided on the handling of hazardous substances or preventive health monitoring at work. Their binding accident prevention regulations (Unfallverhütungsvorschriften - UVV) provide occupational health and safety measures to be observed by employers and workers, such as regulations on the design of machinery, plant and procedures intended to prevent accidents or on safe and healthy working procedures.

All German companies with at least one employee should have a work environment specialist, educated in work environment and risk matters. Companies with more than

20 employees are requested to have a safety representative. Gewerbeaufsichtsamt is the German public supervising authority on working environment issues. (Vitt 1997)
German rules and regulations on safety and security matters are regularly amended to comply with the various directives adopted by the European Union.

Agreements on Price and Quality of Products and Service
Honorarordnung für Architekten und Ingenieure, HOAI, is the central document in agreements between the client and architect or engineer. In Germany, the remuneration for architects and engineers is related to the total costs of the project and is regulated according to HOAI. Thus, the level of payment is set and architects and engineers may not compete on price according to HOAI. Consequently, higher total costs for a project lead to higher remuneration. This is a consequence that has been called in question and various alternatives have been discussed on how to model consultant's fees in order to stimulate lower building costs. Law regulates the rights and obligations of architects and engineers professions.

In every industrial sector, employers' associations and trade unions have agreements about wages, working time, social contribution and working conditions. Negotiations are first made on a national level, setting general agreements, and are then followed by local negotiations.

Competition and Procurement System
Germany comply with the European Union law governing restrictive practices, which apply to commerce between all countries in the European Union and a country within the European Economic Area, EEA. Business within Germany applies to the national rules on competition, which are found in Gesetz gegen Wettbewerbsbeschränkungen, GWB. Bundeskartellamt is the public authority that supervises that rules on competition are complied with on a national level. This authority is supplemented with a Kartellamt in each Bundesland. The German rules on competition imply that all agreements between companies that prevent or warp competition are forbidden. (Vitt 1997)
In Germany, three main different forms of tender and different possibilities to place orders are in use:

- Directly placed orders or negotiated tender
- Selective or limited tender
- Open tender

Private clients and commercial investors (industrial or commercial companies, banks, insurance companies, and building societies) often use the form of selective tender, inviting only contractors well known for efficiency and to whom they have good, long-term relations. Public clients are allowed to place orders directly or use selective tender only if the work is very small or if the work requires highly specialised qualification that only a few firms can offer. But normally public clients have to use the open tender form.

A German building client normally uses very divided contracts with bids set according to a bill o quantity. It is the architect who is responsible for coordination of all contractors on site.

Financing and Taxation
In the 1990s the German government set up action programmes in order to support construction initiatives in the New Länder. For example, it was made possible to get investment grants for construction projects up til 35 percent of the total investment cost, under the condition that jobs were generated due to the construction investment in an

area with high unemployment rates. Each Bundesland decided which areas, with high unemployment levels, that should be given priority.
Governmental initiatives were also taken through a number of development funds, providing favourable loans with low interest rates and a long period of amortisation. Various Bundesländer also have temporary subsidy programs, before as well as after the reunification, and some local authorities support modernisation works, e.g. renovation of buildings with specific cultural and historical value. Further, the Kreditanstalt Für Wideraufbau (bank of reconstruction) offers favourable loans to for modernisation or energy-saving measures. For private persons it is possible to get tax allowance (i.e. state subsidy) by declaring building expenses in the income tax return form.

All building and construction products and services are charged with an added-value tax, VAT, of 16 percent, which is the general level of VAT in Germany with exception for foodstuffs and printed matters. All companies pay a national corporate income tax of 25 percent on profits and a local trade tax of 14 – 19 percent of net profit. (Vitt 1997)

R&D Support and Education
There are a large number of trade associations for different occupational groups with nationwide coverage in Germany. Besides legal advices and relevant market information, these trade associations assist their members in educational matters.

The German education program for building and construction workers is based on an apprentice system. An apprenticeship lasts two years and mixes theoretical studies and practice at the company where the apprentice is employed. Trade unions negotiate with companies about the conditions for apprenticeship. Educational establishments, jointly organised by trade associations, provide the theoretical part of the apprentice studies. The next step for promotion, after a completed apprenticeship, is journeyman (Geselle). After three years as journeyman a Meister title can be attained after getting through a test doing a qualifying piece of work. The Meister title is required to start a craftsman company in the construction sector (similar rules for craftsman businesses in other sectors). Normally, a Meister is head of a company taking on jobs as a subcontractor. (Vitt 1997)

Currently, there is a discussion (and legal process) about weather the German master system is consistent with the rules of European Union open market, with free movements of goods and services. Thus, it is not inconceivable that the German system will change as the harmonisation process proceeds in the European Union.

The German educational system at all levels is regulated and financed by each Bundesland. Besides the public schools and universities there are also private schools providing education at a all levels. These private schools follow the rules and regulations of the Bundesland but are privately financed.

CONCLUSION

The German economy experienced two major alterations in the 1990s, the reunification and European single market. The construction sectors of former East and West Germany became one in the reunification in 1990. The two construction sectors were originated from two basically different political systems. The financial system, rules and regulations, institutional actors, and other characteristics of the construction sectors were basically different. The reunification launched a neutralisation process to even differences in social structure and the construction sector played an important role in this political effort. The German government introduced building and construction

subsidies and initiated large infrastructure projects etc as part of the neutralisation process.
Increased construction activities in Germany attributable to the German reunification lead to substantial cross border activity and coincided with the European single market in 1993, resulting in accelerated developments in the 1990s. Germany became the target for many large European contractors attempting to get established in the foreign market with particular expectations on the opening of the Eastern markets.

The political ambition to equalise the living standards in the New and Old Länder made the government initiate generous state subsidies and tax benefits to promote construction activities in the 1990s. Construction boomed from 1991 until 1994, making total construction added value grow. However, despite that the German construction industry grew in nominal terms of added value in the 1990s, the construction industry lost ground relative to the development of other industrial sectors and the national GDP. The German residential construction remained on a high and stable level even after the initial construction boom in the early 1990s, and constituted 57 percent of total construction production in 1999. Significant differences between the New and Old Länder were apparent in, for example, terms of construction volumes. The number of completed dwellings in the New Länder increased by almost 170 percent yearly between 1993 and 1997. The production of dwellings in the Old Länder decreased over the same period, but still reached 400 000 new dwellings in 1997.

Thus, the reunification and opening of the single market had impact on the development of the German construction sector in the 1990s and had influence on political, social and regulations matters in society as well as competition, demand etc. in the construction sector. In this perspective, the meso-economic analysis stands out as applicable when analysing the development of the German construction industry of the 1990s, as the meso-approach comprises political and regulative as well as structural aspects of the whole construction sector.

REFERENCES

Deutsches Institut für Wirtschaftsforschung (DIW), 2001. *The German economy: is the upturn already coming to an end?*, in Economic Bulletin 1/2001, Berlin.

Euroconstruct, 1999. Western and Eastern Europe, Austria, Germany, Switzerland. *In: 47th Euroconstruct conference, Prague.*

Euroconstruct, 2000. Western and Eastern Europe, Austria, Germany, Switzerland. *In: 48th Euroconstruct conference, Cambridge.*

Euroconstruct, 2000. Western and Eastern Europe, Austria, Germany, Switzerland. *In: 50th Euroconstruct conference, Paris.*

Ive, G.J. and Gruneberg, S.L., 2000. *The economics of the modern construction sector*. Macmillian Press Ltd., London.

Lubanski, N., 1999. *The Impact of Europeanisation on the Construction Industry – a comparative analysis of developments in Germany, Sweden and Denmark*. Industrielle Beziehungen, 6. Jg., Heft 3, University Copenhagen.

Institut für Witschaftsforschung (IFO), 1999. *Gebäudebestand in Westeuropa: Fast 17 Mrd.m² Wohn- und Nutzfläche.* IFO Schnelldienst 12/99, Munich.

Institute of World Economics (IFW), 2001. *End of the Upturn in Germany*. Kiel 2001.

Statistisches Bundesamt, 2000. *Entwicklung des Baugewerbes ab 1995 in Deutschland*. In Wirtschaft und Statistik 12/2000, Wiesbaden.

Statistisches Bundesamt, 2000. *Produzierendes Gewerbe-Beschäftigung, Umsatz und Energieversorgung der Betriebe des verarbeitenden Gewerbes sowie des Bergbaus und der Gewinnung von Steinen und Erden.* Fachserie 4, Reihe 4.1.1.Wiesbaden.

Statistisches Bundesamt, 2000. *The housing situation in Germany 1998*. Wiesbaden.

Statistisches Bundesamt, 2001. *Ausgewählte Zahlen für die Bauwirtschaft – November 2000*. Wiesbaden.

Statistisches Bundesamt, 2001. *Bautätigkeit und Wohnungen 1999.* Fachserie 5, Reihe 1, Wiesbaden.

Statistisches Bundesamt, 2001. *German economy*. Wiesbaden.

Statistisches Bundesamt, 2001. *Produzierendes Gewerbe-Beschäftigte und Umsatz der Betriebe im Baugewerbe,* Fachserie 4, Reihe 5.1.,Wiesbaden.

Statistisches Bundesamt, 2001. *Volkswirtschaftliche Gesamt-rechnungen.* Fachserie 18, Wiesbaden.

Syben, G., 1996. *Integration and disintegration of rules and actors: The German construction system under change*. Bartlett Research Papers, London & Plan Construction et Architecture, Paris

Vitt, B., 1997. *Byggande i Tyskland – En handbok*, AB Svensk Byggtjänst, Stockholm

Zentralverband Deutsches Baugewerbe (ZDB), 2001. *Analyse & Prognose,* Berlin.

Internet

www.bundesarchitektenkammer.de (May 2001)
www.diw-berlin.de (April 2001)
www.ifo.de (March 2001)
www.destatis.de (Stat.BA) (April 2001)
www.zdb.de (April 2001)

CHAPTER VII

SOME RECOMMENDATIONS FOR THE DEVELOPMENT OF THE LITHUANIAN CONSTRUCTION SECTOR

Arturas Kaklauskas and Edmundas-Kazimieras Zavadskas
Faculty of Civil Engineering
Vilnius - Lithuania

INTRODUCTION

From 1990 to 2000, Lithuania's economy underwent some earthshaking changes in all of its sectors. Three distinct phases emerged during this period of economic development:

- From 1990 to 1994, Lithuania experienced a dramatic economic decline. While changes in the structure and profile of the Lithuanian industry were underway, output began to stagger, falling slightly during the beginning of this period : 2.8% in 1990 and 4.8% in 1991. However, during 1992, 1993 and 1994, industrial output plummeted (28.6%, 34.4% +and 38.1%, respectively). By 1995, industrial output was only 30.6% of that obtained in 1990. The plunging rate of Lithuania's industrial output can be compared to the drop in the gross domestic product (GDP).
- From 1995 to 1998, Lithuania entered a recovery period. The GDP reflected these growth trends. Reported growth rates were 3.3 percent in 1995, 4.7 percent in 1996, 7.3 percent in 1997 and 5.1 percent in 1998 (see Table 1).
- At the end of 1998, the economic growth rate slowed down due to the financial crisis in Russia. The Russian economic crisis influenced the entire Lithuanian economy, resulting in a downturn in GDP growth to 4.1 percent in 1999.
- From 2000 to 2003, Lithuania repeatedly entered a recovery period. The GDP reflected these growth trends. Reported growth rates were 4.0 percent in 2000, 6.5 percent in 2001 and 6.7 percent in 2002.

Table 1. Changes in Lithuania's GDP, construction and industry output

Years	Annual changes in GDP, %	Annual construction changes, %	Annual industry changes, %
1991		-27.4	-4.8
1992	-34	-22.6	-28.6
1993	-30.4	-36.6	-34.4
1994	1	3.5	-38.1
1995	3.3	0.4	5.3
1996	4.7	-11.6	5.0
1997	7.3	9.4	3.3
1998	5.1	20.5	8.2
1999	-4.1	-16.4	-11.2
2000	4.0	-17.8	2.2
2001	6.5	7.5	16.0
2002	6.7	13.1	3.1

Source: Lithuania's Statistical Yearbook

According to the data collected by the Lithuanian Statistics Department during the 1991-1998 period, construction volumes plunged approximately two-fold, and the construction materials industry's gross production by more than five-fold. The fall-off in the construction materials industry's gross production was much greater than that in construction volumes; the restructuring policy applied to construction (employment of new materials and construction methods) had moved significantly ahead, increasing the use of imported materials.

From 2001 to 2003, Lithuania's construction volume rose (7.5 percent in 2001 and 13.1 percent in 2002). Over the first quarter of 2003, Lithuanian construction volume rose of 19.5 percent if compared to the respective period last year. The Department of Statistics says that the growth was predetermined by rapid expansion of new constructions and reconstructions.

How the construction industry and the other sectors of the Lithuanian economy develop depends heavily on the budget. Up to now, the budget has been constantly growing, and the construction industry is continuing to slowly revive, but only temporarily.

An effective legal system is one of the absolute prerequisites for a positive transition to a market economy. And, a legal framework in which construction may develop is one of the major priorities.

For this study, the industry related data were collected mainly by surveying the trade's professional literature, comprising official statistical data, annual reports and market analysis made by the construction association and official authorities. The main source of information was Lithuanian statistics.

In addition, this article conforms to the standard classification system used by Lithuanian national statisticians:

- Preparation of a construction site.
- Construction of buildings and assembly units; civil engineering.
- Installation and equipping of the buildings and constructions.
- Completion of construction.
- Rental of wrecking and demolition equipment (with operators).

The monetary values in this article are expressed in the European currency, the Euro, and designated by the European currency symbol EUR (1 EUR = 3.4528 Litas).

ANALYSIS OF LITHUANIA'S TRANSITIONAL CONSTRUCTION

Clout of construction on the Lithuanian economy

The construction industry is highly dependent on Lithuania's general national economic level. The volume of contracted construction work is directly related to the demand for buildings, which in turn is closely tied to the demand for other products and services. The more developed the various sectors of industry are and the more available the services are in a country, the higher the demand will be for different types of buildings. This means that investments made in various activities over the long run will be transformed into construction investments. And, the constructed buildings will be used for many different industrial and service purposes.

In Lithuania the construction output as part of the GDP accounted for 9.32% in 1992, 5.1% in 1993, 7.2% in 1994, 7.1% in 1995, 7.1% in 1996, 7.5% in 1997, 8.0% in 1998, 6.9% in 1999, 6.1% in 2000 and 6.1% in 2001. The last decade (1991-2000) was not favourable for the development of construction nor for the other industrial sectors. These ten years have been a period of painful and complicated transition from a planned economy to a market economy. According to the Lithuanian Statistics Department, during the 1991-1998 period, the construction output defined by relative prices plunged nearly 50%, while the total output from the construction materials industry shrank more than five-fold.

As of December 31, 1998, the Lithuanian construction industry meso-system employed 118 200: 5 700 in state-owned construction companies and 112 500 in privately owned construction companies. The Lithuanian Statistics Department does not provide more detailed information concerning the distribution of the employees by profession, developers, property and facilities managers, real-estate agents, architects, quantity surveyors, land surveyors, technical engineering, construction firms, materials or plant industry. Overall, the construction industry meso-system represents 6.1% (2001) of the working population (see Table 2).

Table 2. Percentage of construction added value in GDP and construction employment in national employment

Years	Percentage of construction added value in GDP and recent evolution (constant prices)	Percentage of construction employment (construction firms) in national employment and recent evolution
1970	9.9	9.1
1975	10.72	8.8
1980	9.31	7.7
1985	8.21	7.8
1990	10.11	9.6
1991	6.21	7.8
1992	9.32	9.1
1993	5.1	7.1
1994	7.2	6.6
1995	7.1	7.0
1996	7.1	7.2
1997	7.5	7.1
1998	8.0	7.1
1999	6.9	6.6
2000	6.1	6.1
2001	6.1	6.2

Source: Lithuania's Statistical Yearbook

When the construction sector of Lithuania was in a planned economy (until 1991) it was given much more attention; later, in the transition period, the situation has changed. This can be easily seen from Table 2. In 1970-1990 construction added value in GDP fluctuated from 8.21 to 10.72 per cent, in the transition period (according to date for the years 1993-2001) this figure decreased to 5.1-8.0 per cent. 2001 m.

The building structure costs (in percent) are presented in Table 3.

Table 3. Building structure costs (in percentages, 1999)

Structure costs	%
Raw materials and consumables	38.8
Cost of resale goods	4.3
Rent and services	23.6
Depreciation and amortization	3.3
Wages and social security costs	28.5
Wealth and life insurance payments	0.2
Taxes	1.3
Total	100

Source: Financial indicators of enterprises

Building structure stocks and production

As of January 1, 1997, building structure stocks represented 46.4% of the country's non-financial assets and were estimated at 27 055 million Euros (1 Euro = 3,4528 Litas), or 2.83 times the GDP. Public ownership accounted for 57.2 % and private ownership 42.8 % of the net stock of building structures in Lithuania (see Table 4).

Table 4. Estimation and ownership of the net stock of building structures in Lithuania in 1997 (as of January 1)*

	Amount	Parts in %
Public	8 078.2	70.1
Private	18 977.1	29.9
Total	27 055.3	100.0%

Units : Euro millions (1 Euro = 3.4528 Litas) *Source: Lithuania's Statistical Yearbook*

* The Lithuanian Statistics Department did not present concrete information concerning property owned by households, companies, government with respect to building and infrastructure stocks

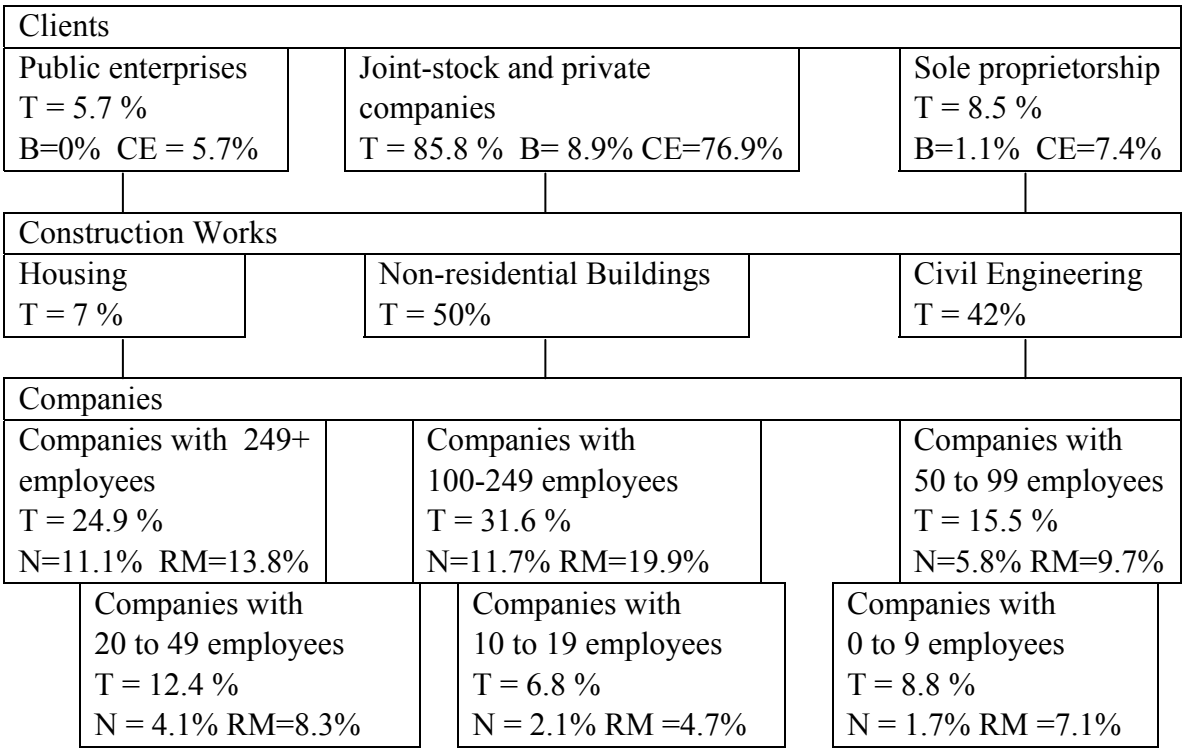
The production of residential houses represented 7-10 % of the total, non-residential buildings 47-50 % and civil engineering 42-44 % in 1997-2000. Non-residential buildings and civil engineering were the most important sub-segments of construction in 1997-2000 (see Table 5).

Table 5. Work carried out within the country by type of construction units (in percentages)

	Total		Public enterprises		Joint-stock and private companies		Individual (personal) enterprises	
	1997/ 1998	1999/ 2000	1997/ 1998	1999/ 2000	1997/ 1998	1999/ 2000	1997/ 1998	1999/ 2000
Total	100/ 100	100/ 100	100/ 100	100/ 100	100/ 100	100/ 100	100/ 100	100/ 100
Residential houses	7/7	10/10	1/-	-/1	7/7	10/10	7/5	13/12
Non-residential buildings	49/50	47/47	17/12	10/14	51/53	48/48	64/53	56/52
Civil engineering	44/42	44/43	82/88	90/85	42/40	42/42	29/42	31/36

Source: Lithuania's Statistical Yearbook

Figure 1. The construction meso-system in Lithuania's domestic market in 1999 included : clients, works and companies



Legend: T - total, B - residential buildings, CE - Civil Engineering and non-residential buildings, N - new constructions; RM - repair and maintenance

Source: Lithuania's Statistical Yearbook, Services, Industry, Economic and Social Development

When clients, works and construction firms on the domestic market in 1999 were analysed (see Figure 1), joint-stock and private companies represented 85.8 % of the declared work ordered by clients, sole proprietorship 8.5 %, and public enterprises 5.7 %.

The main functions and regulations of the Lithuanian meso-system are essentially the same as in the France.

Housing sector

Following the political changes in 1990, various reforms were carried out in the Lithuanian housing sector. However, the stagnant trend of the housing sector continued during the transition period (1990-2000):

- The sharp decline in the construction of new housing, leading to an increasing housing crisis.
- Restricted mobility of labour to and within the major urban areas, reducing the potential for economic growth.
- Lost employment and growth potential in construction, including related economic activities and multiplier sectors.
- Slowdown of environmental improvement and energy efficiency.

During the transition period (1990-2000), housing construction in Lithuania was in depression. This may be illustrated by the following figures: in 1985, 28 800 dwellings were built; in 1990, 22 100; during 1995-1997, 5 600 each year, while in 1998 only 4 176 dwellings were completed. Thanks to the opening-up of the construction market in the private sector, both the quality and average floor space per dwelling significantly increased. This significant increase in average floor space per dwelling may be illustrated by the following figures: 64 sq. m. in 1985; 66 sq. m. in 1990; 101 sq. m. in 1995; 112 sq. m. in 1996; and 120 sq. m. in 1998.

From 2002 to 2003, Lithuania's housing construction volume rose very rapidly. Reported growth rates were 10.1 percent in 2002. Over the first half-year of 2003, Lithuanian housing construction volume rose of 15.2 percent if compared to the respective period last year. The Department of Statistics says that the growth was predetermined by rapid expansion of new constructions and reconstructions.

Privatisation of dwellings had both positive and negative effects. Among the advantages was a faster development of the housing market, taking into account the demands and financial possibilities of inhabitants. Living space became more efficiently used as well, because low income inhabitants changed their spacious high-standing flats into smaller ones situated in less prestigious districts, while those financially better off purchased better apartments or houses in more comfortable and prestigious areas, thus improving their living conditions. It is predicted that in the future privatised flats (mainly in prefabricated blocks of flats) will be occupied by low income inhabitants. The other houses, occupied by more well-off dwellers, will be refurbished, regaining and even raising their values. Maintenance of blocks of flats with privatised premises is growing in importance. The structures and areas of such houses, which are shared by all kinds of dwellers, are frequently in bad and often a threatened condition because of poor maintenance. This calls for financial state support to make the necessary repairs and improve maintenance of such areas.

Table 6. Estimation and ownership of the net housing stock in Lithuania in 1997 (as of January 1)

	Amount	Part
Public	1 743.35	9.5
Private	16 653	90.5
Total	18 396.35	100.0%

Units : Euro millions (1 Euro = 3.4528 Litas) *Source: Lithuania's Statistical Yearbook*

About 98 percent of Lithuanian's housing stock is currently under private ownership. In most cases, housing is the single most substantial asset held by inhabitants. Most of these dwellings are in need of significant modernisation.

Non-residential buildings and Civil Engineering

In 2000, non-residential buildings accounted for about 47 percent of the total of new construction in Lithuania. Non-residential construction in 1998 compared to 1997 grew by 28.8 percent, and in 1995 construction rose by 59.74 percent. In 1998, the output of non-residential construction accounted for 396.27 million Euros. The economic crisis in Russia impacted on the non-residential construction, resulting in a downturn of 20.5 percent in 1999 of the non-residential construction output. The stock of non-residential buildings and Civil Engineering infrastructures are mainly owned by local authorities, with a significant part belonging to State-controlled companies such as the railway system and electricity institution.

Table 7. Estimation and ownership of the net stock of non-residential buildings and Civil Engineering infrastructures in Lithuania in 1997 (as of January 1)

	Amount	Parts in %
Public	6 334.9	73.2
Private	2 324.1	26.8
Total	8 659.0	100.0%

Units : Euro millions (1 Euro = 3.4528 Litas) *Source: Lithuania's Statistical Yearbook*

In 2000, Civil Engineering accounted for about 43 percent of the totality of new constructions in Lithuania. The situation in Lithuanian's Civil Engineering is quite good at present. Civil Engineering in 1998 compared to 1997 grew by 22.5 percent and compared to 1995 rose by 51.72 percent. In 1998, the output of Civil Engineering accounted for 338.46 million Euros. The economic crisis in Russia impacted on Civil Engineering, resulting in a downturn of 23.9 percent in 1999 of the Civil Engineering output.

Improvement-maintenance activities

The costs for Lithuanian energy resources have significantly increased over the last 13

years. These increases in energy resources have brought about, in turn, increased heating costs, accounting for a considerable part of a family's budget. Existing residential houses (especially large-panel housing) have deteriorated and have become obsolete. Deterioration, obsolescence and housing values have changed over time and depend on various factors, such as physical state, management, legal, architecture, aesthetic, function, comfort, maintenance, social, as well as defects in engineering services.

At present, some Lithuanian low income inhabitants (i.e. pensioners, the unemployed and large families) cannot afford to pay heating costs. The renovation of a building's heating system and insulation would reduce heating costs and save state social expenditures. In addition, the political party in power, which cannot solve this urgent problem in a rational way, will probably not win the upcoming election. The construction problem is not only a social problem, but a political one as well.

In 2002, improvement and maintenance activities represented 63.4 % of the declared construction work (see Table 8). Percentages tended to increase over longer periods of time.

Table 8. Share of reconstruction, repair, restoration, warming up and modernisation of the heating system in declared Lithuanian construction works (in percent) (1996-2002)

	1996	1997	1998	1999	2000	2001	2002
Reconstruction	16	18	23	22.6	25.6	23.5	25.7
Repair and restoration	45	43	38	38.6	35.4	35.4	32.7
Other work	1	2	2	2	4.3	3.7	5
Total	62	63	63	63.2	65.3	62.6	63,4

Source: Lithuania's Statistical Yearbook

Real estate

The economic situation in any country is clearly reflected by its real estate market. So far, Lithuanians have been completely convinced that real estate is the best investment. As a result, prices in this sector rose about 2.5 times during the years 1994-1998, and peaked during the depression period. However, prices suddenly stopped climbing and actually frozen in expectation of a new crisis. Then, in 1999-2000, the real estate market was shaken by a drop-off in prices. Falling real estate prices in Lithuania were a sure sign of its economic stagnation, and revealed some drastic changes in the market trends as well. According to real estate valuators, three types of property have a most uncertain future. They are old standard flats in suburban districts, commercial premises in downtown areas and structures situated in rebuilt flats and areas of industrial buildings on the outskirts of cities. Real estate activities are fragmented (see Table 9 and Table 10).

Table 9. Distribution of real estate activities by number of employees in 1999 (in percentages)*

	Total	Under 4	5-9	10-19	20-49	50-99	100-249	250-499	500+
Number of enterprises	100	58.3	15.6	10.5	7.8	4.3	2.8	0.6	-
Number of employees	100	8.3	6.7	8.8	15.7	19.8	27.4	13.2	-
Income	100	15.0	10.3	16.5	16.7	14.0	21.9	5.6	-

* - Real estate activities include: purchase and sale of own real estate, letting of own property, real estate agency's activities, management of real estate on a fee or contract basis, maintenance services for communal property dwellings *Source: Services*

Table 10. Number of service enterprises and employees according to the register of enterprises in 1999

	Number of enterprises	Number of employees
Purchase and sale of own real estate	41	1.3
Letting of own property	732	40.9
Real estate agency's activities	108	3.2
Management of real estate on a fee or contract basis	62	9.3
Maintenance services for communal property dwellings	84	45.2
Total	1027	100.0

Source: Services

Distribution of real estate activities by ownership in 1999 are as follows: State or municipal (14.1%), private (81.9%), and foreign (4.0%). Distribution of real estate activities rendered by consumers in 1999 are as follows: population (34.5%), industrial enterprises (8.5%), financial intermediary enterprises (0.9%), services enterprises (53.9%), general government institutions and organisations (2.2%). Property and facilities management companies are still under development in Lithuania at the moment.

Within the Lithuanian property transaction and valuation sector, there is an emerging professional service organised at the national level. Two organisations are thought to play a significant role, namely, the Association of Lithuanian Property Surveyors and the Association of Real-Estate Companies. Due to the existence of municipal housing maintenance enterprises, management of the private sector in housing is limited and geographically concentrated in the towns of Vilnius, Kaunas, Klaipeda and Alytus.

Construction companies

The Government's programme of "voucher privatisation" accounted for major changes in the construction industry more recently. Due to these changes, 474 state-owned construction companies were registered by the end of December 1991 and at that time employed some 161 800 people. In 1998, the number plummeted to 40, with only 5 700 people employed (see Table 11).

Table 11. Construction companies, 1991-1998

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Number of enterprises									
Total	1286	1074	1259	1628	1879	1982	2031	2136	3452
State-owned construction companies	474	313	189	133	42	52	40	40	38
Share (percent)	36.9	29.1	15.0	8.2	2.2	2.6	2.0	1.9	1.1
Privately owned construction companies	812	761	1070	1495	1837	1930	1991	2096	3414
Share (percent)	63.1	70.9	85.0	91.8	97.8	97.4	98.0	98.1	98.9
Average annual number of employees, (000)									
Total	174.4	169.4	126.8	110.9	114.7	119.1	118.7	118.2	108.6
State-owned construction companies	161.8	98.1	39.1	17.3	10.2	11.8	9.8	5.7	
Share (percent)	98.2	57.9	30.8	15.6	8.9	9.9	8.3	4.8	
Privately owned construction companies	12.6	71.3	87.7	93.6	104.5	107.3	108.9	112.5	
Share (percent)	7.2	42.1	69.2	84.4	91.1	90.1	91.7	95.2	
Volume of work done in Lithuanian territories (current prices), Euro millions (1 Euro = 3.4528 Litas)									
Total			227.26	400.51	491.44	530.83	679.8	872.4	804.5
State-owned construction companies			62	62.75	45.43	60.58	38.45	53.1	46.6
Share (percent)			7.68	4.18	2.43	3	1.48	1.58	5.8
Privately owned construction companies			140.25	312.75	421	445.25	616.3	794.3	757.9
Share (percent)			17.33	20.83	22.58	22	23.53	23.43	94.2

Source: Lithuania's Statistical Yearbook; Investment in Tangible Fixed Assets and Construction

In 1998, 98 percent of the construction companies were privately owned. They represented 94 percent of the construction contracts in terms of value and provided work for 95 percent of the total number of employees working within the construction sector. Many construction companies had signed contracts in international markets, especially during the relocation of the Russian Army over the period 1993-1995. In 1995, such relocation contracts amounted to 18 percent of the total volume of contracts signed in Lithuania. As a result of the financial crises in Russia, foreign construction processes began to continually taper off at that time and amounted to only 3 percent in 1998. Even then, 80 percent of those construction works were carried out within the Russian Federation.

In the earlier years, the average number of employees in private construction companies increased to satisfy the demands in foreign construction, as well as the needs in the existing domestic market. Then, these demands dwindled, reflecting the concerted efforts made in productivity and efficiency. On the whole, public construction companies are larger in size, but will not escape an eventual downsizing. In general, Lithuania has a private construction sector that could be capable of functioning under competitive circumstances, such as imposed by the repair and maintenance of existing housing and the demand for new housing construction.

Consequently, national organisations have emerged within the construction sector, namely, the Association of Lithuanian Engineers and the Association of Lithuanian

Architects. The Association of Contractors of Lithuania, along with other construction associations, are taking every possible step to influence the Lithuanian Parliament and Government to adopt more favourable laws for the construction sector. The Association welcomes the Government's and Ministries' representatives at its meetings so that all can be acquainted with the problems encountered by the construction industry.

At the heart of the construction firm's sector considerable differences exist between building and Civil Engineering. In Civil Engineering, orders are less dispersed and the technical levels are higher than in construction, resulting in a lower dispersion within this sub-sector.

We were able to distinguish by this study 4 highly differentiated categories of construction activities. The first category of activities covers most of the Civil Engineering companies and general building contractors. This is the most concentrated part of the sector and the technical level is high. Companies and public administration constitute the major portion of the clientele. The percentage of improvement-maintenance activities, which is generally not very large, can, however, be strong in certain areas of activity, such as railways and roads. The second category of activities is mainly made up of very specialised, high-technology Civil Engineering companies. The third category comprises the finishing work carried out by high-technology activities, where large and small companies co-exist. Finally, the fourth category concerns most of the shellwork and low-technology finishing work activities. This category is dominated by companies employing under 20 people and includes a high proportion of craftspeople. Households and individual companies are the most important clients by far and the proportion of improvement-maintenance work is high (Carassus, 2000). This situation is similar in Lithuania and France.

As can be seen from Tables 12 and 13, the construction industry is overwhelmingly made up of firms with more than 100 employees, which contribute to most of the industry's output. Businesses with more than 100 employees accounted for 56.5% of all the businesses in the building industry.

Table 12. Volume of work carried out within Lithuania by number of employed persons, 1999 (Euro thousands (1 Euro = 3.4528 Litas))

	Total	Volume of work carried out by number of employed persons						
		0-9	10-19	20-49	50-99	100-249	250-499	500+
Total	803 518	71 150	54 373	99 564	124 546	254 035	138 690	61 159
New construction	267 971	11 787	14 954	30 042	41959	86 628	56 934	25 667
Reconstruction	181 376	12 431	11 084	20 820	25 979	64 172	30 889	16 001
Repair and restoration	326 216	42 552	24 772	45 108	50 078	95 078	49 578	19 050
Other work	27 955	4 380	3 563	3 594	6 531	8 157	1 288	442

Source: Investment in Tangible Fixed Assets and Construction

Table 13. Specialisation of construction enterprises and companies, 1999

	Total	As a	Volume of work carried out by number of employed persons, Euro thous						
	Euro thousands	Percenta-ge of total	0-9	10-19	20-49	50-99	100-249	250-499	500+
Volume of work carried out in Lithuania	803 515	100.0	71 153	54 373	99 565	124 547	254 035	138 690	61 159
Preparation of construction sites	34 300	4.3	1 918	1 621	1 995	3 688	19 143	3 064	2 871
Building Construction and assembly units; Civil Engineering	498 213	62.0	27 632	21 951	49 505	77 888	164 621	107 480	49 137
Installation and equipment of building and construction	152 077	18.9	28 725	23 056	32 079	26 789	32 077	7 325	2 030
Completion of construction	114 131	14.2	12 711	7 560	15 753	14 656	35 534	20 797	7 121
Rental of wrecking or demolition equipment (with operators)	4 794	0.6	167	185	233	1 526	2 660	24	-

Source: Investment in Tangible Fixed Assets and Construction

In Lithuania in 1999, 1 102 architectural, engineering and related technical consultancy enterprises existed.

Real-estate development is also a dispersed profession. Design including architects, quantity surveyors and land surveyors, is highly fragmented. Construction engineering is a dispersed activity, especially in building construction (Carassus, 2000). This situation is similar in Lithuania and France.

Material industries

The volume of production of construction materials grew in 1997-1998. Optimism, which accompanied earlier growth, decreased when the volume of construction fell to 16.4 percent in 1999. Simultaneously, production of construction materials plunged in 1999. Production of assembling constructions amounted to 89 percent, windows and doors 95 percent, bricks 88 percent, and cement 84 percent in 1998. The main reason may be explained in a sentence, i.e., Lithuania's economy slowed down, and the gross domestic product fell off. Usually, construction's response to economic changes is quite an inert process. However, the expected rise in construction is still awaited, even though it might continue to fall off.

During the past 5 years, the calculated cost of construction has grown 2.5 times. Local building materials have become 2.48 times more expensive, the use of machinery has increased 2.3 times in cost, and work salaries have increased 3.14 times. As can be seen, the percentage for materials decreased in cost, while work salaries increased. With the rising percentage for work salaries, concerted efforts are being made to use less labour-intensive technologies. Price levels are most often determined by the relationship between supply and demand, the character of seasonal work and the dwindling stock of building material parts.

Until 1991, the Lithuanian construction industry was an integral part of the industrial

complex of Russia, with a considerable number of buildings erected within Russia. The technologies and machines used consumed high quantities of energy and were detrimental to the environment. Up to now, the situation has not changed very much. Thus, the manufacture of certain construction materials requires twice as much energy as specified by the standards accepted within the EU countries, and has led to 2.5 – 3 times more environmental pollution. Consequently, the manufacture of construction materials has suffered more than the other industries from Lithuania's economic decline.

In Western Europe, there are now more construction materials and products and its firms are competing for new markets. The Lithuanian market is also being flooded with German, Italian, Spanish and English construction materials and products. Since 1995, the import of construction materials has exceeded their export and this imbalance in trade is still increasing in this field. In recent years, only one-third of the construction materials and products used have been made in Lithuania.

The material's production sector is, in fact, very heterogeneous everywhere. A simplified analysis enabled us to identify three categories of activities (Carassus, 2000). Table 14 shows the three representative activities of each category. The first category concerns the very concentrated, high-technology and capital-intensive activities. Activities of this kind are often oligopolies, such as cement, lime and plaster producers. The second category covers relatively concentrated activities, with the main companies exerting strong market clout, such as the producers of ceramic tiles, flags, and baked-clay tile and construction products. The third category is made up of dispersed activities, generally requiring lower technology and investment, such as the stone cutting, shaping and finishing industries. This situation is similar in France.

Globally, the material sectors are more concentrated than the construction sector and less concentrated than the plant sector. Intermediary goods hold a mid-range position in the industry. The materials and plants are more dispersively distributed (Carassus, 2000). This situation is similar in Lithuania and France.

Table 14. Building material companies. Representative examples of three categories (Industry, 1999)

		Number of employees in enterprises						
		0-9	10-19	20-49	50-99	100-199	200-499	>500
Very concentrated activities: manufacture of cement, lime and plaster								
Number of enterprises	2						1	1
Number of employees	1158						233	925
Sales of production (without VAT, excises), in Euro thousands	35 239							
Relatively concentrated activities: manufacture of ceramic tiles, flags, baked-clay tile and construction products								
Number of enterprises	16	2	2	1		6	5	
Number of employees	2362	10	26	22		878	1426	
Sales of production (without VAT, excises), in Euro thousands	17 600							
Dispersed activities: stone cutting, shaping and finishing								
Number of enterprises	39	29	8	1	1			
Number of employees	318	141	98	21	58			
Sales of production (without VAT, excises), in Euro thousands	1 631							
		0-9	10-19	20-49	50-99	100-199	200-499	>500
		Number of employees in enterprises						

Source: Industry

An analysis of the weak points and the strong points of the Lithuanian construction sector

In addition, this article contains an analysis of the weak points and the strong points of the Lithuanian construction sector:

The Lithuanian construction sector's weak points are as follows:

- Many ministries or their sub-ordinated institutions, counties, and municipalities regulate construction activities. Laws on Environmental Protection, Roads, Communications and other sectors supplement the laws on the Planning of Territories and Construction. Activities of such ministries or their sub-ordinated institutions are not always co-ordinated, and some functions are, in fact, duplicated.
- Ministries, counties, and municipalities regulating construction activities are often striving to achieve different objectives and perceive the market economy in different ways – from strict state control to unrestricted market operation.
- No legal environment exists to facilitate and stimulate innovative development.
- The supply of efficient energy and ecological construction services and products is not promoted.
- The preparation of new documents regulating construction activities is considerably weak due to insufficient financial resources.
- Since the Lithuanian construction market is fragmentised, and residents have only

comparatively restricted purchasing power, the construction potential is not totally exploited.

- The construction potential available cannot be effectively exploited because of the economic recession in Lithuania and the neighbouring countries.
- The construction sector's companies are too small to compete alone in the international market. The Lithuanian construction companies do not have enough experience to form timely temporary alliances and combine their resources and experience for the implementation of certain export projects.
- The Lithuanian Government is weakly participating in supporting attempts by enterprises to penetrate into foreign markets.
- Ongoing studies are conducted inefficiently and ineffectively.
- The Lithuanian construction information system is in its initial phase of creation.
- Many Lithuanian construction organisations, especially small- and medium-sized enterprises, are not taking advantage of the opportunities offered by information and Internet technologies at all or only in a minor manner.
- Financing of housing programs requires a substantial portion of state budget funds, which could be used in other fields of activities.
- Public utilities funding to needy people is a major expenditure and problem in the state budget.
- Lithuania is far from the European average in apartments per 1000 residents. State funding for housing acquisition has continued to fall off since 1998.
- No detailed strategy and planning documents are available in connection with the housing acquisition policy, nor details on housing policy objectives.
- The problem of social housing is not taken into consideration. 10-40 percent of all the housing funds allotted in Western countries are earmarked for social housing; however, Luthania's social housing funds amount to less than 3 percent of the state budget.
- Lithuania has inherited an irrational building materials and products manufacturing industry, requiring huge investments for modernisation.
- A lack of funds is reducing the possibilities of competing with foreign companies. Very few investments were allotted for the implementation of new technologies over the last decade.
- Relations between employers and employees are not at their best.
- Lithuanian construction associations (Lithuanian Contractors' Association, Lithuanian Union of Civil Engineers, Association of Construction Industry, etc.) are not representing the interests of organisations very well abroad, nor solving the problems of occupational training and improvement of qualification.
- Inefficient traditional construction organisational models continue to prevail.
- The level of investment allotted for the development of science and technologies is too low compared with other countries.
- Cooperation between construction enterprises and institutions of science and technologies and universities is at a very low level.
- Stagnant cash flow and low profitability characterise the construction sector.
- A systematic financial reform of mechanisms is not being performed (weak financial services sector; poor financial resources selectivity).
- Interest rates are too high.
- Land ownership is still an unsolved problem.

The Lithuanian construction sector's strong points are as follows:

- The Seimas has adopted a new Law on Construction, concordant with EU requirements. By amending the Law on Construction, the project agreement procedure valid for decades has been revamped. Up until now, the draft agreement procedure usually called for several months to be concluded, resulting therefore in price hikes for projects. Today, the time to sign a construction project agreement and issue a building permit has been reduced to 30 or 35 days.
- Government controlled construction companies have been privatised and restructured.
- The housing sector has been privatised.
- Construction sector basics are good, as well as strong traditions.
- The preparatory system for construction specialists has been developed; with a qualified potential for scientists.
- Present conditions in housing credits and state guarantees are better in Lithuania than in many other Central and Eastern European countries.
- After a reorganisation of real estate land surveying and registering, a mortagage based infrastructure has been created; therefore, housing mortgage credits have commercially increased.
- The financing of housing programs by the state budget and international support is reviving the Lithuanian financial market.
- A favourable macro-economic environment exists (economic growth, low inflation, etc.).

RECOMMENDATIONS FOR IMPROVING THE LITHUANIAN INSTITUTIONAL CONSTRUCTION FRAMEWORK

The Lithuanian statutory domains of institutional participants according to the type of regulation are presented in Table 15. The Lithuanian meso-system is characterised by the major role played by the central government, and the minor role played by professional organisations, as well as by extremely insignificant trade unions and user associations. The role of the European Community, local authorities and participating institutions, in particular, has recently become more important. Lithuania, hoping shortly to become a member of the EU, is harmonising its laws with those of the EU. Therefore, transition periods are being fixed. The same initiative is also committed in the construction sector. As a result, this is why EU "Competition and Procurement Systems" and "Financing" regulations are being applied in Lithuania as opportunities emerge.

Table 15. Schematic presentation of statutory domains of institutional participants according to the type of regulation

	Construction permits	Building regula-tions	Component certifications and quality systems	Professional rules and firms' standards	Safety/security and personnel management	Agreements on price and quality of products and services	Competition and procurement systems	Finan-cing	RD support Education
National	X	X			X		X	X	X
Local authorities	X							X	
Clients, Industrials, Professional organisations			X	X	X	X	X		
Trade unions					X				
Users									

In 1991, Lithuania launched a privatisation programme, a two-stage process. The first stage was a distribution-type asset privatisation assisted by investment vouchers. The second stage was a commercial-type privatisation, and is still currently underway. The development in the construction industry illustrates the rapid transition of the Lithuanian economy into a market system. In 1998, 84.04% of all construction was carried out by the private sector. Construction by the private sector gained importance during the transition period between 1991 and 1999. During this period, the number employed in the private sector rose from 7.2 to 95.2 percent. The totally dominant public sector has now been replaced by the private sector. The opening-up of the construction market to the private sector has resulted in a significant increase in the quality of new buildings.

The first stage of restructuring the Lithuanian industry was rather chaotic, leading to the splitting up and privatisation of large enterprises, without any strategical plans or in-depth analysis. Due to a lack of experience, extensive restructuring has not been achieved to date. Major restructuring strategies were based on a privatisation stage during the initial phases, as well as an upgrading stage based on the attraction of overseas enterprises which would participate as partners.

The Lithuanian housing institutions will have to make reforms. It is clear that market mechanisms are not a universal solution to all housing problems. Effective forms of State regulation - legal, tax and financial incentives, in particular – will be required to establish a viable balance between existing market imperfections and enable competition in the market place.

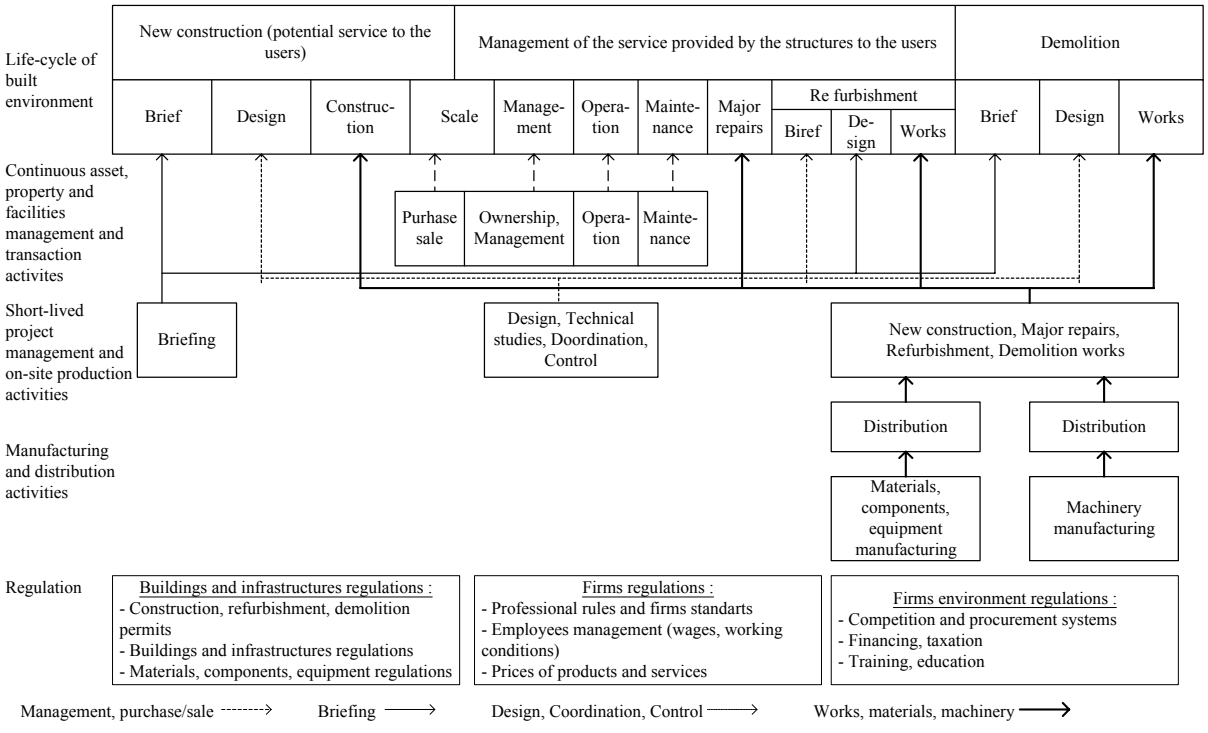
Political responsibility for housing should be made more clearly visible in Parliament. An obvious concentration on major housing policy issues within one parliamentary committee would reflect appropriate political priority, and would increase political efficiency on housing matters. Similarly, ministerial responsibility for housing should be strengthened. In particular, the limited institutional capacity of the Housing Policy Division within the Ministry of the Environment is a bottleneck in the institutional transformation of Lithuanian housing. The new regional administration in Lithuania should be given a stronger political mandate to play a key role in the coordination of

housing and other municipal activities within each region. The present regional administration needs to acquire a clear mandate for coordination and advice on municipal housing policies.

The municipal level lacks political and administrative structures with clear responsibility for housing issues. Lithuania is confronted with an institutional vacuum related to the regulation of the housing system. The transformation of national legal and financial frameworks has been somewhat slow and relatively inert to institutional change. Residual structures, a legacy of the Soviet housing system, continue to exist (such as municipal maintenance companies). In some cases, State companies recast as private entities are not effectively competing in the housing market. In addition, the organisation of private owners in multi-flat housing is considered to be a major challenge in the future development of Lithuanian housing. Institutionalising homeowner associations will require urgent top-priority national and municipal actions.

The Lithuanian construction sector system is presented in Figure 2.

Figure 2. The Lithuanian Construction Sector System



After the analysis just made of the weak and strong points of the Lithuanian construction sector system and in order to enhance its competitiveness, we suggest proceeding with the following main actions and initiatives :

- Review the normative documents and legal acts regulating the construction of ministries, counties, and municipalities and constitute a joint system of the state's technical and special requirements in order to eliminate duplication, as well as unimportant or contradictory documents.
- Ensure Lithuanian state institutions and the construction organisation fight more actively for quotes allowing construction activities in foreign countries.
- Support the Lithuanian construction exporters by both financial and non-financial

means.

- Create an Internet system of the Lithuanian construction sector in its entirety.
- Create a national system of normative documents and legal acts regulating the construction business in compliance with EC requirements.
- Create a legal environment facilitating the development and promotion of innovation.
- Promote ecological and energy-efficient construction products and services.
- Participate actively in EC-financed infrastructure development projects.
- Improve normative documents and legal acts regulating the construction business and strive for their conformity with the best international practices.
- Promote construction under completion and renovation of old housing.
- Co-ordinate educational programmes and ongoing higher education studies at the national level in Lithuania. Improve their quality and effectiveness.
- Create a promotional system inspiring an interest by both companies and their employees for improved qualifications.
- Promote and support the implementation of up-to-date achievements in information and Internet technologies under construction. Stimulate Lithuanian construction companies to benefit more effectively from the opportunities offered by information and Internet technologies at the following three levels in the construction sector (country, organisations, and projects).
- Formalise the normative documents and legal acts regulating the construction business in order to concur with European Union requirements.
- Initiate the construction of low-income/social housing.
- Implement integrated design technologies.
- Reform work relations in the construction business. Issue a guide offering advice to construction workers on how to carry out on-the-job relations more effectively.
- Implement up-to-date achievements in Facilities and Property Management.

REFERENCES

- Carassus, J. (2000) A Mesoeconomic Analysis of the Construction Sector. Joint meeting of CIB W55/W65 and TG23/TG31/TG35. September 13-15, Reading.
- Economic and Social Development in Lithuania (2000). Vilnius, Department of Statistics under the authority of the Government of the Republic of Lithuania.
- Financial indicators of enterprises 1999 (2000). Statistics Lithuania. Vilnius. 98 p.
- http://www.unece.org/env/hs/workshop/paper-2.pdf
- Industry 1998. Statistics Lithuania (1999). Vilnius. 76 p.
- Investment in Tangible Fixed Assets and Construction (1991-2003). Vilnius, Department of Statistics under the authority of the Government of the Republic of Lithuania.
- Kaklauskas, A. (1996) Total Life Analysis, Modelling and Forecasting of Construction in Lithuania. Research output. EC Phare-ACE Programme 1996. Contract Number: P96-6708-F. - 56 p.
- Lietuvos ukio ekonimines socialines raidos prognoze 2001-2003 metais (2003).
- Lithuanian architecture and building directory (2002). Vilnius.

- Lithuanian Economic and Social Development Forecast for 2000-2002 (2003). Ministry of Economy, Vilnius.
- Main macroeconomics indicators of Lithuania (2001). Vilnius, Department of Statistics under the authority of the Government of the Republic of Lithuania, 2002.
- Review of Baltic States Real Estate Market (2000). Vilnius.
- Services 1999. Statistics Lithuania (2000). Vilnius. 44 p.
- Statistical Yearboook of Lithuania (1990-2003). Vilnius, Department of Statistics under the authority of the Government of the Republic of Lithuania.
- Study on Government Assistance Programmes in the Housing Sector (1998). Danish Ministry of Housing and Lithuanian Ministry of Construction and Urban Development.
- The Survey of the Lithuanian Economy 2002 (2003). Vilnius, Department of Statistics under the authority of the Government of the Republic of Lithuania.

-

CHAPTER VIII

THE PORTUGUESE CONSTRUCTION SYSTEM: THE ADJUSTMENT PROCESS TO A CHANGING MARKET AFTER THE BOOM YEARS

Jorge Lopes
School of Technology and Management
Bragança - Portugal

INTRODUCTION

The study of the construction industry and its role in national economy has been extensively addressed. Traditional analysis of the construction industry has mainly focused on the building firm's size, the structure of employment, and the division of building, civil engineering, and R & M construction works. Existing assumptions persist that structural changes will emerge in the construction industry of a particular country as the national economy develops over time. Bon (1992) analysing the role of the construction sector in economic development presented a development pattern of the construction industry based on stages in development. The main aspects of the development pattern were as follows: in the early stages of development, the share (percentage) resulting from construction in national output will increase, but ultimately will decrease in absolute and relative terms in more advanced industrial countries. Another important aspect of the development pattern is that while the share allotted to improvement and maintenance in total construction increases, the proportion for new construction decreases in the latest stages of development. Ruddock (1999) using more recent data collected from a large sample of countries representing all stages of economic development corroborated this proposition.

An emerging approach is the "meso-economic analysis" of the construction industry or the "construction sector system", which takes into account not only construction firms, but also the wide range of participants in the development of the building environment. According to Carassus (1999), production is only one of the dimensions of the analysis, since the use and the adaptation of products are becoming the centre of the system in industrially advanced countries. Further, there is a constant interaction between the system and its participants, and this interaction is determined by the system, rules and conventions. Does this approach also apply to the construction sector of countries in the middle-income range? What is the effect of the increasing globalisation of the economy, particularly that of property investment, on the development pattern of the construction industry in less advanced countries?

The Portuguese construction sector is one of most important and largest industries of the nation. It contributed to 6.4% of the total value added and 12.1% to national employment in the year 2002. When the activities of design and consultancy services, property activities, the building materials industry, construction machinery, and Government construction departments are added to the construction sector, it is estimated that their share in total output and employment are roughly double those values. Throughout the last decade, construction and economically-related sectors have

experienced a sustained growth in line with the development of the general economy. However, in the last four years, the pattern has shown signs of flagging due to excess supply, particularly in the new residential housing segment, and changing economic environment.

This paper focuses on the application of the 'construction system' model to the Portuguese case in terms of construction firm organisations, market development, player configurations and the relationship between the construction sector and the general economy.

BACKGROUND TO THE STUDY

The application of meso-economic analysis to the study of the construction industry is still in its infancy. According to Carassus (1999), several interchangeable concepts are used in the meso-economics literature: sector, production chain, economic meso-system and industry cluster. The concept of the economic meso-system is, according to same author, an appropriate way to capture the complex nature of the built environment because it deals with, on the one hand, the participants producing specific types of goods and services, and, on the other hand, the institutions responsible for regulating the individual and collective behaviour of the participants involved in the production. It is worth noting that the application of this method of analysis is very close to that proposed by the Australian Expert Group on Industry Studies or AEGIS (1999) in its study of the Australian construction industry. The AEGIS classification divides the industry into five product - system segments: on-site services, client services, building and construction project firms, building products and supplies, and tools, machinery and equipment manufacturing. A detailed review of the construction meso-economics literature is provided in a paper by Carassus (2000).

THE MACRO-ECONOMIC ENVIRONMENT

Before proceeding with the characterisation of the Portuguese construction sector system, it is worth presenting here an overview of the recent country's macro-economic environment. A more complete survey is provided in Lopes (2001). The Portuguese economy has enjoyed an era of remarkable economic performance and a low rate of inflation. Output growth averaged 3.4% per year on a GDP basis during the period 1994-1999, raising the GDP per capita measured in purchasing power parity terms to 69.4% of that of the European Union average of 53.2% in 1985 (OECD, 1999). The construction industry and related sectors have played an important role in the country's economic performance. Construction value added represents 6.5 % of the annual GDP and contributes around 12 % to total employment. According to the figures provided by the National Statistics Institute (INE-b, various years), either 68,522 large or small enterprises were active in the construction industry in 1998, with 353,574 employees. This growth in construction employment (see Table 2) has helped to lower the country's unemployment rate to 4.4%, one of the lowest in the OECD countries.

The last two decades (and particularly from the mid-1980s in the case of Portugal) have witnessed several changes within the construction industry and economically-related sectors at both the national and international levels. The run-up in monetary integration was accompanied by a number of structural reforms that impacted directly and indirectly on the construction market. One of the catalysts of the improved performance was the restructuring of the financial system, with a progressive liberalisation of capital flows. In addition, the implementation of an ambitious privatisation programme stimulated product market competition and productivity gains, particularly in the

booming financial sector services (OECD, 1999). These developments coupled with the fierce competition between banks and other financial institutions as regards mortgage credit have had a strong impact on the development of the construction market, particularly on the new residential housing sub-segment.

On the supply side, the surge in equity and bank-lending markets influenced the operating environment of the major national construction enterprises through mergers and acquisitions of companies. The participation of banks and other financial institutions in the capital of or joint-venturing with major construction companies facilitated the market diversification of the latter, namely, in the property market and utilities services. As regards the property market, the changes in the general environment, increasing per capita income and urbanisation (particularly the EXPO 98 developments in Lisbon) spurred on the development of a more modern property sector in the metropolitan areas similar to those prevailing in the 'maturing' markets of other European countries (for a discussion of this concept of 'maturity', see e.g. Magalhães, 1999).

STATISTICAL SOURCES

The intention of this section is to provide a brief explanation of the accounting procedures of the main bodies concerned with the provision of data and other statistical information pertaining to the construction industry and related sectors in Portugal. The statistical sources used stem from the various publications of the National Institute of Statistics (INE) and the *Construction Annual Report* published by the Association of Building Construction and Public Works Enterprises (AECOPS). The INE *Quarterly National Accounts* is the official publication that provides the most important statistical data concerning the nation. As with other Western European nations, the *Quarterly National Accounts* is fully consistent with the European System of National and Regional Accounts (ESA95). It provides data on Construction Value Added (CVA) and Gross Fixed Capital Formation in Construction (GFCFC), both in current and constant prices. However, since 1995, GFCFC data have not been presented in a disaggregated form. This publication also does not provide data on Gross Construction Output (GCO). Data on construction employment stems from the *Employment Statistics* also published by the INE. The *Construction Annual Report* provides data on Gross Production Value (GPV) by sector companies, disaggregated into its different market sub-segments, and the data are based on regular surveys on construction companies. As there is no official data pertaining to the repair and maintenance (R & M) sub-segment, the figures presented in this study should be taken with a great degree of caution. However, it is generally recognised that R & M data are under-estimated. The same warning also applies to the data pertaining to other segments of the construction sector system presented in this study - design and consultancy services, and property activities. Another construction-related industry analysed here is the building materials industry. All data are supplied from the INE *Business Surveys*, but only enterprises with 20 or more employees are fully reported on to this official body.

THE PORTUGUESE CONSTRUCTION ACTIVITY IN THE PERIOD 1990-2002

Since the entrance of the country in the European Union in 1986, the Portuguese economy has entered an era of sustained economic growth. As stated earlier, the run-up in the economic process and monetary integration started in the early 1990s, coupled with the transfer of EU structural funds, have impacted heavily on the construction industry activity and economically related sectors. New residential building and civil engineering works have been the driving forces bolstering this remarkable growth throughout the last decade.

The Clout of the On–Site Construction Activity

Table 1 presents construction value added (CVA) and gross fixed capital formation in construction (GFCFC) for the period 1990-2002. It is easy to see that the indicators of the construction activity experienced a remarkable growth in the period despite a drop-off in CVA in 1992/1993, which was accompanied by a plunge in national output after the world-wide economic recession in 1991/1992. Table 1 also indicates that two development patterns can be observed: i) the period 1990-1997, in which the indicators of construction activity increased not only absolutely but also relatively, peaking in 1997, which coincided with the completion of most of the major infrastructures and developments of the World EXPO' 98 hosted in Lisbon. The share of CVA in GDP increased from 5.5% in 1990 to 6.7 in 1997. ii) the period 1998-2002, in which an absolute increasing growth in both CVA and GFCFC was accompanied by a relative decreasing growth in the same indicators. The share of CVA in GDP fell to 6.4% in 2002, the year that even experiences an absolute decrease in the construction industry activity. Thus, a trend of relative decline is clearly apparent in the last four years.

Table 1 - Construction Value Added (CVA), Gross Fixed Capital Formation in Construction (GFCFC) and the Share of CVA in GDP (1990-2002)

Year	CVA (constant 1995 million EUR)	GFCFC (constant 1995 million EUR)	Share of CVA in GDP (%)
1990	4045.6	8348.5	5.5
1991	4181.3	8814.3	5.6
1992	4341.9	9152.9	5.7
1993	4311.2	9088.1	5.5
1994	4385.7	9245.2	5.6
1995	4853.3	9824.8	6.0
1996*	5090.2	10361.0	6.2
1997	5432.6	11784.4	6.7
1998	5727.4	12592.0	6.6
1999	5893.7	13053.6	6.6
2000	6155.0	13645.3	6.6
2001	6308.3	14017.8	6.5
2002	6060.2	13547.6	6.4

Source: INE-a (various issues); Note: * - New series

Construction Employment

The growth in construction activity is also visible in employment. Table 2 shows data on construction employment, total employment and the contribution of construction to total employment. Although the data for the whole period are not strictly comparable due to changes in statistical procedures and coverage (until 1998, data referred only to the Portugal mainland and after 1998 to all of Portugal), an absolute and relative growth was generally observed, particularly from 1995 and subsequently. The share of construction employment in total employment reached 12.2% in 2002, one of the highest levels in the European Economic Area.

Table 2 - Employment by Construction Industry and Total National Employment and Share of Construction Employment in National Employment: 1990-2002

Year	National Employment (000')	Construction Employment (000')	Share of Construction in National Employment (%)
1990	4466.3	352.6	7.9
1991	4631.0	362.8	7.8
1992 *	4340.7	346.2	7.9
1993	4255.2	340.2	8.0
1994	4251.1	330.8	7.8
1995	4225.1	340.3	8.1
1996	4250.5	343.1	8.1
1997	4331.8	388.4	9.0
1998 *	4863.3	518.8	10.9
1999	4928.7	538.7	11.2
2000	5028.9	596.4	12.1
2001	5098.4	586.1	11.5
2002	5106.5	622.3	12.2

Source: INE-b (Employment Statistics)
Note: * - New series

Changes in the Composition of Construction Output in Portugal

Table 3 shows the evolution of construction output for the period 1990-2000. As stated earlier, there is no consistency of data throughout the period. All works during the period 1990-2002 and disaggregate data in the period 1990-1995 concern GFCFC. Disaggregated data for the period 1996-2000 refer to gross production by construction firms. It can be seen that all works and the different market sub-segments increased markedly during the period. However, some patterns of change can be observed. In 1990-1997, civil engineering was the fastest growing segment, followed by residential building after 1997. Non-residential building increased fairly well throughout the period. It can also be observed that residential building constituted the largest share of the Portuguese construction output, a pattern that is also clearly illustrated in Table 4 as regards new residential building. No other EU member country (not even Ireland) has been able to match this outstanding performance in this market sub-segment.

Table 3- Composition of Construction Output (1990-2002)

Year	Residential Building		Non Residential Building		Civil Engineering		GFCFC (all works)	
	Share (%)	% change of preceding year	Share (%)	% change of preceding year	Share (%)	% change of preceding year	(EUR million - current prices)	% change of preceding year
1990	52.7	1.5	22.8	7.4	24.5	17.3	6180.3	6.4
1991	49.9	-1.5	22.8	4.3	27.3	19.1	6935.8	4.8
1992	48.7	1.7	22.6	2.3	28.7	8.5	7634.6	3.7
1993	48.0	-1.2	22.1	-2.0	30.0	4.9	7937.4	0.4
1994	46.8	-0.8	22.4	3.2	30.8	4.6	8485.5	1.7
1995	45.4	2.6	22.1	4.6	32.5	11.6	9470.7	5.9
1996 *	50.7	-	22.0	-	27.3	-	10643.8	5.5
1997	50.5	11.6	21.6	10.4	27.9	14.5	12604.4	13.9
1998	51.8	9.0	20.5	0.3	27.7	5.0	13792.5	6.9
1999	54.0	6.0	19.6	0.6	26.4	0.0	14578.9	3.7
2000	55.0	3.0	19.1	1.3	25.9	2.7	16187.0	4.5
2001	53.7	-1.5	19.5	3.0	26.8	5.0	17159.8	2.7
2002	52.4	-4.0	20.4	2.0	27.2	0.0	17228.8	-3.4

Sources: INE-a (various issues) for all works in 1990-2002 and disaggregated data in 1990-1995; Estimates by AECPOS (various years) f or disaggregated data in 1996-2002.
Note: GFCFC comprises the output of new works, major repairs, alterations, site preparation by construction firms and construction works done by other entities. It does not comprise repair and maintenance works.
*- New series for disaggregated data

There is no official data on R & M construction works in Portugal. According to AECOPS (2003 edition), which used data from the *Euroconstruct Report*, the share of this market sub-segment averaged 7.6% of the total market output for the period 1998-2002, the lowest value among the Euroconstruct countries. Although the figures from Portugal, as noted earlier, might be under-reported, they do reflect somewhat the structural imbalance of the construction market, let alone issues concerning data availability and reliability. However, data on awarded public work tenders (AECOPS, 2001 edition) suggest that there has been a marked increase in R & M construction work. The share of R & M public works in total public works increased from 13% in 1993 to 26.4% in 2000. The repair and maintenance of the road network accounted for most of this increase.

The recent legislative measures targeted at stimulating initiatives for the rehabilitation and modernisation of specific aging residential parks, particularly in the metropolitan areas, added to the EU directives to lower the VAT in labour-intensive industries, will undoubtedly contribute to the development of this sub-segment of the construction market.

Table 4–New Construction and R & M in Portugal and in Euroconstruct Countries (%): 1998-2002

	Residential Building	Non Residential Building	Civil Engineering	Repair & Maintenance	Total
Portugal	48.8	17.2	26.4	7.6	100
Euroconstruct (average for 15 countries)	24.0	19.5	20.5	36.0	100

Source: AEC0PS (various years)

Size Distribution of the Construction Firms

The construction industry in Portugal is very fragmented. Table 5 below shows the distribution of firms according to company size for the period 1993-1998. Although there is a discontinuity in the series in 1995-1996 due to change in statistical procedures and improvement in statistical coverage, it can be observed that small firms (up to 9 employees) represented 93% of the total number of firms in 1996-1998, a pattern similar to those of other countries in the European Union. The number of large and medium-sized firms remained fairly stable during the period 1993-1998. The share of large firms (firms employing 100 or more) varied between 0.7 and 0.8% in 1993-1995, and between 0.3 and 0.4% in 1996-1998.

Table 5- Construction Firms by Size of Company (1993-1998)

Size	1993		1994		1995		1996 *		1997		1998	
	Nº of Firms	%	Nº of firms	%	Nº of firms	%	Nº of firms	%	Nº of firms	%	Nº of firms	%
Up to 9 Employees	23780	83.7	26457	84.2	25591	84.2	63972	93.1	59669	92.8	63759	93.1
10 – 19 Employees	2548	9.0	2732	8.7	2665	8.8	2724	4.0	2738	4.3	2831	4.1
20 – 100 Employees	1844	6.5	1971	6.3	1923	6.3	1786	2.6	1683	2.6	1692	2.5
100 + Employees	237	0.8	246	0.8	225	0.7	236	0.3	218	0.3	240	0.4
Total	28409	100	31406	100	30404	100	68718	100	64308	100	68582	100

Source: INE-c, various years (Business Surveys)
*- New series

The distribution of employment according to company size for the period 1993-1998 is presented in Table 6. It can be seen that there was no significant change in employment and in its distribution across the size category during the period 1993-1995. In line with the increase in total employment for the period 1995-1998, the contribution of the small firms to total employment increased both absolutely and relatively, and the share of the large firms decreased relatively during the same period.

Table 6– Employment in Construction Firms by Size of Company (1993-1998)

Size	1993		1994		1995		1996 *		1997		1998	
	Nº of Emplo-yees	%	Nº of Emplo-yees	%	Nº of Emplo-yees	%	Nº of Emplo-yees	%	Nº of Emplo-yees	%	Nº of Emplo-yees	%
Up to 9 Employees	69823	30.0	75657	30.9	74314	32.0	144593	47.2	159186	49.2	185893	52.6
10 – 19 Employees	31423	13.5	35585	14.5	33282	14.3	31224	10.2	34375	10.6	40142	11.3
20 – 100 Employees	63964	27.5	71313	29.1	64242	27.6	65198	21.3	64763	20.0	65269	18.5
100 + Employees	67539	29.0	62225	25.4	60636	26.1	65392	21.3	65237	20.2	62270	17.6
Total	232809	100	244780	100	232474	100	306407	100	323561	100	353574	100

Source: INE-c, various years (Business Surveys)
*- New series

Table 7– Turnover in Construction Firms by Size of Company: 1993-1998 (EUR million)

Size	1993		1994		1995		1996 *		1997		1998	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Up to 9 Employees	2477	24.8	2932	27.0	2951	25.	7879	42.1	11098	46.5	15965	53.6
10 – 19 Employees	1281	12.8	1239	11.4	1553	13.	1703	9.1	2071	8.8	2477	8.4
20 – 100 Employees	2525	25.3	2757	25.4	3042	25.	3443	18.4	3682	15.6	4343	14.6
100 + Employees	3729	37.1	3926	36.2	4265	36.	5689	30.4	6688	29.0	6948	23.4
Total	9988	100	10853	100	11811	100	18714	100	23539	100	29733	100

Source: INE-c, various years (Business Surveys)
*- New series

Table 7 above shows the evolution of turnover by construction firms and its distribution across the size category for the period 1993-1998. It can be observed that the pattern is similar to that of employment during the same period. However, the largest firms played an important role, particularly in civil engineering and non-residential building sub-segments, added to the increasing trend in the concession regime. According to the *Construction Annual Report* (AECOPS, 2001), the turnover of the 13 largest

construction companies totalled EUR 4.1 billion, about 17% of the total turnover of the industry in 1998. The value of construction works completed abroad by companies with 20 or more employees increased from EUR 205 million in 1992 to EUR 435 million in 1998.

Design and Consultancy Services and Property Activities

Table 8 presents the distribution of firms, employment and turnover across the size category in 1998 for property activities. It clearly shows the dominance of small firms in this activity. Firms with up to 9 employees accounted for 97.4% of the total number of firms and contributed to 81.6 % and 87%, respectively, in employment and turnover. Firms with 20 or more employees accounted for just over 8.8% of the total turnover of the industry, which reveals the prevalence of a 'local' market in the Portuguese property sector. The average number of people employed in property activities is 3.1.

Table 8 - Firms, Employment and Turnover in Property Activities: 1998

Size	Firms		Employment		Turnover		Average Employment
	Number	%	Number	%	(EUR million)	%	
Up to 9 Employees	8690	97.4	22625	81.6	5079.3	87.0	2.6
10 – 19 Employees	154	1.7	1854	6.7	247.4	4.2	12.0
20 + Employees	82	0.9	3231	11.6	508.3	8.8	39.4
Total	8926	100.0	27710	100.0	5835.0	100.0	3.1

Source: INE-c (Business Surveys: 1998)
Note: Include property developers, house-renting companies, estate agencies, and building administrators. It does not include property development by construction companies.

The distribution of firms, employment and turnover according to firm size in design and consultancy services shows a pattern similar to that of property activities, although the fragmentation is less pronounced. Firms with up to 9 employees accounted for 92.3% of the total number of firms and contributed to 65.5.6 % and 71.6%, respectively, in total employment and total turnover. Firms with 20 or more employees represent 24.9 % and 20.4%, respectively, in total employment and total turnover. The average number of people employed in design and consultancy services is 5.7, which is higher than in property activities.

Table 9- Firms, Employment and Turnover in Consultant and Design Services: 1998

Size	Firms		Employment		Turnover		Average Employment
	Number	%	Number	%	(EUR million)	%	
Up to 9 Employees	3139	92.3	12623	65.5	1205.1	71.6	4.0
10 – 19 Employees	162	4.8	1854	9.6	135.2	8.0	12.9
20 + Employees	93	2.9	4561	24.9	341.7	20.4	49.7
Total	3394	100.0	19280	100.0	1682	100.0	5.7

Source: INE-c (Business Surveys:1998)
Note: Include architects, engineers, project managers, technical designers, land surveyors and other technicians. It excludes non-registered individual designers and other technicians, and construction and construction–related government departments.

Building Materials Industry

The indigenous building materials industry impacts heavily on the fate of a country's construction industry, even in a globalised market of construction products and services. As pointed out by E & T (2000), innovation in this sector will be a key factor in the competitiveness of the Portuguese construction industry.

The building materials sector is more concentrated than the construction sector, although the heterogeneity of the former is also evident. One distinct category is the very concentrated, high-technology and capital-intensive activities of cement and lime production, sanitary equipment and special steel products. At the bottom end of the sector are the dispersed low-technology manufacturing activities involved with the production of bricks for walls, cement products and stonework. Unfortunately, it is difficult to get a really accurate measurement of the output of the building materials industry and the products directly used by the construction industry. Although input/output tables do provide an important contribution to the data collected for this purpose, they are outdated, however, in the case of Portugal. Indeed, many segments of the building industry provide products that are not exclusively targeted for the construction sector. Thus, the data provided here concern the activities of non-metallic mineral products and basic metallurgical manufacturing, which are to a great extent directed toward the construction industry activity.

Tables 10 and 11 show the distribution of firms, employment and turnover across the size category in 1998 for, respectively, non-metallic mineral products, and metallurgical manufacturing. It can be seen that firms with 20 or more employees play an important role in these activities. In the former industry, they contributed to 70.4% in employment and 81.9 % in turnover. In the latter industry, their share amounted to, respectively, 85.2% and 94.2% in employment and turnover.

As can be obtained from INE-c (*Business Surveys: 1998*) the combined value added and employment figures of these two industry segments were, respectively, 38.6% and 32.5 % of those for the construction industry in 1998.

Table 10 - Firms, Employment and Turnover in Non-Metallic Mineral Manufacturing: 1998

Size	Firms		Employment		Turnover		Average Employment
	Number	%	Number	%	(EUR million)	%	
Up to 9 Employees	3383	74.4	14650	20.0	490.7	11.4	4.3
10 – 19 Employees	513	11.3	7032	9.6	292.7	6.7	13.7
20 + Employees	647	14.3	51629	70.4	3523.1	81.9	79.8
Total	4543	100	73311	100	4306.5	100	16.1

Source: INE-c (Company Surveys:1998)

Table 11 - Firms, Employment and Turnover in Basic Metallurgical Manufacturing: 1998

Size	Firms		Employment		Turnover		Average Employment
	Number	%	Number	%	(EUR million)	%	
Up to 9 Employees	368	70.6	1313	9.8	50.2	3.9	3.6
10 – 19 Employees	51	9.9	665	5.0	24.1	1.9	13.0
20 + Employees	102	19.5	11352	85.2	1213.4	94.2	111.3
Total	521	100	13330	100	1287.6	100	25.6

Source: INE-c (Business Surveys:1998)

VALUE OF THE BUILT ENVIRONMENT STOCK

No statistics are available on the value of the built environment stock. Since the late 1950s, when the National Institute of Statistics (INE) started publishing the country's *National Accounts* in its modern version, data have been compiled and are available on the gross fixed capital formation (GFCF) and the GFCF in construction (GFCFC) as a component of GDP in terms of expenditures. Ever since then, there has been a remarkable uniformity in the value of the GFCF and the GFCFC, the latter being roughly half that of the former. The GFCF varied between 15% and 20% during the period from the late 1950s to the mid-1980s and between 20% and 25% from the mid-1980s up until now.

As stated earlier, the GFCFC comprises new work and major repairs / alterations in residential housing, non-residential housing, and civil engineering by construction firms, as well as works performed by other entities. The residential housing share varied between 45% and 50% compared to the total GFCFC. Considering that building depreciation is far less pronounced than for civil engineering depreciation, it is estimated that the residential building's contribution to the country's total built environment stock is around 60-65%.

The *Census of Population and Housing* and the *System of Price Indicators in Construction and Housing,* both published by the National Institute of Statistics (INE-d, 2001: INE-e, various issues), are the only comprehensive sources to allow an accurate estimate of the country's residential stock value. According to the 2001 Census of Population and Housing, the Portugal mainland had a total of 9,833,408 inhabitants, 3,015,786 residential buildings and 4,849,274 housing units. Table 14 shows a sharp rise in residential housing during the period 1970-2001, an increase just under 2.3 million housing units. The total number of housing units in Portugal (including the Atlantic islands of Azores and Madeira) is 5,036,149 and a total population of 10,318,084 inhabitants. The Metropolitan area of Lisbon (Lisboa e Vale do Tejo) accounts for about 35% of the housing stock.

In 1995, the Portugal mainland housing units had an average inhabitable area of 80 square metres. According to INE-e (2001, third quarter issue), the average housing price was EUR 1,059 the square metre (Table 13). After depreciation, the residential housing stock value may therefore be estimated at EUR 255,530 million, and the non-residential housing and civil engineering stock value at EUR 137,593 million. The ″construction stock to GDP″ ratio is 3.5.

Table 12 – Evolution of Housing Units in the Portugal Mainland (1970-2001)

Year	Habitual space of residence	Vacant/second residence	Total	% change of preceding census
1970	2135360	423380	2558740	-
1981	2653100	586900	3240000	26.6
1991	2928500	1061770	3990270	23.2
2001	3585472	1263802	4849274	21.5

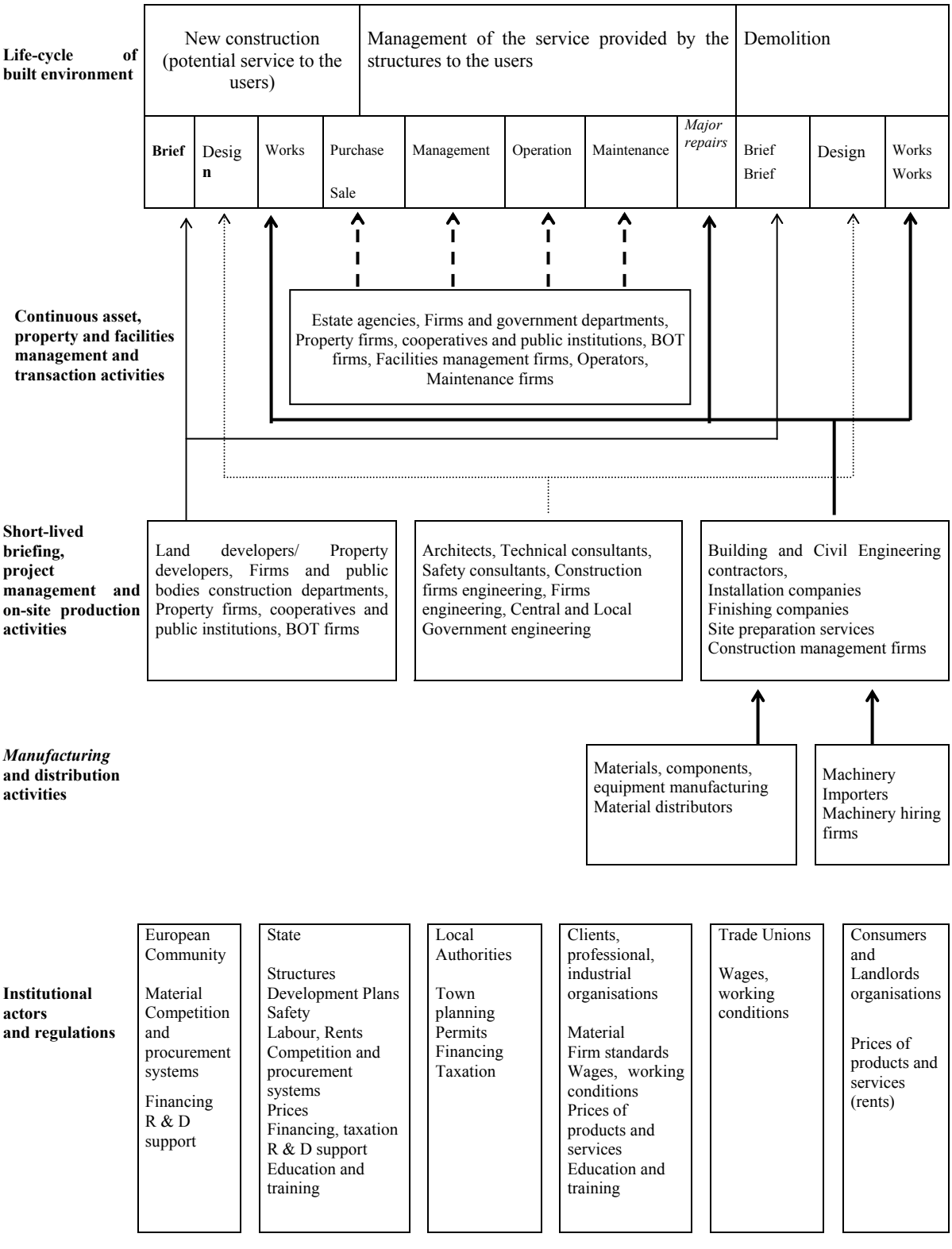
Source: INE-d, 2001(2001 Census of Population and Housing)

Table 13– Bank Valuation (mean average) of Housing in the Portugal mainland (EUR/m2): third quarter 2001

	Total	Apartments	Detached houses
Portugal mainland	1,059	1,147	886
North	922	996	797
Centre	895	1,002	797
Lisboa e Vale do Tejo	1,272	1,302	1,149
Alentejo	898	996	839
Algarve	1,158	1,199	1,043

Source: INE- e (Systems of Price Indicators in Construction and Housing)

Fig.1 Construction Sector System in Portugal



INSTITUTIONAL ACTORS AND MAIN REGULATIONS

Institutional Actors

The Portuguese construction sector system is characterised by the important roles played by the Central and Local Governments and the major construction companies. Table 13 below presents schematically the statutory domains of the main institutional actors in the built environment. The principal promoters in the construction market are the central government and local private housing investors, but international investors and financial companies have been increasingly playing an important role, namely, in the commercial property market and construction works in the concession regime.

The recent development of capital markets influenced the operating environment of major national construction enterprises through mergers and acquisitions. Another recent feature is the increasing market diversification of these companies, namely, in the property activities and utilities services. It is also worth noting that according to Decree Law 59/99, the concession consortiums must include at least one construction company. There are today three major holdings each with an annual turnover above EUR 500 million. They are Mota-Engil, Somague-Sacyr and Teixeira Duarte-Soares da Costa. The main representative organisations of Portuguese contractors are: AECOPS (Association of Building Construction and Public Work Contractors); ANEOP (National Association of Public Work Contractors); AICCOPN (Northern Industrial Association of Building Construction and Public Works); and AICE (Industrial Association of Builders). Their main functions are to represent the interests of their member associations to the Government and other public bodies related to the institutional environment of the construction industry, and to provide information and services concerning relevant aspects of the industry to their members.

In terms of professional practice in construction, the graduate professionals are architects, civil engineers or technical civil engineers. In order to legally practise in the field, architects must be registered with the Order of Architects, civil engineers with the Order of Engineers and technical civil engineers with the Professional Association of Technical Engineers, respectively. The role of these organisations is to ensure and enforce educational and training standards and to set up and control the professional conduct of their respective members. As far as the qualification of design professionals goes, the legal regime is somewhat ambiguous (Lopes and Ribeiro, 2001). According to the Decree Law 73/73, only architects are qualified to make architectural designs in protected areas and for 'prestigious' buildings. For other kinds of architectural designs, these professionals compete either with technical civil engineers or civil engineers. It should be noted that the technical civil engineer is awarded a degree after completing three years of higher education, while the civil engineer is awarded a degree after completing five years of higher education. In terms of engineering design and supervision/management of construction works, technical civil engineers and civil engineers are the ones entitled to carry out these activities. However, the Decree Law 73/73 stipulates that in construction projects of great complexity both the design and execution of works 'should' be under the responsibility of a civil engineer, but the term **'**great complexity' is not defined. As regards project management and real estate professions, these professionals are not obliged by law to fulfil any specific educational requirements nor are they subject to any legal regime regulating their activities. It should be noted, however, that some design consultants act also as project managers, particularly those that are members of the Portuguese Association of Designers and

Consultants (APPC).

Although the enforcement of the rules regarding the construction industry and related sectors pertains to the central and local governments, there has been an increasing concern on the part of industrial and professional associations for the safety, quality and environmental aspects of the built environment. The role of the European Community has also become more important lately.

Table 13 - Main Regulations and Institutional Actors

	Construction permits	Building regulations	Rules concerning materials and quality systems	Firm standards and professional rules	Safety, human resources management	Agreements on price and quality of products and	Competition and procurement systems	Finance Taxation	RD Support Education
European Commission			X		X		X	X	X
Government	X	X	X	X	X		X	X	X
Local Authorities	X							X	
Clients, Professional, Industrial Associations			X	X	X	X	X	X	
Trade Unions					X				
User Associations						X			

Contracts, Competition and Procurement Systems

The Portuguese law (art. 1207º of the Civil Code) defines a project as a contract whereby one of the parties guarantees to the other that he will undertake certain work for an agreed price. According to Martinez (1990), a construction project has three essential features: the parties;the execution of a job; and the payment of a fee. Thus, according to the legal definition, the same features also apply with restrictions to other construction services (design services, project management services, sub-contracts, works in concession regime). In public works contracts, the owner of the project may be the State, a public association, a public institute, a public enterprise or a municipality (art. 3º of the Decree Law 59/99). The Civil Code and Decree Law 59/99 for, respectively, private works and public works, state the rights, duties and obligations of the different parties. For example, the contractor is liable not only for infractions against his duties under the terms of the project contract (e.g. defective compliance), but also for failure to comply with any legal requirements which directly affect a third party. As regards the owner, he has the right to supervise the execution of the work, but he must not interfere with the ordinary progress of the job - the notion of good faith, or the owner's right to make alterations on the works with the ensuing obligation to pay an indemnity to the contractor. It is worth noting that in some cases the contractor's

liability is excluded pursuant to those legal provisions. For instance, the impossibility to perform the work at the present state of the art, or if the defects resulting in the work appear in work of its nature, or if the defect could not be avoided on account of the degree of accuracy demandable from the contractor (Martinez, 1990).

Construction characteristics influence the construction market's competition. Construction in Portugal is mainly a local market. Any company that wants to compete outside its own local market is charged with transport costs for labour, material and equipment. This is the case for small companies, which normally carry out their activity in the house building segment of the construction market (low capital intensity and lower works complexity). Generally, there are no real entry barriers, except for some segments of the industry, namely, in the civil engineering works, office and retail markets, which are the domain of major national companies. According to INOFOR (1999), the market quotation of construction enterprises in the stock exchange can only be enhanced if entry barriers are sufficiently effective, in conjunction with structural changes that differentiate trademarks and enterprises with high profitability (implying necessarily stability and recurrent profit making). The construction enterprises are according to the Decrees Laws 60/99 and 61/99 (Regime of Entry and Permanence in the Construction Activity) classified as either public work contractors or private work contractors. These two categories are further sub-divided into classes: class 1 to class 9. Thus, a class 1 company may only undertake works having a value up to EUR 125,000 (in 2001), while a class 9 company has no value limit imposed on its activity. Besides financial and economic capacity, the enterprises are differentiated by technical capability.

The traditional approach on procurement practices is by far the most commonly used in construction projects, especially in public construction projects. This approach may be the result derived from cultural reasons as well as the latent conflicting objectives of the different parties in the construction process. Owing to the changing industry structure, new contracting practices such as design-build and build-own-operate-transfer are being adopted. In 1999, the investment through the involvement of private sector accounted for 32% of the country's total investment in the road networks (ANEOP, 2000). Instead of the traditional reliance on tight prescriptive specifications and low-price selection criteria, those practices allow, according to some advocates, ensuring the best value for one's money. Several authors have already referred to the resistance to their use among some clients, many of whom are concerned about the quality of the finished project, inaccuracies in the client's briefing, conflict between the briefing and the contractors proposal, and the dubious quality of the work done by some firms (for a more detailed account on this subject see e.g. de Valence, 2001). As regards Portugal, an account in the media making reference to the concession of road projects points to the risks associated with this kind of procurement practice, particularly the excessive weight given to the price factor to the detriment of safety.

With respect to tender procedures and selection criteria, there are different ways to invite tenders for project contracts: open tendering, invited tendering, and negotiated tendering. The most favoured way in public work contracts is open tendering as stipulated in the Decree Law 59/99. According to EU directives, if the estimates in value of the works are equal to or greater than EUR 5 million, the invitation to tender shall be published in the *Official Journal of the European Communities*. The article 105º of the Decree Law 59/99 also stipulates that the works shall be awarded to the

most ‘economically advantageous’ tender, i.e. implying the weighting of different factors, namely, the ‘price, time, the cost of utilisation, the profitability and the technical value of the proposal.’ This appears to be somewhat contradictory to that stipulated in article 67º of the same Decree Law, which states that ‘the certificate of public work contractors constitutes a presumption for the capacity to trade, technical capacity and economic and financial capacity’ As regards the price factor, it is interesting to note that the Ministerial Order 15/72 (as amended in 1986) of the Ministry of Public Works provides instructions for the establishment of the fee level for project designs in public works (it is debatable whether the ministerial order applies to all public projects or only to those promoted by this ministry). What is unquestionable is that the price factor is one of the criteria for the selection of designers in public work projects (Decree Law 197/99) and the fee level rarely is higher than 5% of the price of the project contracts (Lopes and Ribeiro, 2001). The value stipulated in the Ministerial Order varies from 7 to 8%.

Building Regulations and Building Standards

The General Regime of Building and Urban Development enacted in 2001 (as an amendment of the formerly separate General Regime of Building and General Regime of Urban Development, both enacted in 1991) and the General Regulation of Urban Buildings enacted in 1951 (successively amended to take into account technical developments) constitute the core regulations for the Portuguese urban built environment. The former regulation deals with building and urbanisation work permits and covers the administrative procedures for building control and approval. The latter stipulates the mandatory minimum requirements concerning the safety, health and welfare of people in buildings and other urban facilities.

Mandatory detailed requirements are laid down (by means of Decree-Laws) in separate Regulations pertaining to structural safety, traditional materials, fire safety, acoustic and thermal comfort, water supply and waste water systems, electrical appliances, building installations, toxic and hazardous substances, and facilities for disabled people.

Other technical details regarding construction materials and components can be found in the Portuguese Standards and the National Laboratory of Civil Engineering (LNEC) Specifications and Homologation Documents. The Portuguese Institute for Quality and the LNEC are the main official bodies of the Portuguese System for Quality for the accreditation of construction products and processes within the framework of the Construction Products Directive of the European Union.

CONCLUSION

This paper constitutes an attempt to analyse the construction industry in Portugal using the construction sector system approach. This study implicates that such an analysis sheds more light on the roles the industries pertaining to the development of the built environment play in the global economy. Indeed, the data presented here have shown that if the activities of the construction industry, the construction professions, the property related professions and the building materials industry are collectively considered, their combined share in the GDP and the national total employment are, respectively, 1.72 and 1.46 compared to those pertaining to the construction industry. If the activities of the construction equipment manufacturing and distribution sectors, and the construction and construction-related government departments are added to this total, the construction sector system's contribution to the national output is about 13%, and its share in the nation's total employment is about 20%. Thus, this approach seems to be a promising methodology for dealing with international comparisons. However, compared to other important sectors of the economy, the research designated for the study of the construction sector encounters up front data limitations and measurement problems. It is not surprising that these problems tend to get worse when a more extensive scope is taken for the analysis. Further efforts are needed to investigate the usefulness of this analysis in the study of the construction sector in Portugal.

REFERENCES

- AECOPS (various years), *Relatorio Anual da Construção*, AECOPS, Lisbon.
- ANEOP (2000)*, Construção e Obras Públicas, Relatório Trimestral*, ANEOP, O'Porto
- AEGIS (1999), *Mapping the Building and Construction Product System in Australia,* Department of Industry, Science and Resources, Canberra
- Bon, R. (1992) "The Future of International Construction: Secular Patterns of Growth and Decline", *Habitat International,* Vol. 16 (3) pp 119-128
- Carassus, J. (1999), "Construction System: From a Flow Analysis to a Stock Approach", *Proceedings of the CIB TG31 International Workshop*, Cape Town. CIB Publication Nº 240
- Carassus, J. (2000), "A Mesoeconomic Analysis of the Construction Sector Applied to the French construction Industry", *Proceedings* of the *Joint Meeting of CIB Working Commissions W55 and W65 and Task Groups TG 23, TG 31 and TG 35*, The University of Reading, UK, September 13-15.
- INE-a (various issues), *Contas Nacionais Trimestrais*, Instituto Nacional de Estatística - INE, Lisbon
- INE-b (various issues), *Estatísticas do Emprego*, INE, Lisbon.
- INE-c (various issues), *Estatística das Empresas*, INE, Lisbon.
- INE-d (2001), *Census 2001-Recenseameno Geral da População*, INE, Lisbon
- INE-e (various issues), *Sistemas de Indicadores de Preços na Construção e Habitação*, INE, Lisbon
- INOFOR (2000), *Sector de Construçâo e Obras Públicas*, Lisbon
- Martinez, P (1990) 'Legal Aspects in Building Liability during and post Construction' *2ª Encontro Nacional de Construção*, LNEC, Lisbon
- Lopes, J. (2001), "The Impact of the Economic and Monetary Union on the Housing Market", *Property Management,* Vol.5 (1), pp 25-32
- Lopes, J and Ribeiro, F (2001), 'Working Out a Rational Institutional Framework for the Development of the Construction Industry, *Proceedings of the ARCOM 17th*

Annual Conference, University of Salford, UK, 5-7 September 2001
- Magalhães, C. (1999) "The Expansion of British Property Consultants and the Transformation of Local Property Markets", *RICS Research Conference- Cutting Edge 1999*, UK.
- Organisation of Economic Cooperation and Development- OECD (1999), *Report on Portugal,* OECD
- Ruddock, L. (1999), "Optimising the Construction Sector: A Macroeconomic Perspective", *Proceedings of the CIB- TG31 International Workshop*, Cape Town. CIB Publication Nº 240.

CHAPTER IX

THE SWEDISH CONSTRUCTION SECTOR: ITS ECONOMIC AND SOCIAL ROLE

Niclas Andersson
School of Civil Engineering
Lund - Sweden

INTRODUCTION

The building sector has a central role in the Swedish society and the impact on the construction industry from the Swedish government is tangible. The Swedish housing policy has been characterised by a social and distribution policy. Thus, the housing policy has been an instrument in creation of the Swedish welfare state based on social democratic policies. Public involvement in the construction industry has been characterised by regulation and an extensive subsidy system. Governmental housing loan and subsidy to new construction of residential buildings were examples of public financial support to the building market. Furthermore, the maximum rent in tenancy apartments is regulated by a utility value system, which implies that the rent is not adapted to the market value, but adjusted to the rent level of municipal housing companies in the local area.

The central and local government also play an important role as a client on the Swedish construction market. Due to the relationship between the construction market and national economy the Swedish government has taken various actions over the years in order to moderate market fluctuations. Investments in civil-engineering projects are in a wide extent financed by the government and constitute an example of political action taken to steer business activity.

The Swedish national economy entered the 1990s with a decline in business activity followed by a period of economic recovery starting in 1993. The building sector followed the recession of the national economy in the early 1990s but when the national economy showed an upturn from 1993, the recession of the construction sector continued and reached the decades lowest level of construction volume in 1997.

Due to the difficult economic situation in the early 1990s, the Swedish government reduced the financial support to the building sector, e.g. Governmental mortgage loans and subventions for new residential building were reduced. Previously detailed rules and regulations of building and construction design were replaced with new and more flexible regulations. Besides the reduced subsidies and the deregulation policies, raised value-added tax (VAT) on building construction as well as raised real-estate tax composed thoroughly changed conditions for the Swedish construction sector in the 1990s.

Objectives

The objective of this study is to give an overall picture of the Swedish construction industry and its development in the 1990s. The paper describes the structure of the construction industry by its activities, main regulations as well as industrial and

institutional actors from a meso-economic approach. The data is presented in a descriptive and principally quantitative format in order to constitute a basis for comparison with construction industries of other countries.

Information Sources
The principal technique used to collect data on the construction sector for this study is based on literature studies, principally official statistical data, annual reports and market analysis made by trade association and official authorities. The main source of information has been Statistics Sweden.

All companies in Sweden that conduct some form of economic activity are registered in the Swedish business register, regardless of whether they belong to the private or public sector. The Business register of Statistics Sweden classifies all companies by line of business according a SNI code, which is the acronym for the Swedish industrial classification. The SNI code corresponds to NACE Rev. 1[22], which is a common classification system of economic activities used by all member states of the European Union.

The data on the Swedish construction sector in Table 2, Table 3, Table 4 and, Table 5 is demarcated to construction firms within SNI code 45, see Table 1.

Table 1: Classification of Group 45 Construction, NACE Rev.1 and SNI

45	Construction		
45.1	Site preparation	45.4	Building completion
45.11	Demolition and wrecking of buildings, earth moving	45.41	Plastering
45.12	Test drilling and boring	45.42	Joinery installation
45.2	Building of complete constructions or parts thereof, civil engineering	45.43	Floor and wall covering
45.21	General construction of buildings and civil engineering works	45.44	Painting and glazing
45.22	Erection of roof covering and frames	45.45	Other building completion
45.23	Construction of highways, roads, airfields and sport facilities	45.5	Renting of construction or demolition equipment with operator
45.24	Construction of water projects	45.50	Renting of construction or demolition equipment with operator
45.25	Other construction work involving special trades		
45.3	Building installation		
45.31	Installation of electrical wiring and fittings		
45.32	Insulation work activities		
45.33	Plumbing		
45.34	Other building installation		

(Statistics Sweden)

Interviews with client representatives, architects and consultant have been a complementary source of information, especially to gain qualitative data on the Swedish construction sector system, its main institutional actors and rules and regulations.

Monetary values in the paper are stated in the European currency Euro, expressed with the currency code EUR. (1 EUR = 9.2313 SEK by 15 August 2001 when nothing else is stated).

22 Nomenclature Générale des Activités Economiques dans les Communautés Européennes. Statistical classification of economic activities in the European Community

PERCENTAGE OF CONSTRUCTION ADDED VALUES IN GDP

After the decline in the Swedish national economy in the early stage of the 1990s a period of recovery begun. By the end of the 1990s, the Swedish GDP[23] grew significantly with GDP growth rates at 3.6 percent, 4.6 percent and 4.4 percent from 1998 to 2000.

Construction investments were continuously reduced from the beginning of the 1990s to 1994, and reached its lowest volume in 1997. Over the decade, construction investments dropped by 30 percent. In accordance to the reduced level of construction investments in the early 1990s, construction added value[24] was also reduced, reaching its lowest level in 1997.

Table 2 presents information on GDP development in the 1990s together with data on the construction industry based on Swedish National Accounts.

Table 2: GDP, Added Values and Total Gross Fixed Capital Formation (1995 Reference Prices in Billion EUR)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
GDP (at market prices)	180.2	178.2	175.1	177.1	184.5	192.0	194.5	199.2	206.4	215.9	225.3	227.1
Value Added by Industry, total	124.5	122.7	119.7	119.7	127.1	135.4	137.7	143.4	148.9	158.1	168.0	169.4
Manufacturing Industry (SNI 15-37)	32.4	30.6	29.4	29.6	34.0	38.4	39.7	42.6	46.0	50.2	55.6	54.3
Construction Industry (SNI 45)	9.0	8.9	8.4	7.4	7.4	7.6	7.6	7.2	7.2	7.5	7.6	7.9
Manufacturing Added Value in GDP (%)	18.0	17.2	16.8	16.7	18.5	20.0	20.4	21.4	22.3	23.2	24.7	23.9
Construction Added Value in GDP (%)	5.0%	5.0%	4.8%	4.2%	4.0%	4.0%	3.9%	3.6%	3.5%	3.5%	3.4%	3.5%
(Value Added in Basic Prices)												
Gross Fixed Capital Formation, Total	36.03	32.95	29.13	26.14	27.87	30.64	32.01	31.93	34.40	37.21	39.66	39.98
Construction	18.18	17.47	15.81	13.59	12.73	12.85	12.92	11.93	12.16	12.16	12.67	13.29
Dwellings	9.96	9.72	8.59	5.72	3.77	2.87	3.13	2.77	2.75	3.05	3.35	3.47
- New Construction	na	na	na	2.79	1.62	1.24	1.27	1.18	1.18	1.42	1.67	1.81
- Reconstruction	na	na	na	2.89	2.16	1.63	1.86	1.59	1.56	1.59	1.64	1.64
Other buildings and constructions	8.23	7.74	7.21	7.87	8.96	9.98	9.80	9.16	9.40	9.11	9.31	9.81
Construction in total Gross Fixed Capital Formation (%)	50.5	53.0	54.3	52.0	45.7	41.9	40.4	37.4	35.3	32.7	31.9	33.2

(Statistics Sweden)

CONSTRUCTION EMPLOYMENT

A significant part of the Swedish workforce works in companies that are directly or indirectly related to the construction sector. In 2000 there were more than 226 000 individuals employed in the Swedish building industry. The figures presented in Table 3 cover the number of people working in construction companies, i.e. SNI code 45.

[23] GDP – Gross Domestic Product. The total value added or net output of all firms in an economy is called the Gross Domestic Product (GDP). The GDP estimate is based on the returns that firms provide. These returns are based on selling prices, which relate to new goods that immediately begin to depreciate. The term domestic refers to output or product made within the national borders of an economy (Ive 2000).

[24] The "value added" is defined as the difference between the value of inputs (excluding immediate labour and fixed capital, which are not treated as inputs) and the value of outputs. (Ive, 2000).

Table 3: Swedish Construction Employment in 2000 (in Thousands)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total Swedish Workforce	4 485	4 396	4 209	3 964	3 928	3 986	3 963	3 920	3 979	4 066	4 159	4 239	4 244
Construction Employment	323	320	279	240	225	230	225	218	220	225	226	232	235
% of Total	7.2%	7.3%	6.6%	6.1%	5.7%	5.8%	5.7%	5.5%	5.5%	5.5%	5.4%		

(Statistics Sweden)

In 1970 more than 370 000 people were employed in the construction sector. In 1997 the number of employees was reduced to 118 000, which until then was the lowest level measured since 1970. Despite a reduction of the numbers of construction employees by 30 percent in the 1990s, construction was still a large industry sector in Sweden. In a broader perspective more than 400 000 people were working with construction industry related activities in 2000. This figure includes employment in building material and equipment manufactures, real estate companies and employment in other building related business activities and this corresponds to about 10 percent of the total Swedish labour force in 2000, see Segments in the Meso-System of Construction below.

MAIN CHARACTERISTICS OF CONSTRUCTION WORKS

In 2000 construction investments (expressed by Statistics Sweden as gross fixed capital formation, see Table 2) reached a total of EUR 12 665 million, including new construction and reconstruction. Maintenance is not included since it is defined as running expenses and not considered as investments in the Swedish national accounts. Residential investments in new construction and reconstruction represented 30 and 13 percent respectively of the total construction investments.

In between 1990 and 2000 total construction investments decreased by fully 30 percent (in 1995 reference prices). The reduced level of investments is most significant for dwellings that dropped by 66 percent from 1990 to 2000. Over the same period non-residential and civil engineering investments remained on a stable annual level at about EUR 8 billions. But, as the total investment volume decreased, the share of non-residential and civil engineering increased from 45 percent to 73 percent of total investments.

Construction investments distribute among households, industry and government as three types of clients. According to Table 4, the reduced level of construction investments from 1993 to 1999 distribute proportionately between households, firms and government.

Table 4: Construction Investments by Type of Client, Maintenance Excluded (Households, Industry and Government) (Million EUR in 1995 Reference Prices)

	1993	1994	1995	1996	1997	1998	1999	
Households	1 804	1 264	1 167	1 265	1 244	1 440	1 642	14%
Firms	7 634	6 514	6 527	7 029	6 704	6 712	7 055	61%
Government	3 303	3 943	3 949	3 551	2 945	3 024	2 909	25%
Total Construction	12 741	11 721	11 642	11 844	10 893	11 176	11 606	100%

(Statistics Sweden)

In terms of production output, the construction sector totalled EUR 17,89 billion in 2000, which compared to 1999 was an increase of 3.2 percent (see Table 5). Residential and non-residential production have showed a slightly increasing tendency by the end of

the 1990s while civil engineering has stayed on an annual level of about EUR 4 billion with a local peak in 1998.

Table 5: New Construction and Repair/Maintenance for Building and Civil Engineering Works (Billion EUR in 2000 Reference Prices, 1 Euro = 8.45 SEK)

Construction (taxes excluded)	1996	1997	1998	1999	2000
Total production output	16.77	15.97	16.77	17.34	17.89
Residential, total	5.60	4.85	5.29	5.85	6.08
New	1.01	1.01	1.19	1.45	1.66
Repair and Maintenance	4.67	3.89	4.15	4.42	4.42
Non-Residential, total	7.10	6.95	7.14	7.45	7.82
New	2.00	2.07	2.16	2.32	2.76
Repair and Maintenance	5.11	4.88	4.98	5.13	5.06
Civil Engineering, total	4.09	4.12	4.29	4.01	3.99
New	3.20	3.27	3.42	3.07	3.01
Repair and Maintenance	0.90	0.86	0.89	0.94	0.97

(Euroconstruct 2001)

Non-residential construction is the largest category with 44 percent of the total production output in 2000. The distribution between residential, non-residential and civil engineering production has developed rather stable in the second half of 1990s, though there has been a slightly decreasing tendency for civil engineering production and an increasing share for residential and non-residential production over the period.

Table 6: Production output of Residential, Non-Residential and Civil Engineering Works (Billion EUR, 2000 constant price, taxes excluded, 1 EUR = 8.45 SEK)

Construction	2000	
Total production output	17.89	100%
Residential	6.08	34%
Non-residential	7.82	44%
Civil Engineering	3.99	22%

(Euroconstruct 2001)

Characteristics of Residential Construction

The start of new residential buildings increased in 2000 to about 17 100 homes (preliminary). This corresponds to an increase of 18 percent, or 2 600 units, compared to 1999. Rebuilding of non-residential buildings into residential buildings added 3 500 flats in 2000. But, 4 600 flats were demolished in 2000 giving a net increase of about 16 000 new dwellings in 2000 (Statistics Sweden). New production of residential buildings is mainly located to the metropolitan areas and some of the larger urban districts around the country.

The new residential production showed tendencies of growth in the final phase of the 1999s. However, the general picture of the 1990s was characterised by a significantly reduced production of new residential buildings, which mainly can be referred to political actions that changed the conditions on the housing market. Sweden legislated a tax reform in 1991, which implied fundamental changes to housing taxation, and in 1992 and 1993 the system of granting interest subsidies based on a guaranteed interest rate was fundamentally changed (Andersson, 2003).

The living space per home in one and two family houses, as well as residential blocks,

has increased strongly in new produced buildings in the second half of the 1990s. The average living space in new produced one and two family houses were 179 square meters in 2000, which is 16 percent larger than houses started in 1996. The corresponding living space for flats in residential blocks was 177 square meters in 2000, which is about 26 percent larger than in 1996 (Statistics Sweden). The increased living spaces in newly produced residential buildings indicate that mainly high standard dwellings were produced at the end of the 1990s.

Characteristics of Non-Residential Construction

Construction of non-residential buildings was on the increase from 1950 to 1970 and stabilised in the 1970s on an average value of EUR 4.3 billion (1995-reference prices). In the beginning of the 1980s the investments decreased, but recovered by the end of that decade.

New production of non-residential buildings increased by 40 percent from 1996 to 2000, which corresponds to an annual growth rate of almost 9 percent. The most significant increase of production occurred in 2000 when the annual growth rate almost reached 19 percent. The increase is most significant for new offices and commercial buildings while production of new educational buildings in schools and universities decreased.

Table 7: Non-residential production output by type (Billion EUR, 2000 constant price, taxes excluded, 1 EUR = 8.45 SEK)

	2000	
Non-residential, total	2.76	100.0%
Schools and Universities	0.41	14.9%
Hospitals	0.04	1.4%
Industrial Buildings	0.53	19.2%
Office Buildings	0.80	29.0%
Commercial Buildings	0.53	19.2%
Other non-residential	0.45	16.3%

(Euroconstruct 2001)

One explanation to the growth of new production of non-residential buildings in 2000 is the fact that project sizes have increased substantially. The fact is that the number of projects initiated under the second half of the 1990s have remained on a quite stable number.

Characteristics of Civil Engineering Construction

New production in civil engineering showed a weak development in the second half of the 1990s in comparison to residential and non-residential production. Some major infrastructure projects, such as the Öresund Bridge between Denmark and Sweden, were completed in 2000 and were not followed by new projects of similar magnitude.
Telecommunication works, such as 3G-systems and broadband, made 12 percent of total civil engineering production in 2000, but this category is expected to grow within the next coming years (Euroconstruct 2001)

Table 8: Civil Engineering production output by type (Billion EUR, 2000 constant price, taxes excluded, 1 EUR = 8.45 SEK)

	2000	
Civil Engineering, total	3.01	100.0%
Transport Infrastructure	1.65	54.8%
(Thereof Roads and Bridges)	1.03	
Telecommunications	0.37	12.3%
Energy and Water Works	0.99	32.9%

(Euroconstruct 2001)

Characteristics of Repair and Maintenance Works

The production output of repair and maintenance constituted more than 60 percent of the total construction production output in 2000. But, in the second half of the 1990s, the share of repair and maintenance in total production has decreased from 58 percent in 1996 to 53 percent in 2000.

For residential repair and maintenance the total production output totalled EUR 4.42 billion in 2000, which were the same as in 1999. Repair and maintenance of non-residential buildings were the most stable category of the Swedish construction output in the end of the 1990s. Repair and maintenance is not as affected by the national economic development as residential or civil engineering production. Instead, an important factor regulating repair and maintenance of non-residential construction is the volume of new non-residential production, i.e. the net change of the total stock of non-residential buildings.

Table 9: New and Repair/Maintenance of Building and Civil Engineering Works (Billion EUR in 2000 Reference Prices, 1 Euro = 8.45 SEK)

	1996	1997	1998	1999	2000	
Construction, total	16.89	15.98	16.79	17.32	17.88	100%
New Construction Building	3.01	3.08	3.35	3.77	4.42	25%
Repair & Maintenance Building	9.78	8.77	9.13	9.55	9.48	53%
New Construction Civil Engineering	3.20	3.27	3.42	3.07	3.01	17%
Repair & Maintenance Civil Engineering	0.90	0.86	0.89	0.94	0.97	5%

(Euroconstruct 2001)

Repair and maintenance in civil engineering ended up at barely EUR 1 billion in 2000, which corresponded to an increase of 3.6 percent compared to 1999. Civil engineering activities, including repair and maintenance, are dependent on political initiatives. In the 1990s the Swedish government launched various national infrastructure programs, especially for railways and roads. But, as the national economy recovered after the crisis in early 1990s, the civil engineering programs were reduced.

VALUE OF THE BUILDING STOCK

In the middle of the 1990s, new construction added less than 0.5 percent per year to the existing building stock in terms of building area (Elmberg *et al.* 1996). This fact emphasises the importance of existing stock to the construction industry. Further, it coincides with the the meso-economic approach that focuses on the management of the building and construction service rendered to users, rather than a one-sided contemplation of the production process of new buildings and constructions.

Sweden has about 9 million inhabitants on a territory with a total area of about 450 000 square kilometres. Only 3 percent of this area (11 000 square kilometres) is built-up land.

Table 10: The Swedish Land Use and Distribution of Build-up Land in 1995

Built-up land	3%
Agriculture	8%
Water	8%
Bog	11%
Mountainous Country	18%
Forest	52%

Built-up Land:	
Housing	51%
Trade and Industry	9%
Public Service	4%
Transport, construction	30%
Other	6%

(Statistics Sweden)

Housing (land for residential buildings and weekend cottages) represents 50 percent of the built-up land. These figures include the total area of house properties, i.e. gardens, and not only the area of the building. The method of measurement is the same for trade and industry buildings that represents less than 10 percent of the built-up land, including buildings as well as open-air storage spaces etc. A third of the built-up land is used for transport and constructions (bridges, harbours etc.). The category of other, see Table 10, includes farm properties etc.

In many countries, property taxation data is used for the description of the building stock (Thuvander 2000). There are some remarks needed to make clear when using the Swedish Property Taxation Register as a basis for determine the value of the building stock. The total area of Sweden is divided into real estates. Accordingly, a real estate represents a piece of land and each piece normally corresponds to an assessed unit. Hence, all buildings are located on a real estate that contains none, or any number of buildings.

The assessed units (real estates and/or buildings) are categorised as taxable or non-taxable. School buildings, churches, cultural buildings and defence buildings are examples of non-taxable units and consequently these types of buildings are not included in the value of stock based on taxation data. The Swedish tax authority carried out a general assessment in 2000 and repeats that operation every 6th years. The general outline for the recurrent adjustments of the tax assessment value is that it should correspond to 75 percent of the market value.

Table 11: Total Stock Value and number of Taxable and Non-taxable Units in 2000 (Million EUR, 2000 current prices)

	Total Value	Buildings	Real Estate	Units (no)
Total Value of Stock (market value)	365 274	238 622	126 652	2 906 030
Residential	222 371	155 897	66 474	2 302 358
Non-residential, industry, farming	142 903	82 725	60 178	517 395
Other (non taxable units)	0	0	0	86 277
Value of Stock in GDP (GDP=225 Billion EUR, 2000)	1.6			

(Statistics Sweden)

The Residential Stock

The housing market has a great influence on household economy. In Sweden people spend more than 30 percent of their total income on housing costs (Wigren 1995). In 2000 there were some 4.3 million apartments on the building market of which detached or semi-detached houses held 2.0 million and multi-dwelling blocks 2.2 million. The major part of the detached or semi-detached houses is privately owned. For apartment buildings there are three main categories of owners:

- Municipal housing companies
- Private real estate companies, and
- Tenant-owner associations

Ten of the largest real estate companies represent about 10 percent of the total dwelling space leased by private real estate companies. Consequently, there is a large number of small real estate companies of which the majority owns a single block of flats, see Table 16. About 620 000 of the apartments in multi-dwelling blocks, or 30 percent of the total number of apartments, are owned by tenant-owner associations.

Housing costs in tenancy apartments are only partly controlled by supply and demand of the market and to some extent adjusted by production costs. The rent level in municipal housing companies is normative for the maximum rent even for private tenancies. This regulation does not include private owner-occupied houses and tenant-owner association for which prices are set on market values (Statistics Sweden, 1999).

By the end of the 1970s, and in the beginning of the 1980s, private and tenant-owner associations owned about 60 percent of the total number for dwellings. Municipal housing companies share of new apartment buildings were considerably reduced in the 1980s and represented 35 percent in 1991. Under the first part of the 1990s municipal housing companies recovered their share of new constructed apartment buildings and reached a share of about 50 percent in 1994. Up to 1999/2000 the share decreased again to a level of 30 percent. (SOU 2000:44)

Segments in the Meso-System of Construction

In a meso-economic perspective, the life cycle of the build environment is based on three main activities (see Figure 3):

- Continuous asset, property and facilities management and transaction activities
- Short-lived briefing, project management and on-site production activities, and
- Manufacturing and distribution activities

These activities are carried out by various groups of companies such as contractors, professionals, material manufacturers etc. All companies in Sweden that conduct some forms of economic activity are found in the Business register, regardless of whether they belong to the private or public sector. The SNI code (see Information Sources) has been used as the basis for the following description of the Swedish construction sector segments by numbers of companies and employees. The figures on numbers of companies and employees presented below are all collected from the business register of Statistics Sweden. Note that the numbers of employees consists of the people employed in a company as well as the owner of the company. For example, the owner of a one-man company is considered an employee and is consequently included in the employee statistics.

Construction Firms

Swedish construction firms are characterised by a few large companies, that operates nation-wide as well as on the international market, and a large number of small companies operating on the local or regional markets. Thus, the building industry is fragmented with more than 26 000 companies of which only 11 have more than 500 employees, see Table 12.

Table 12: Number of Contractors and Employees by Number of Employees in 2002 (SNI codes 45.1 – 45.2)

Company Size (By Number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	15 763	58.8%	15 763	13.1%
1-4	7 611	28.4%	14 516	12.0%
5-9	1 795	6.7%	11 644	9.7%
10-19	1 009	3.8%	13 708	11.4%
20-49	489	1.8%	13 897	11.5%
50-99	104	0.4%	6 823	5.7%
100-199	31	0.1%	4 165	3.5%
200-499	8	0.0%	2 310	1.9%
500-	11	0.0%	37 709	31.3%
Total	26 821	100.0%	120 535	100.0%

Among Sweden's largest building and construction companies, Skanska AB, NCC AB and PEAB AB operate on the national as well as on the international market and are the dominating construction companies of Sweden. Companies with less than 50 employees represent 99 percent of total number of companies and almost 60 percent of the number of employees.

Specialised Construction Firms

Specialised construction firms (SNI code 45.3 – 45.5) generally act as subcontractors doing electrical, plumbing, ventilation or other service installation works. There are more than 30 000 companies involved in specialised construction works, i.e. installation activities, see Table 13. Only the largest ones operate nation-wide and take part in the design as well as production phase.

Table 13: Number of Specialised Construction Companies and Employees by Number of Employees in 2002 (SNI code 45.3 – 45.5)

Company Size (By Number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	18 677	62.0%	18 677	17.4%
1-4	7 699	25.6%	14 932	13.9%
5-9	20 019	6.6%	13 050	12.2%
10-19	1 139	3.8%	14 969	14.0%
20-49	457	1.5%	13 238	12.4%
50-99	89	0.3%	5 954	5.6%
100-199	34	0.1%	4 865	4.5%
200-499	18	0.1%	5 603	5.2%
500-	14	0.0%	15 840	14.8%
Total	30 128	100.0%	107 128	100.0%

There is certain difference between installations and services in residential, non-residential and industry installations. The last-mentioned often require special skills. Large and middle-sized companies normally handle all kinds of installation jobs, while small firms are mainly specialised in residential or non-residential works.

Professionals

In the 1990s, the number of construction professionals (architects and building consultants) was slowly decreasing with exception for the number of architect's offices.

The line of business for professionals is characterised by a large number of small firms, generally one-man companies, operating in a certain field of specialised skills. Theses small professional firms often work for a limited number of clients. To survive on the market the small professionals firms need to establish a network of contacts and create personal reliance with the clients. The business of the large companies serves not only the construction industry but also other industry sectors on the national as well as international markets.

Table 14: Number of Architect Offices and Employees by Number of Employees in 2002 (SNI code 74.201)

Company Size (By Number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	1 828	66.7%	1 828	27.0%
1-4	665	24.3%	1 176	17.4%
5-9	140	5.1%	930	13.7%
10-19	76	2.6%	1 000	14.8%
20-49	24	0.9%	707	10.4%
50-99	4	0.1%	283	4.2%
100-199	1	0.0%	128	1.9%
200-499	2	0.1%	715	10.6%
500-	-	-	-	-
Total	2 542	100.0%	6 767	100.0%

Table 14 includes only architect offices (SNI code 74201). Building consultants, included in SNI code 74202, covers both building consultants and other industry consultants that are not directly involved in construction activities. However, the general category of technical consultants, SNI 74202, consists of almost 7 000 companies with a total of 47 000 employees of which approximately 20 000 are building consultants.

Even though the commissions of architects and building consultants principally occur in the early stages of the building process, they do have significant influence on the competition of building material suppliers in the latter stages of construction. Architects and consultants often make elaborate specifications of products and their manufacturers in drawings and building descriptions, e.g. carpentry works, kitchen equipment etc. Consequently building material suppliers put effort in to establish close relations with the professionals. Large domestic material suppliers are favoured in this system having a large assortment of products and sufficient marketing resources. (Hammarlund 2000)

Real Estate and Property Management Firms and Estate Agents

There are a variety of different actors on the Swedish real estate market. Professional actors can in an overarching perspective be divided into the two major groups of real estate firms and property management firms. Real estate firms are basically defined as estate owners while property management firms provide real estate related services. In this context there is no distinction made between property management and facilities management firms. The terminology of facilities management is not yet widely used in Sweden even though a few property management firms have adopted that term in the description of their business activities. Statistics Sweden, the main information source in this study, does not present specific information on facilities management firms.

Table 15: Number of Dwellings in Multi-dwelling Blocks by Owner Category in 2000

	Number of dwellings in Multi-dwelling blocks (2000)
Tenant-owners' societies	620 000
Municipal Housing Companies	860 000
Private Companies	710 000
Total	2 200 000

(Sveriges Fastighetsägare)

There were more than 4.2 million dwellings in Sweden in 2000 of which approximately 2.2 million were in multi-dwelling blocks and about 2 million in one or two-family house. Municipal housing companies are the largest owner category of multi-dwelling block and private real estate companies are the largest owner of non-residential premises.

The Swedish Association of Municipal Housing Companies, SABO, is the organisation of municipal housing companies in Sweden. In 2000, SABO was the largest organisation on the Swedish housing market with about 305 companies affiliated, managing 860 000 dwelling units. This represents 22 percent of the total Swedish housing stock and about one third of all dwelling units in multi-dwelling blocks. The size of the SABO companies varies considerably, more than 60 percent have 500–5 000 dwellings and the largest SABO company owns and manages some 54 000 dwellings (SABO 2001). Local and central government also run companies for non-residential premises such as schools, universities, libraries etc.

There are different categories of private estate owners. Besides the downright real estate companies for which property asset management is the core business, non-profit making tenant-owner associations and major contractors also act on the real estate market. Private estate owners lease dwellings to households and non-residential premises to trade and industry. The total area in private owned apartment buildings approximately distribute between 156 million square metres of dwelling space and about 70 million square metre of non-residential premises. The structure of the Swedish real estate companies show that the vast majority is one-man companies run by the owner (see *Table 16).*

Table 16: Number of Real Estate Firms and Employees by Number of Employees in 2002 (SNI code 70.110 – 70.209)

Company Size (By Number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	32 602	82.8%	32 602	49.5%
1-4	5 841	14.8%	8 874	13.5%
5-9	488	1.2%	3 140	4.8%
10-19	191	0.5%	2 507	3.8%
20-49	168	0.4%	5 149	7.8%
50-99	59	0.1%	4 081	6.2%
100-199	29	0.1%	3 830	5.8%
200-499	18	0.0%	5 002	7.6%
500-	1	0.0%	694	1.1%
Total	39 397	100.0%	65 879	100.0%

Even though real estate firms are estate owners by definition in this context, real estate companies can do property management services on their own or other companies real-estate units. The downright property and facilities management firms strictly provide

real estate related services. Similarly to real estate actors, private as well as governmental companies also represent property management firms. The structure of property managers is more equally distributed in comparison to real estate firms (see Table 17).

Table 17: Number of Property Management Firms and Employees by Number of Employees in 2002 (SNI code 70.321 – 70.329)

Company Size (By Number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	2 300	68.3%	2 300	14.0%
1-4	745	22.1%	1 354	8.2%
5-9	147	4.4%	968	5.9%
10-19	89	2.6%	1 203	7.3%
20-49	45	1.3%	1 401	8.5%
50-99	16	0.5%	1 218	7.4%
100-199	20	0.6%	2 772	16.8%
200-499	3	0.1%	1 002	6.1%
500-	3	0.1%	4 263	25.9%
Total	3 368	100.0%	16 481	100.0%

Table 18 presents the structure of estate agent companies by number of companies and employees. The business trade of estate agents focuses on the selling process of real estates including advertising, domiciliary visits, inspections, contract documents etc.

Table 18: Number of Real Estate Agents and Employees by Number of Employees in 2002 (SNI code 70.310)

Company Size (By number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	2 236	59.7%	2 236	33.1%
1-4	1 284	34.3%	2 361	34.9%
5-9	173	4.6%	1 076	15.9%
10-19	38	1.0%	484	7.2%
20-49	8	0.2%	211	3.1%
50-99	3	0.1%	223	3.3%
100-199	1	0.0%	172	2.5%
200-499	-	-	-	-
500-	-	-	-	-
Total	3 743	100.0%	6 763	100.0%

Building Materials and Equipment

The building material industry is characterised by a large number of companies of various sizes. But, in contrast to the itinerant characteristics if the construction industry building material companies are stationary with factory premises all over the country. Historically, factories have been located where natural resources could be found and consequently, the traditional use of building materials varied from region to region.

Table 19: Examples Describing the Concentrations of the Swedish Materials Market in 1998

Type of Material	Market concentration (as part of the total market)	
Cement	1 company	95%
Ballast	4 companies	80%
Ready mixed concrete	5 companies	80%
Asphalt	2 companies	80%
Reinforcement steel	1 company	80%
Lightweight concrete	1 company	100%
Concrete pipe	3 companies	100%
Plastic pipe	1 company	50%
Plasterboard	3 companies	100%
Rock wool	2 companies	90%
Bathtub	2 companies	100%

(SOU 2000:44)

A few large material suppliers dominate the market of building materials (see Table 19). The markets of cement, lightweight concrete, asphalt and rock wool are some examples of materials where one or two companies dominate the domestic market.
TableTable 20 consists of building material manufacturers[25] of all kinds and Table 21 consists of building material wholesale trades[26].

Table 20: Number of Building Material Manufacturers and Employees by Number of Employees in 2002

Company Size (By Number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	4 615	59.1%	4 615	7.3%
1-4	1 541	19.7%	3 145	5.0%
5-9	641	8.2%	4 263	6.7%
10-19	419	5.4%	5 725	9.0%
20-49	354	4.5%	10 649	16.8%
50-99	139	1.8%	9 549	15.1%
100-199	64	0.8%	8 373	13.2%
200-499	30	0.4%	9 735	15.4%
500-	8	0.1%	7 256	11.5%
Total	7 811	100.0%	63 310	100.0%

[25] Building material manufacturers defined according to SNI codes 20.101 – 20.302, 20.510, 26.300 – 26.520, 26.611 – 26.821, 28.110 – 28.120, 28.220 and 28.751.
[26] Building material wholesale trades defined according to SNI codes 51.130, 51.530, 51.542, 52.461 and 52.495.

Table 21: Number of Building Material Wholesale Trades and Employees by Number of Workplaces and Employees in 2002

Company Size (By Number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	3 705	52.9%	3 705	12.0%
1-4	2 073	29.6%	4 274	13.9%
5-9	683	9.8%	4 475	14.6%
10-19	334	4.8%	4 461	14.5%
20-49	156	2.2%	4 468	14.5%
50-99	33	0.5%	2 170	7.1%
100-199	9	0.1%	1 302	4.2%
200-499	6	0.1%	1 942	6.3%
500-	5	0.1%	3 955	12.9%
Total	7 004	100.0%	30 752	100.0%

The total market of building materials varies from year to year in relation to the production volume. Especially companies producing materials for buildings, particularly residential buildings, suffer in times of business recession. Dominating companies fortify their market position when smaller companies go bankrupt or get acquired by stronger companies.

Building equipment companies presented in
TableTable 22 consists of wholesalers and companies that rent construction machines (SNI codes 51620 and 71320).

Table 22: Number of Building Equipment Related Companies and Employees by Number of Employees in 2002

Company Size (By number of Employees)	Number of Companies	% of Total	Number of Employees	% of Total
0	679	54.4%	679	10.0%
1-4	355	28.4%	678	10.0%
5-9	117	9.4%	773	11.4%
10-19	61	4.9%	780	11.5%
20-49	22	1.8%	578	8.5%
50-99	5	0.4%	382	5.7%
100-199	3	0.2%	371	5.5%
200-499	6	0.5%	1 941	28.7%
500-	1	0.1%	579	8.6%
Total	1 249	100.0%	6 761	100.0%

THE SWEDISH CONSTRUCTION SECTOR SYSTEM

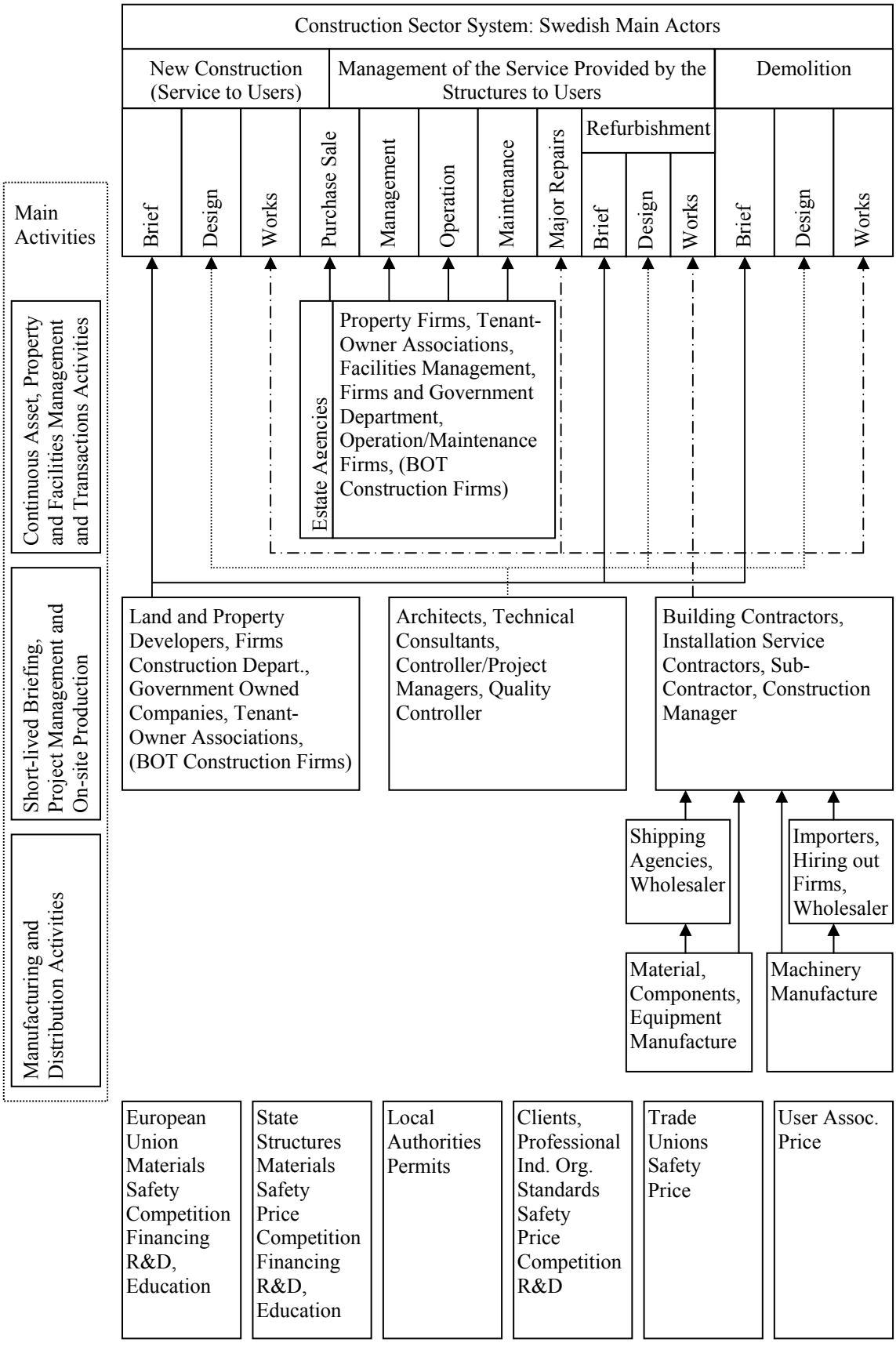
The Swedish construction sector has a central position in Swedish economy and society. The construction sector employs, directly and indirectly, a significant number of people and contributes to the national GDP. In a political perspective, construction has been a tool in the creation of the Swedish welfare state. Thus, in a historical sense politics have influenced the construction activities by governmental investments, taxes, subsidies etc.

A few large contractors that operate nation-wide as well as internationally dominate the private actors of the Swedish construction sector. These contractors undertake residential, non-residential and civil engineering works and are involved in all phases of the construction process. One significant feature of Swedish construction is the rather subdued role of the architect that is, more or less, limited to the early brief and design

phase and the development of architectural drawings. Another aspect of the construction system is the important role of private non-profitmaking and municipal housing companies on the Swedish residential market. These companies have a long tradition and are big actors on the housing market.

An overview of the Swedish construction meso-system is presented in Figure 3. Segments of the meso-system are placed according the phases of the lifecycle of a building or construction and are described on basis of three main building activities. The first main activity is related to asset and real estate management, which in the Swedish case are carried out by property managers, real estate firms and non-profitmaking housing companies. The second main activity covers the brief and design phase as well as production activities on site. In Sweden mainly contractors and professionals, such as architects and engineers, carry out the brief and design phase. General or specialised construction firms do on site activities such as site preparation, construction and civil engineering works and, installation and completion of buildings. Finally, producers and distributors of construction materials, components, equipment and machinery perform the manufacturing and distribution activities that constitute the third main activity in the meso-system.

Figure 3: The Swedish Construction Sector System



MAIN REGULATIONS AND INSTITUTIONAL ACTORS

In the 1990s, the Swedish government took a number of decisions in order to ease the rules and regulations on the construction industry. Sweden has had a tradition of governmental financial support to the building industry through public guarantees, economic aid and subventions as a way to control and stimulate the building industry. But, in the beginning of the 1999s, the public finances where strained and in the early 1990s, new and less generous subsidy rules where introduced along with more flexible building rules and regulations. All Swedish construction regulations are in force nationwide.

Table 23 presents an overview of institutional actors and their corresponding regulations that characterise the Swedish construction industry.

Table 23: Regulations and Institutional Actors on the Swedish Construction Industry

Regulations / Institutions	Building and Materials			Firms			Environment of the Firms		
	Construction Permits	Rules Concerning Structures	Rules Concerning Materials	Professional Rules and Firms Standards	Safety/Security and Personnel Management	Agreements on Price and Quality of Products and Services	Competition and Procurement Systems	Financing Taxation	R&D Support Education
International institutions			X		X		X	X	X
Government		X	X		X	X	X	X	X
Regional and local authorities	X								X
Client, industrial, professional organisations				X	X	X	X		X
Trade unions					X	X			X
User associations						X			

Construction Permits
Construction permits are managed by local authorities and is handled in by the client. Local authorities make comprehensive, area development and detailed development plans in their respective municipalities and give building permits according to these plans.

Since 1995 a number of changes in the Swedish Planning and Building Act (PBL), with construction permit regulations etc, has been in force. The new set of rules that were introduced implied a deregulation of the construction sector. It involved a number of changes on construction permits, for example:

- Building permissions no longer had to contain technical aspects of the building
- The building client became responsible for technical standards of the building
- A new system for inspection and control of the technical standards were introduced

For a traditional construction permit (residential or non-residential building) only elevations and plan drawings are needed, accordingly, no detailed structural calculations are needed.

Rules Concerning Structures
In 1994, new and more flexible building regulations BBR 94 and BKR 94 were introduced. The general purpose of the new, less detailed, regulations was to enhance the possibilities for the practitioners to choose design and construction solutions as well

as choice of materials. The idea was to stimulate development and implementation of new technique.

Rules Concerning Materials
Materials, structures and appliance that are embraced by BBR 94 and BKR 94 (see Rules Concerning Structures) can be certified according to Swedish building rules and regulations. Certain materials, structures and appliance can also submit to manufacturing control. The rules about certification are strictly national and are not to be mixed up with the system and procedures of the building products directive and the CE-marking of materials in the European Community. Type approvals of materials used in building and construction is not a strict demand from the Swedish public authorities.

Professional Rules and Firms Standards
Contracts set up in the construction industry regulates the relation between two parties and refers to documents in which responsibilities are defined in a set of general regulations. The parties can make their own adjustments and exception from the contract templates. See general regulations in the list below. Abbreviations of the regulations are put in brackets.

- Consultants, professionals commissions (ABK)
- Building, construction and installation contracts (AB, ABT, AFU and ABS)
- Supply of building materials (ABM), and
- Procurement templates (AMA)

Safety, Security and Personnel Management
The Swedish Work Environment Authority is the central authority for issues related to the working environment and working hours and it is the authority to which the Work Environment Inspectorate is accountable. The objectives of the Work Environment Inspectorate is to control that employers fulfil the demands of the Swedish law on working environment and the legislation enacted by Swedish Work Environment Authority. The Swedish laws on work safety and environment are valid nationwide. (Arbetsmiljöverket 2001).

Swedish rules and regulations on working environmental matters are regularly amended to comply with the directives adopted by the European Union.

Agreements on Price and Quality of Products and Services
In Sweden housing costs are regulated according to the market price, with one exception. The rent in tenancy apartments is set by a utility value analysis on basis of prime costs, including financial costs, repairs, maintenance, heating etc. of the building. The basic political idea of this system, in which equivalent dwellings shall have the same rent, is to avoid segregation where only wealthy people can afford to live in the most attractive locations. The rent is set by an agreement between the tenants' association and the real estate owner. (Blomkvist et.al. 1997).

The Act on Employee Participation in Decision Making, MBL, was introduced in 1997. Under MBL employers must inform and negotiate with the union at the workplace before undertaking important changes (selling the company, revise production, give employees notice or appoint executives). Employers are also required to keep the union informed about the company's finances, production, activities and staff policy. An example of the consequences of MBL is that a construction company needs to negotiate with the employees, i.e. the union, to get their approval for engaging a specific subcontractor. The union uses this procedure to protect their own work and to ensure that employers follow the protective labour legislation. (Sesam 2002)

Competition and Procurement Systems

The Swedish government and other official authorities follow the European Union regulation on public purchase of goods, services and building contracts for investments over a specified value. Invitation to tender must be handled and published by the office of European Union official publications. The construction industry and all other lines of businesses is regulated by the act governing restrictive practices. The Swedish Competition Authority supervises competition matters.

There are different ways to invite tenders for a contract:

- Open tendering — The client invites all interested companies for tendering
- Invited tendering — The client invites a selected a group of companies for tendering
- Negotiation tendering — The client turns to a single company for contract negotiations.

Financing, Taxation

Financing of residential construction is divided into short-term building loan and long-term real estate loans. Building loans are used to finance the production phase and are usually borrowed in banks. When the production is completed the building loan is replaced with a long-term real estate loan.

The Swedish government have financially supported building projects through public guarantees, economic aid and subventions as a way to control and stimulate the building industry. But, as mentioned before, when the public finances where strained in the beginning of the 1999s, new and less generous subsidy rules where introduced in 1993.

All building and construction products and services are charged with an added-value tax of 25 percent. This is the Swedish general level of added-value tax. Real estates, i.e. land, are excluded from taxes. But, when buying a ground, the buyer is compelled to pay a fee that can be considered a tax, in order to get registered as the lawful owner of the land in a national land register. This fee is currently 1.5 percent of the total purchase-price for private persons and 3.0 percent for juridical persons, i.e. companies and organisations. Mortgage bonds also involve a stamp duty of 2 percent of the mortgage amount.

R&D Support and Education

The educational system related to the construction industry consists of institutions for higher education, technical schools, schools for labour market training and in service training. It is the Ministry of Education that, on a governmental level, handles all matters related to the technical education on upper secondary school and university levels for the construction industry. The Government also supports basic research conducted at the national universities.

The employers' association of contractors financially contribute to a business development fund that supports research and development for the building industry.

The Worker's Educational Association, ABF, is the oldest (1912) and largest voluntary adult education organisation in Sweden. AFB consists of 55 member organisations and has strong connection with the Labour movement, construction as well as other areas (ABF 2002).

CONCLUSION

The analysis of the Swedish construction sector presented in this paper provides a general picture of the construction sector and its development in the 1990s. A decade in which the construction sector went through some significant changes which, to some extent, can be referred to political actions taken as a consequence of the deep economic recession in the early 1990s.

The paper identified structural changes of construction activities in the displacement between new construction and repair and maintenance works, as well as the redistribution between residential, non-residential and civil engineering works. The analysis illuminated the service aspects, in terms of repair and maintenance works, as prominent characteristics of the Swedish construction sector. For example, in 2000, repair and maintenance represented a larger share of total production output than new construction did. The important share of repair and maintenance reflects that buildings and constructions are long-term investments, with a short production phase relative to the phase of property management. The balance between new construction and repair and maintenance also reflects the diversity of construction activities, ranging from new production of large-scale civil engineering projects to minor and demarcated repairs. The diversified construction activities relate to the fragmented picture of contractors and other components of the construction sectors, considered in the paper.

REFERENCES

Andersson, N. 2003. *A Mesoeconomic Analysis of the Construction Sector*, Department of Construction Management, Lund University, Sweden.

Blomkvist, S., *et al.* 1997. *Handbok i Fastighetsförvaltning*. Sveriges Fastighetsägare-förbund, Stockholm.

Elmberg, A., *et al.* 1996. *Hus i Sverige – perspektiv på energianvändningen*. Byggforskningsrådet, Stockholm.

Euroconstruct Sweden 2001. *51st Euroconstruct Conference – Construction in Europe 2001 – 2003*, Country report edited and formatted by Prognoscentret AB

Hammarlund, J., 2000. *Marknads- och konkurrensförhållanden i byggsektorn.*

SOU 2000:44, Byggkostnadsdelegationen 2000. *Från byggsekt till byggsektor, Byggkostnadsdelegationen betänkande.* Statens offentliga utredningar 2000:44, Stockholm.

SOU 2000:44, Byggkostnadsdelegationen 2000. *Från byggsekt till byggsektor, bilaga 1 byggteknik*. Statens offentliga utredningar 2000:44, Stockholm.

SOU 2000:44, Byggkostnadsdelegationen 2000. *Från byggsekt till byggsektor, bilaga 2 byggprocessen*. Statens offentliga utredningar 2000:44, Stockholm.

SOU 2000:44, Byggkostnadsdelegationen 2000. *Från byggsekt till byggsektor, bilaga 3 byggkostnader och konkurrens*. Statens offentliga utredningar 2000:44, Stockholm.

Statistics Sweden, 1999. *Bostads- och byggnadsstatistisk årsbok 1999.*

Thuvander, L., 2000. *The Building Stock: A Complex System Changing over time*. Chalmers University of Technology, Gothenburg.

Wigren, R., 1995. *Byggkostnader och bostäder, teori och metod samt en empirisk analys av utvecklingen 1968 – 91*. Meyers, Gävle.

Internet

ABF	www.abf.se
Arbetsmiljöverket	www.av.se
SABO	www.sabo.se
Sesam, nyhetstidningen	www.inv.se
Statistics Sweden	www.scb.se
Sveriges Fastighetsägare	www.svefast.se

CHAPTER X

THE UK CONSTRUCTION SYSTEM AT THE BEGINNING OF THE TWENTY-FIRST CENTURY[27]

Les Ruddock and Alex Wharton
University of Salford
Salford - England

Construction is one of the largest and most important industries in the United Kingdom (UK). In 1998, construction contractors (and a small number of public-sector direct-works departments) alone employed 1.8 million people (6.3% of national employment) in the production, repair and maintenance of buildings and infrastructures for clients in agriculture, mining, manufacturing, the utilities industry, trade, transport, banking, business activities, public services and other economic activities. Their total output was worth £102 billion or 6.4% of the UK's Gross Domestic Product (GDP). Add to this the activities of building professionals, real estate agents, suppliers of building components and other actors involved in construction, and one finds that the output of the construction industry was worth about £244 billion, or 15% of GDP, and that the industry employed at least 6 million people, or 23% of national employment.

Despite its importance to the general economy, changing economic conditions have forced the industry to decline significantly in relative terms since the peak of the post-war building cycle in the late 1960s. This is reflected in a long-term change in the structure of output away from new works toward repair and maintenance and a dramatic decline in public sector work. The impact on the structure of the industry has been immense. There has been increased price competition and industrial fragmentation, leading to the emergence of a powerful group of firms whose core activity is the management of specialist sub-contractors and professionals, and whose survival requires a large and balanced portfolio of management contracts.

At the beginning of the twenty-first century, the industry continues to face new challenges. This chapter sets the context within which the industry will have to deal with these challenges. It describes the key features of the UK construction industry, including its regulatory system, and explains the broad patterns of change in construction activity during the 1990s.

THE CONSTRUCTION INDUSTRY

In its broadest sense, the construction industry comprises all those activities that actually, or are intended to, contribute specifically to the production, repair and maintenance of the built environment (see Carassus, 1999 and European Commission, 1997). This includes the activities of firms that build or demolish structures – the

[27] Special thanks to Bob Davies and Frances Pottier at the former Department of the Environment, Transport and the Regions for assistance in the compilation of Construction Statistics Annual 2002 data used in this paper, and to Damian Braganza and James Wilson at the Office of National Statistics for assistance with the collection of National Accounts data used in this paper but not published in the Blue Book 2002.

conventional and narrow actor-based definition of the construction industry commonly employed by statistical bureaux. It also includes the activities of building professionals, manufacturers of building components and construction machinery, facility managers and governmental bodies.

Figure 1 presents the main processes, sub-systems and *framework conditions* of construction. There are two main processes: building product integration and product recycling (including demolition). These activities draw on and shape the various sub-systems of the industry (including building materials, facility maintenance, design, and distribution) within a framework of infrastructures, institutions, regulations, and standards.

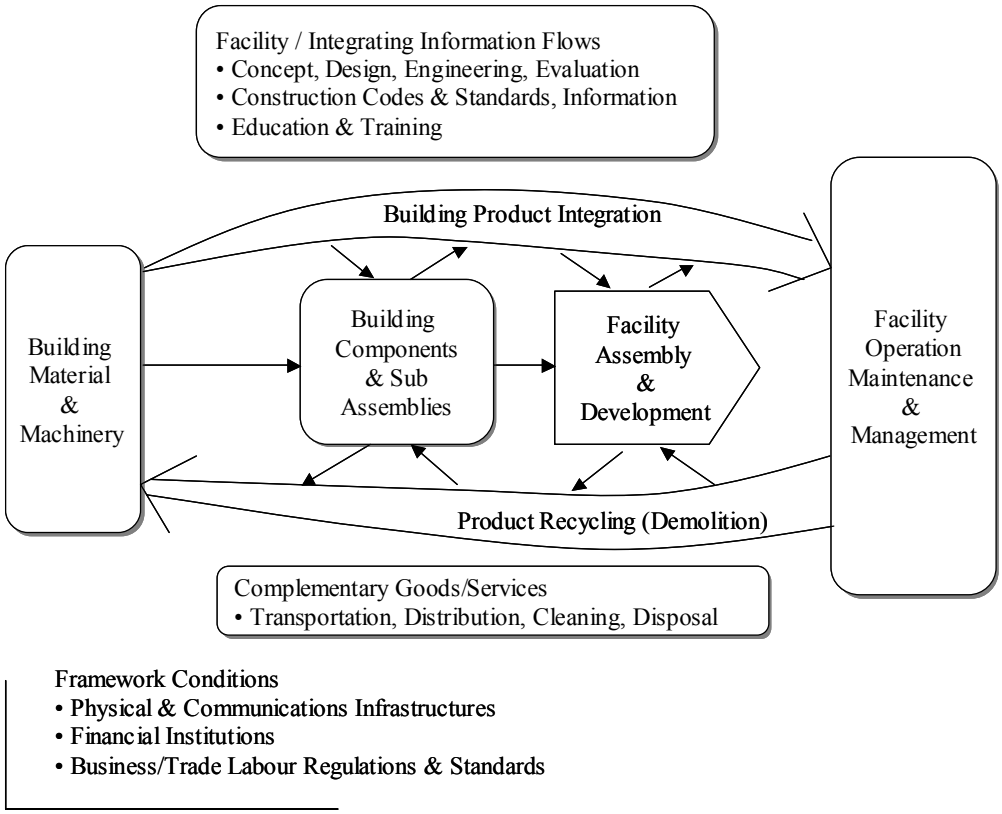


Figure 1. Key agents, major types of interactions and framework conditions in the construction industry (based on: Manseau et al*, 2001)*

The core process of building product integration (and product recycling) involves feasibility studies, conception, design, production planning, on-site construction, and facility management. In the UK these activities are highly specialised. For example, in 1999, 98% of on-site construction, and 91% of 'architectural and engineering activities and related technical consultancy' were performed by specialist firms. Sixty-five per cent of construction firms are themselves specialists. Even real estate activities are becoming more specialised, with the government and large, blue-chip clients choosing more and more to outsource the ownership and management of property.

The construction industry uses three main methods for organising "building product integration". These are: The traditional method; the construction management contract; and design-and-build. Traditionally, the building professional, acting on behalf of the client, will appoint the main contractor (and subcontractors), often by competitive tender, following the preparation of a detailed bill of quantities and detailed drawings.

This method of contracting allocates risk to the main contractor (and its subcontractors), who effectively underwrites the price for all works shown in the drawings and bill of quantities. One consequence of this is that the most profitable building contractor rather than the least-cost producer is the one with the best portfolio of contracts.

Under the construction management contract, or 'fee system', the role of the main contractor is replaced by a management contractor, who agrees the direct cost of construction and a profit margin for co-ordination of the construction works. The physical work and supply of materials are tendered out to sub-contractors, whose costs the client will meet as and when they become known. Design is independent of construction, in contrast to the 'project management' system, wherein a 'project manager' is contracted to take overall control for a project. Management contracts are regularly used for larger projects. Design-and-build contracts give a building contractor responsibility for and ownership of design. A survey of building contracts in use (Davis Langdon and Everest, 2000) in 1998, indicates that Design and Build procurement has increased in the UK at the expense of traditional procurement. Even within traditional contracts, the Contractors Designed Portion Supplement – a significant design element – featured in 48% of contracts using the Joint Contracts Tribunal (JCT) standard form, which is itself employed by 91% of contracts.

Partnering is a form of contracting which has been promoted as a mechanism for improving efficiency. It favours negotiations between the client and a small number of 'partners'. Partnering and Design-and-Build allow early involvement of contractors and specialists to assess buildability. Partnering is a result of one of the biggest cultural changes to have occurred in construction during the last 20 years, with 'strategic alliances' challenging the traditional adversarial relationships between the client and its suppliers. There has been an increase in longer-term relationships based on partnering agreements.

REGULATIONS

The activities of the construction industry are subject to a multitude of regulations, both governmental and non-governmental. Some of them affect all industries, while others have been designed to regulate construction specifically. In the UK, many of the main regulations that affect construction, specifically, relate to planning, building regulations and building control, contract resolution, health and safety, and various professional codes and standards.

The Planning System

Current legislation is provided by the 1990 and 1991 Planning Acts, and covers development plans, the definition of development, enforcement notices and other matters. Development control in England and Wales is administered at three or two levels. In shire counties, it is administered at the level of district, county and central government. In areas where the district and county authorities have been merged to form unitary authorities, it is administered at two levels. A separate (albeit similar) system of building control operates in Scotland.

Each level of authority has particular powers and responsibilities. The local authorities have the statutory obligation to produce planning policies. A Development Plan comprises the plans produced by the local authorities. In shire counties, the county

councils are responsible for the preparation of a Structure Plan, which sets out the broad policy for development, within which local plans can be developed by individual district, borough and city councils. In non-shire counties, the unitary authorities produce a Unitary Development Policy rather than a structure plan. It comprises broad policy objectives and detailed site-specific policy. Although devolution of power away from central government may result in an increased role for regional bodies, such as the Greater London Authority and Regional Development Agencies, decision-making still rests with local authorities.

Central government is responsible for ensuring that local policy conforms to national objectives. The Office of the Deputy Prime Minister formulates the central government's planning policy and issues planning guidance notes, which set the policy framework within which local authorities are required to draw up their development plans and take decisions on individual applications. The main objective of central government's present policy is sustainable development, as reflected in its preference for the minimisation of travel, mixed-use developments, and regeneration. This is supported by a sequential approach to development, whereby the development of town centre sites is preferred to the development of non-urban sites.

The System of Building Regulations and Building Control

Under Section 1 of the Building Act 1984, Building Regulations can be made in England and Wales for the purposes of securing the health, safety, welfare and convenience of people in or around buildings; to further the conservation of fuel and power; and to prevent waste, undue consumption, misuse or contamination of water – similar but separate regulatory systems exist in Scotland and Northern Ireland. Central government is responsible for developing and applying a policy on regulations. The present regulations cover structures, fire safety, site preparation, resistance to moisture, toxic substances, passage of sound, ventilation, hygiene, drainage and waste disposal, heat-producing appliances, protection from falling, collision and impact, conservation of fuel and power, access and faculties for disabled people, glazing, materials and workmanship. The regulations are short and contain no technical detail. Technical detail is found in the Approved Documents and certain other non-statutory guidance, such as Building Standards.

Since the Building Regulations were consolidated in 1991, a series of amendments have been made to them and they have been consolidated again in the Building Regulations 2000, which came into force on 1 January 2001. Changes have been made for a number of reasons, including the climate change strategy, flooding, pressure groups, greater appreciation of risks to health and safety, research into the effectiveness of current regulations, the change from British to European standards, and weaknesses and ambiguities in the Approved Documents.

Buildings are required by law to have building control approval, an independent check that Building Regulations have been complied with. Responsibility for complying with the Regulations rests with builders and developers. To ensure that they do comply, they must either notify Local Authorities (Unitary, District and London Boroughs in England and County and County Borough Councils in Wales) of their plans or select a private sector Approved Inspector (companies or individuals) who will work with them to achieve compliance. Local authorities are the traditional choice used in the vast majority of cases. Checking compliance can involve both the approval of plans and a number of site visits by inspectors throughout the construction process. There are two methods of achieving approval. 'Full Plans' involves the submission of detailed drawings and specifications fro checking by building surveyors. 'Building Notice' requires only the

submission of a building notice application form with site location. Although this method enables work to start almost immediately, it comes with the added risk of abortive or remedial work. Individual local authorities co-ordinate their services regionally and nationally (and provide a range of national approval schemes) via Local Authority Building Control (LABC) Services.

Building Standards

There are various other techniques for achieving a more reliable end product (and conforming with building regulations). These techniques include the adoption of general good practice, accreditation, inspection, and contractual warranty. General good practice and accreditation bodies in the UK include:

- BSI (British Standards Institute). This body accredits the specification of elements of manufacturing and construction. The basic accreditation is the full British Standard. The Code of Practice is an enhanced specification.
- BISRIA (Building Services Research and Information Association). Deal with mechanical and electrical specifications and issues guidance notes.
- BBA (British Board of Agrément). Issues European Technical Approvals for construction products.
- BRE (Building Research Establishment). Provides in-depth scientific testing of many building components.
- Trade Associations. These offer 'best practice' advice.

On traditional contracts, the main contractors often employ a Clerk of the Works. Design and build contracts come with a 12-year warranty, which passes the burden of risk to the contractor and encourages it to take action to produce a more reliable product.

The Construction Products Directive (CPD) in the UK aims to break down technical barriers to trade in construction products between Member States in the European Economic Area (EEA) – the European Community, Norway and Iceland – as part of the agreement to extend the four basic freedoms of the European Community to all EEA members, viz. movement of services, capital, goods, and workers. Member States and public and private sector procurers are free to set their own requirements on the performance of works and therefore products. What the CPD harmonises are the methods of test, the methods of declaration of product performance values, and the method of conformity assessment. The choice of required values for the chosen intended uses, is left to the regulators in each Member State.

Contract Resolution

Although some forms of contract are bespoke, the bulk are standard. There has been a proliferation of the range of contract providing bodies and the array of contracts, despite attempts to promote standardisation. However, by far the majority of building projects in the UK operate under contracts issued by the Joint Contracts Tribunal Ltd. The Council and Directors of the JCT Ltd have begun to embrace the 'rethinking' message of Sir John Egan's Construction Task Force and have produced a non-binding partnering agreement for use with existing JCT forms. They are also working on proposals for a fully binding partnering contract. (RIBA, 2003).

Disputes about defects, delay and disruption and payment can be resolved in many ways, including arbitration (favoured for traditional contracts), litigation (increasingly favoured), and adjudication (a new statutory right to all under recent contracts. Part II of the Housing Grants, Construction and Regeneration Act 1996 applies to England, Wales and Scotland. It gives parties to a construction contract certain rights – principally, the right to quick adjudication, the right to suspend work under the contract in cases of non-

payment and the right to interim payments on "longer" contracts. It outlaws "pay-when-paid" provisions in contracts in most circumstances and requires all contracts to have specific payment and adjudication provisions.

Health & Safety

The Construction, Design and Management (CDM) regulations deal with health and safety duties and responsibilities of those involved in the procurement, design and construction of buildings. They focus on how designers and clients can reduce risk at source with a view to the long-term maintenance and occupation of the building. CDM regulations operate under the Health and Safety at Work Act (1974). It is the planning supervisor's statutory duty to oversee and co-ordinate the requirements of the regulations. The designer and client are formally responsible for appointing the planning supervisor. Breaches of CDM regulations are tried in criminal courts. The contractor has formal responsibility for health and safety on site.

The Health and Safety Executive, currently sponsored by the Department of Work and Pensions, is responsible for ensuring that risks to people's health and safety from work activities are properly controlled. It is their job to uphold the law and to develop new health and safety laws and standards, and play a full part in international developments, especially in the European Union.

Professional Codes and Standards

In order to practice legally in the UK, an architect must be registered with the Architects Registration Board, established by the Architects Act 1997 to guarantee the professional competence of architects to consumers of architectural services. The Royal Institution of Chartered Surveyors (RICS) is the professional body that regulates chartered surveyors and technical surveyors in the UK. It sets, monitors and enforces standards in two areas: education and training and professional conduct. The basic requirements for chartered surveyor status are a degree accredited by the Institution plus two years' structured training, followed by success in the RICS Assessment of Professional Competence. Once qualified, members have to undertake continuous professional development throughout their working lives. All RICS members are bound by the RICS rules of conduct which cover such issues as conflicts of interest and the proper handling of clients' money. The Association of Consulting Engineers (ACE) is the UK's leading trade association for engineering, technical and management consultancies. All ACE members abide by a Code of Conduct. CIBSE (The Chartered Institution of Building Services Engineers) is an international body, which represents and provides services to the building services profession

The Construction Confederation is the predominant representative organisation for the UK's construction sector. It comprises six organisations the National Federation of Builders (NFB); the Major Contractors Group (MCG); the National Contractors Federation (NCF); the Civil Engineering Contractors Association (CECA); Scottish Building; the British Woodworking Federation (BWF). Together these organisations represent 5 000 member companies, who are responsible for over 75% of construction work in Great Britain. The Construction Confederation has four main functions: To represent the common interests of its constituent organisations to the Government, the European Union, the UK and European parliaments, and to other decision-makers and opinion formers; to negotiate appropriate agreements on behalf of these constituent organisations and represent their interests in pan-industry bodies such as the

Confederation of British Industry (CBI) and Construction Industry Training Board (CITB); to provide information and advice to member companies; and to take any other appropriate action to promote the interests of the industry.

The National Federation of Builders is the leading organisation for medium sized contractors and smaller builders. It offers its members advice on legal, taxation, employment, health and safety and other relevant issues. Their representative strength means they both lobby and are consulted by government, at both UK and European levels, ensuring the concerns of the building and construction industry are brought to bear on the matters that affect it. The principal activities of Trade Associations include: representing individual sectors of industry through the political process, the media and other channels of influence, contributing knowledge, expertise and broadly based views; promoting competitiveness through research, innovation and supply chain initiatives, support for training and skills development and encouragement of technical, service and quality standards; developing market opportunities through marketing and commercial strategies as well as promotional, trade show and export activities.

UK CONSTRUCTION ACTIVITY IN THE 1990s

Although construction is one of the biggest industries in the UK, there has been a significant decline in its share of economic activity since the peak of the long post-war "building" cycle in the late 1960s, when site-based construction firms alone accounted for approximately 8 per cent of the UK's Gross Value Added (Griffiths and Wall, 1997). This decline has been accompanied by distinct patterns of change in the main parts of construction output. For example, during the 1970s and 1980s, new works exhibited a similar pattern to the 'building' cycle; repair and maintenance (R&M) experienced a steady but significant increase both in real terms and in its share of construction output – from 29 per cent in 1972 to 46 per cent in 1985; public sector work declined dramatically; and there was strong growth in the commercial sector, particularly in the 1980s. The 1970s and 1980s also bore witness to increased volatility in R&M and private-sector works, especially in the housing (notably owner-occupied), industrial and commercial sectors. These changes had a major impact on the industry and many of these patterns of change continued into the 1990s.

The Changing Weight of On-Site Construction Activity

Table 1 shows the Gross Value Added (GVA) for the UK construction industry expressed as a percentage of the UK economy's total GVA for the years 1989 to 2001. During the 1990s the construction industry's share of economic activity continued its long-term decline. Following the historically unprecedented increase in the costs of construction during the general economic boom in the late 1980s, economic recession forced the industry into dramatic decline, both in terms of its contribution to economic wealth and its share of economic activity. Although the industry recovered in real terms, as of 2000 it had still not returned to the peak of the 1980s boom, and its share of economic activity remained unchanged from its low of 5 per cent in 1993, suggesting a significant change in the efficiency of the industry and/or the built environment.

Table 1. The output of the construction industry, 1989–2001

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
GVA at 1995 basic prices (1995=100)	107.3	110.4	101.6	97.5	96.3	100.0	100.0	102.7	105.7	107.0	107.8	109.7	113.7
GVA at current basic prices (£ billion)	33.4	34.7	32.1	30.0	29.2	31.2	33.0	34.6	36.9	39.1	41.5	44.0	47.3
Share of all industries' GVA (%)	7.2	6.9	6.1	5.5	5.1	5.1	5.2	5.1	5.1	5.1	5.2	5.3	5.4

Source: United Kingdom National Accounts, 2002

The absolute and relative decline in construction activity is also visible in employment. Table 2 shows the number of employee jobs in the construction industry expressed as a percentage of the national total for the years 1989 to 2001. Total employment by the industry fell during the economic recession, but, in contrast to output, it failed to make a significant recovery. The industry's share of national employment also fell during the 1990s, from 7.6% in 1991 to 6.3% in 1999. The decline was more prolonged than the industry's share of all industries' output, suggesting significant improvements in the relative productivity of labour in construction.

Table 2. Employee jobs (000s) in the construction industry, 1989–2001.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Construction Employment	2 246	2 261	2 074	1 858	1 753	1 767	1 753	1 745	1 706	1 774	1 787	1 837	1 883
Share of National Employment (%)	8.1	8.0	7.6	7.0	6.7	6.7	6.5	6.4	6.1	6.3	6.3	6.4	6.5

Source: United Kingdom National Accounts 2002

Patterns of Change in the Parts of Construction Output

Table 3 shows total new work and total repair and maintenance work expressed as a percentage of the total construction output of private contractors and public sector direct labour departments in Great Britain for the years 1989 to 2001. This is complemented by Table 4, which shows new orders for private works and public works expressed as a percentage of total new orders obtained by private contractors for the same period, which provides a rough indication of future output. The nominal value of new works exhibited a similar pattern of change to the total output series, declining dramatically in the early 1990s before recovering gradually during the rest of the decade, and more noticeably in 1999. This pattern of change is largely accounted for by changes in private commercial works, most notably in offices and entertainment, although private sector housing, and private industrial each exhibit a similar pattern of change. Public sector housing, infrastructure, and other new public sector works show a quite distinct pattern of change, largely counter-cyclical and indicative of a real fall in public-sector demand for construction over the period.

Like new works, R&M also fell in nominal terms during the downturn in construction, but the fall was less dramatic, and there has been a gradual increase since then. The fluctuations are largely accounted for by changes in private sector demand for construction, there being further evidence in R&M output of a real decline in public spending on construction.

Table 3. The composition of construction output in Great Britain, 1989–2001.

Year	All work (£ million)	Breakdown 1 (%)		Breakdown 2 (%)				
		New Work	R&M	New residential	New Infrastructure	New other	R&M residential	R&M non-residential
1989	52 150	56.2	43.8	15.5	7.7	33.0	25.1	18.7
1990	55 307	55.6	44.4	12.1	9.0	34.5	25.0	19.4
1991	51 115	54.2	45.8	11.3	11.9	31.0	25.4	20.3
1992	47 472	52.3	47.7	12.8	12.0	27.4	26.5	21.2
1993	46 323	50.9	49.1	14.3	12.0	24.5	27.7	21.5
1994	49 439	50.7	49.3	15.0	10.4	25.3	27.8	21.4
1995	52 643	50.7	49.3	13.6	10.7	26.4	27.7	21.6
1996	55 243	50.6	49.4	12.7	11.5	26.4	27.2	22.2
1997	58 352	51.3	48.7	13.7	10.8	26.8	27.0	21.7
1998	62 060	52.4	47.6	13.6	10.0	28.8	26.1	21.5
1999	65 658	54.9	45.1	12.8	9.6	31.6	25.1	21.0
2000	69 676	54.1	45.9	14.3	9.3	30.5	24.3	21.7
2001	74 690	53.5	46.5	13.7	9.6	30.2	23.6	22.9

Source: Annual Abstract of Statistics, 2003.

Notes: New construction work includes extensions, major alterations, site preparation and demolition, except for housing, where such work is included under R&M. It also includes houses converted to other uses. Figures for R&M infrastructure are not available.

Table 4. The composition of new orders obtained by contractors, 1989–2001.

Year	Total value (£ million)	Private Residential (%)	Private Non-residential (%)	Public Works (%)
1989	27 142	23.9	50.0	26.1
1990	22 491	21.6	52.5	25.9
1991	19 455	23.4	47.7	29.0
1992	17 493	23.0	44.5	32.6
1993	19 965	24.4	37.8	37.8
1994	21 285	26.9	39.0	34.1
1995	22 065	22.2	47.4	30.4
1996	22 834	23.7	51.3	24.9
1997	24 806	25.2	53.6	21.1
1998	27 477	21.8	56.5	21.6
1999	26 079	22.6	55.4	22.0
2000	28 120	21.6	56.5	21.9
2001	29 643	22.0	53.4	24.6

Source: Annual Abstract of Statistics, 2003.
Notes: Information on the value of new orders in the construction industry relates to contracts for new construction work awarded to main contractors by clients in both the public and private sectors; it also includes speculative work, where no contract is awarded.

Changes in the Size Distribution of On-site Construction Firms

The downturn in construction during the early 1990s caused a major reduction in the number of firms in the industry. Table 5 shows how this continued until 1997, since when it has gradually picked up.

Table 5. Number of firms (thousands) in the UK construction industry, 1989–1999

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total	201.1	209.8	207.4	205.7	195.1	194.7	194.1	163.3	160.1	163.2	165.6	163.4	168.1

Source: Construction Statistics Annual 2002
Notes: There is a discontinuity in the series between 1992 and 1993 and 1995 and 1996 due to improvements in the Department of Industry's register of firms.

Although there was no significant change in the distribution of firms across the broad size categories of the industry (Table 6), there was a significant redistribution of turnover from large firms to small firms (Table 7). In 1990 the top 1% of firms (by employment size) accounted for 55% of the industry's annual turnover. By 1993 their share was down to 49%. This new distribution persisted throughout the rest of the 1990s.

Table 6. Firm distribution by size: % of firms in each size category.

Size	Year										
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
1-10	94	95	95	95	95	96	96	95	95	95	95
11-50	5	4	4	4	4	3	3	4	4	4	4
51 +	1	1	1	1	1	1	1	1	1	1	1

Source: Construction Statistics Annual 2000

Table 7. Output of firms: percentage by size category, 1989–1999

Size	Year										
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Up to 10	27	27	29	31	32	33	33	30	30	28	32
11-50	18	17	17	19	20	19	18	20	19	19	17
51-250	20	19	19	18	19	18	19	20	21	20	20
251 plus	35	37	35	31	30	30	31	31	31	32	31

Source: Construction Statistics Annual 2000

Specialisation within the industry

In 1999, roughly one-third of all firms practiced general construction and civil engineering works. Relative economies of scale were evident in this sub-group; the construction of highways, road, airfields and sport facilities; and site preparation. For example, general construction and civil engineering works accounted for 60% of firms with a turnover of more than £5million.

Construction firms tend to be specialists, especially smaller firms. The largest sub-groups of specialist activities include installation of electrical wiring and fittings, plumbing, other construction work involving special trades, joinery installation, painting and glazing. In addition, many of the firms undertaking general construction and civil engineering works actually specialise in the management of sub-contractor packages.

Related Changes in Other Construction Activities

Specialisation is also evident in the broader construction industry. Table 8 provides a detailed analysis of expenditure in 1998. The largest item of expenditure by construction firms was the output of other construction firms, a fact that supports the previous statements about specialisation in the narrowly defined construction industry. The second largest item was manufacturing goods, including 'articles of concrete stone etc.', 'plastic products' and 'wood and wood products', a fact that illustrates the organisational division of on-site and off-site construction. Expenditure on business services was also high. This included 'owning and dealing in real estate' and 'architectural and technical consultancy, and highlights the organisational separation of conception, control, construction, and property management.

Table 8. Analysis of intermediate consumption by the UK construction industry in 1998.

	Value (£000)	As % of Intermediate Consumption	As % of own industry's total output	Construction-related Employment (000)
Total Intermediate Consumption by Construction: of which	63 329	100.0	61.9	
Construction (F)	26 073	41.2	25.5	
Manufacturing (D), of which:	19 992	31.6	5.0	193
Articles of concrete stone etc	4 110	6.5		
Plastic products	2 967	4.7		
Wood and wood products	2 040	3.2		
Other manufacturing	1 803			
Metal forging, pressing etc.	1 586			
Other non-metallic products	1 308			
Business Services and Finance (JK): of which:	13 591	21.5	3.7	183
Other business services	4 801	7.6		
Owning and dealing in real estate	4 005	6.3		
Renting of machinery etc	2 927	4.6		
Architectural activities and technical consultancy	1 237	2.0		
Mining and Quarrying (C)	1 854	2.9	8.1	18
Transport and Communication (I)	1 168	1.8	0.3	8
Other	651	1.0	0.1	14

Sources: UK Input-Output Annual Supply and Use Tables, 1998; and UK National Accounts 2000

The Construction Professions

There is empirical evidence of a reduction in the optimal size of building-professional firms during the 1990s. Since 1995 there has been a gradual increase in the number of firms, rising from 48 202 in 1995 to 52 490 in 1998. During the same period, the number of employees in architectural and technical consultancy fell by 13 000 to 319 000 (Table 9). There is also evidence of a relatively high degree of competition. More than 50% of firms had a turnover of less than £100k in 1999, and only 18% had a turnover of £250k or more.

Table 9. Employee jobs (000) in architectural and technical consultancy (Great Britain), 1995–2001

Year	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Employees	*332*	*338*	*342*	*319*	*324*	*323*	*334*

Source: Annual Abstract of Statistics 2003.

Table 10 shows the gross turnover of consulting engineers for years 1990 to 1999. Here too, there is evidence of increased competition during the mid-1990s, but, also, a rapid growth in fees during the late nineties as the demand for construction rose.

Table 10. Consulting engineers: turnover, 1990–1999

Year	Gross Fees (£ Million, current prices)	Gross Fees (£ Million, constant 1982 prices)
1990	1 241	788
1991	1 208	734
1992	1 298	768
1993	1 248	725
1994	1 162	660
1995	1 091	602
1996	1 083	579
1997	1 279	660
1998	1 677	847
1999	1 834	936

Source: Construction Statistics Annual 2000.

The market for real estate services has increased gradually during the 1990s, with first the government and then large, blue-chip companies choosing to outsource the ownership and management of property. Empirical evidence is provided in Table 11, which shows an increase in the total number of employee jobs in the real estate industry since 1995.

Table 11. The number of employee jobs (000s) in property activities (Great Britain), 1995–2001.

Year	1995 ?	1996 ?	1997	1998	1999	2000	2001
Real estate renting & business activities	2 854	2 977	3 265	3 383	3 526	3 650	3853
Real estate activities	277	271	288	289	310	341	364
Activities with own property	156	152	166	174	187	214	224
Activities on a fee or contract basis	105	117	122	115	122	128	141

Source: Annual Abstract of Statistics.

Changes in the Value of the Built Environment

There has been a gradual increase in the quantity of all buildings and structures. A comparison of the Gross Capital Stock (analysed by type of asset at 1995 prices) with the market value in current prices of buildings and infrastructure for the years 1991 to 1999 indicates that: the prices of residential property fell between 1991 and 1992, remained depressed until 1995, and picked up significantly thereafter; that the prices of other buildings were highly volatile throughout the period, falling in 1992, 1994, 1995,

and 1998, but increasing dramatically in 1993 and 1999; and that prices of infrastructure have remained fairly steady throughout the period. These changes are shown in Table 12.

The fall in the property stock to GDP ratio suggests that the built environment is now able to support a higher level of economic activity (and that the relative importance of construction in the UK economy has therefore fallen) and also that the efficiency of the built environment has been increased.

Table 12. Net worth of building stock and infrastructure (£ billion at year end) – 1995 prices.

Year	Value of Residential Building Stock		Value of Non-Residential Building Stock		Value of Civil Engineering Stock		Value of Total Stock	Stock:GDP Ratio
		%		%		%		
1991	1 354.2	67	450.3	22	229.7	11	2 034.2	3.1
1992	1 273.7	63	459.0	23	273.7	14	2 006.4	3.1
1993	1 313.3	58	594.2	26	348.4	15	2 255.9	3.4
1994	1 260.0	56	574.1	26	414.5	18	2 248.6	3.2
1995	1 199.9	58	470.1	23	395.9	19	2 065.9	2.9
1996	1 279.6	60	474.4	22	387.0	18	2 141.0	2.9
1997	1 342.3	60	512.4	23	386.0	17	2 240.7	3.0
1998	1 466.0	62	476.4	20	408.6	17	2 351.0	3.0
1999	1 583.4	63	529.6	21	414.9	16	2 527.9	3.2

Sources: United Kingdom National Accounts 2000.
Notes: Constant prices use reflation factors. The formula used for reflation is 1 + (constant price – current)/current.

THE FUTURE

The construction industry is always facing new challenges. At the beginning of the twenty-first century, its major clients are demanding more flexibility in occupational terms to meet more rapid changes in the economy, and more savings in terms of their construction costs. The government and large blue-chip clients are selling off and leasing their corporate estates; outsourcing facility operation, management and maintenance, and generally seeking to pass on the risks of non-core activities and assets to specialist firms, so that they can focus on achieving flexibility and operating efficiency in their core activities. The UK government has launched the private finance initiative and public-private partnerships, and blue-chip clients have followed suit by initiating similar partnering arrangements. The challenges for organisations in the industry are to attract and retain capital, to diversify portfolios to include facility operation, maintenance and management, and to improve business practices, especially contract management. One outcome may be structural realignment towards large operating units, to benefit from financial economies and to spread the risks of investment. If so, the industry will continue to favour firms with a large portfolio of construction management (and project management) contracts, within a context of framework agreements and other partnering arrangements with clients, contractors, building professional and suppliers of other goods/services. Smaller, specialist firms may find it increasingly difficult to survive.

The industry's ability and willingness to meet these new challenges will depend to a great extent on the strategic and operational management of construction by central government. Since the General Election in 2001, the affairs of construction have been

redistributed and are now spread across five departments of central government. The Department of Trade and Industry (DTI) is now the main government sponsor of the industry. Procurement issues are dealt with by the Treasury's Office of Government Commerce (OGC), unless they relate to the Prime Minister's initiative to improve public buildings, in which case they are handled by the DTI or the Department of Culture, Media and Sport (DCMS). The DCMS also has responsibility for Architecture. The Office of the Deputy Prime Minister has responsibility for housing, planning, and building regulations. The Health and Safety Executive, currently sponsored by **the Department of Work and Pensions,** is responsible for construction health and safety.

In recent years, the central government strategy for improving the performance of the construction industry has involved the establishment of a number of bodies and programmes, including the Construction Industry Board; the safety task force; the Movement for Innovation; the quality mark scheme; and Construction Industry Best Practice Programme. It has stressed the importance of working together with the industry and its clients. Indeed, the end of the 1990s saw an increasing emphasis on the role of clients in ensuring that products and services meet needs fully and at the best possible value. This is particularly the case for Government's role as a client for construction projects, which was highlighted most strongly by the Latham Review in 1994 and the 1995 Efficiency Scrutiny of Government Construction Procurement.

In housing policy, central government will continue the sell-off, or transfer, of local government housing to non-profit-making registered social landlords, subject to the agreement of tenants. This is the central government's main solution to meeting its manifesto commitment to bring all social housing up to a decent standard by 2010. It is also providing extra capital for local authorities to improve their remaining housing stock, setting aside extra funds for authorities who achieve excellence in the quality and management of their housing stock, and increasing the number of PFI housing schemes. It will give local authorities access to extra funds, if they establish arms-length arrangements for the management of their housing, including funds for companies to manage homes on behalf of local authorities.

Fundamental reforms of the planning system have been proposed. If approved, there will be a new structure for planning, based on two tiers: a tier of strategic planning by regional bodies; and a tier of local decision-making at the district and unitary council level. Central government claims that this will "reduce complexity, ensure greater consistency from the strategic through to the local level, make plan preparation and adoption more understandable and accessible to the community and enable plans to be put in place in a more flexible and timely way" (Office of the Deputy Prime Minister, 2003). Statutory Regional Spatial Strategies (RSS) will replace Regional Planning Guidance, with the aim of integrating the formulation of regional and sub-regional priorities for housing with priorities for environmental protection and improvement, transport, other infrastructure, economic development, agriculture, minerals and waste treatment and disposal. At the local level, a single tier of Local Development Frameworks (LDF) will replace local plans and unitary development plans, and along with RSS, replace structure plans. The LDF will be a key component of a local authority's Community Strategy, consistent with the RSS.

REFERENCES

Ball, M. (1988) *Rebuilding Construction: Economic Change and the British Construction Industry*. London: Routledge.

Building (2001) *Regulations: The A-N Guide to the Great Building Rules Shake-up, March 2001*. London.
Carassus, J. (1999) *The Economic Analysis of the Construction Industry*. Cahiers du CSTB No.405. Paris.
Construction Industry Board (2000) *The State of the Construction Industry Report*: *Issue 12*.
Davis Langdon and Everest (2000) *Contracts in Use: A Survey of Building Contracts in Use During 1998.* London: Davis Langdon & Everest.
Department of the Environment, Transport and the Regions (2000) *Construction Statistics Annual: 2000 Edition*. London: TSO.
Department of Trade and Industry (2002) *Construction Statistics Annual: 2002 Edition*. London: TSO.
European Commission (1997) *The Competitiveness of the Construction Industry*. Brussels.
Freeman (2000) *Freeman's Guide to the Property Industry (1st. Edition)*. London: Freeman Publishing.
Griffiths, A. and Wall, S. (1997) *Applied Economics: An Introductory Course (7th. Edition)*. London: Longman.
Manseau, A. and Seaden, G. (Eds.) (2001) *Innovation in Construction: An International Review of Public Policies*. London: Spon Press.
Office for National Statistics (2000) *United Kingdom Input-Output Annual Supply and Use Tables, 1998*. London: TSO.
Office of the Deputy Prime Minister (2003) *The Housing Policy Statement and The Housing Green Paper*. www.odpm.gov.uk
Office of the Deputy Prime Minister (2003) "Making the system work better: planning at regional and local levels". www.odpm.gov.uk

Office for National Statistics (2000) *United Kingdom National Accounts, 2000*. London: TSO.
Office for National Statistics (2002) *United Kingdom National Accounts, 2002*. London: TSO.
Office for National Statistics (2003) *Annual Abstract of Statistics, 2003*. London: TSO.
Royal Institute of British Architects (2003) "Contracts & Appointments". www.riba.org

CHAPTER XI

CONSTRUCTION SECTOR SYSTEM: AN INTERNATIONAL COMPARISON AND ACTION PLAN

The construction sector system analysis "works"

The test of construction sector system or construction industry cluster analysis in nine countries is convincing. The diagram of the main functions and regulations summed up in the figure 1 of the chapter 1 "works" in the nine countries. The weight of the construction sector system seems to be roughly twice larger than the one of the construction industry, as assessed in Canada and in Australia.

This new approach takes into account the "tertiarisation" of the economy. It takes into consideration the recent development of Public Private Partnership and Facilities management. It is clearly focused on the service provided by buildings and infrastructures to the users.

It highlights the new part of construction in the economy: to build and to manage built facilities to provide services for an efficient and sustainable economy. It underlines the end of the boundaries between construction, manufacturing and services. Companies and government are asking for a package of a better service, coming from buildings and infrastructures, services activities and industrial utilities.

The test in nine countries highlights differences related to institutional contexts, clients' orders and actors. But it emphasizes significant similarities about the rising of services, the decreasing of construction industry weight, the heaviness of the construction sector system, the significance of the stock and of its maintenance, the coexistence of big companies with a very fragmented system.

Institutional contexts are different

Among the nine countries, the institutional contexts are different. Using Boyer (1996) typology, implemented by Winch (2000a) for the analysis of construction business systems in Europe, four main institutional contexts can be differentiated.

The characteristics of the « anglo-saxon » context is the reliance upon liberal market values, the relatively low state regulation, the reliance on the stock market for industrial finance and the relatively low levels of worker protection. This characterises the context of the construction sector systems in UK, Canada and Australia, even if differences are significant between the three countries.

The « social-democrat » context is characterised by the reliance on tripartite agreements state-employers-unions, the reliance on strong unions and the high levels of worker

protection. This is the institutional context of Danish and Swedish construction sector systems.

The German context can be named « corporatist » with negotiated coordination between the « social partners », greater willingness to intervene in the market to protect social values, greater reliance on banks for industrial finance and relatively high levels of worker protection.

The French and Portuguese institutional contexts are « public », because the state has a high role in coordinating and financing the economy is high; the protection of worker condition is relatively high.

Let us add a « transitional » institutional context, where economy is in transition from a planned economy to a market economy. Public firms are massively privatised and a new public regulation has to be set up. Lithuania is in that case.

In spite of strong differences among the five institutional contexts, the significance of the government regulation in construction sector system is a common characteristic among the nine countries.

About international regulation, a high difference distinguishes European Union countries from the other countries. Among the “anglo-saxon” group, this explains differences between UK on the one hand, and Canada and Australia on the other hand. European Union role in regulating construction sector system is increasing. This role is especially high in materials regulation, competition and procurement systems, financing and R & D.

Among the “anglo-saxon” group, in spite of the market oriented context, government (central or regional, in a federal state such as Canada) regulation of the construction sector system is very important. Trade Unions and users associations role is high in Canada.

Among the “social-democrat” group, the role of regional and local authorities regulation is rather weak in Denmark and in Sweden. The role of central local government is stronger in Denmark than in Sweden. Sweden deregulated the construction sector in the 1990s.

In Germany, the role of central and regional government, industrial and professional organisations regulation is high. In French and Portuguese “public” context, central government and industrial organisations are strong, the unions and user associations role is weak. Eventually, in Lithuanian “transitional” context, a new role of central government and industrial organisations has to be specified. Unions and user associations role is very weak

Clients and orders may be varied

The part of civil engineering is very high in Canada and in Lithuania for different reasons. The high level of new engineering works in Canada can be explained by the industrial and economic structure of the country. An important share of industrial activities is based on exploiting natural resources, such as gas & oil, mining and forestry activities, as well as on transforming these raw material into added-value products, such as pulp and paper, primary metal and alloys, and chemical industries. Canada is also a large country with still a rather low density of population in comparison with many other countries. New roads, bridges and various municipal and communication infrastructures are still expanding in the country. In Lithuania, civil engineering share is strong, for housing share is presently very weak.

Civil engineering share is quite high in Australia, which has common characteristics with Canada, and in Portugal, which is developing its infrastructures. Among the building works in Europe, the share of residential works is currently high in Germany and Portugal.

Table 1. Shares of residential, non residential, civil engineering (percentages of the value of the total construction production). Total per column = 100 %

	Australia (2003)	Canada (2002)	Denmark (2000)	France (2001)	Germany (1999)	Lithuania (1998)	Portugal (2002)	Sweden (2000)	UK (2001)
% residential	44	34	36	44	57	7	52	34	37
% non residential	21	20	35	34	27	51	21	44	63
% civil engineering	35	46	29	22	16	42	27	22	

*civil engineering includes construction works other than building and civil engineering

As can be seen from Table 1, the shares of residential, non-residential and civil engineering construction in Lithuania differ from similar indices in the highly industrialized countries. The volume of residential construction in Lithuania, for instance, is too low and the volume of non-residential buildings and civil engineering is leading compared with industrialized countries. This can be explained by the fact that in a planned economy the state allocated much resources to the construction of residential buildings and in a market economy the amount of funds allocated for this purpose has been reduced considerably. The growth of investments of private citizens into construction of residential buildings does not fully offset the decrease in public investment. Although the share of investment coming from various companies have increased, most of these funds are used for non-residential construction. Civil engineering is much more active than in very developed countries of the world thanks to considerable investments made by the EU and the Lithuanian government (Table 1).

Table 2 Shares of households, firms, government (percentages of the value of the ordered total construction production). Total per column = 100 %

	Australia (2003)	France (2002)	Germany (2000)	Lithuania (1999)	Sweden (1999)	UK (2001)
% households	31	35*	25	8	14	22
% firms	54	40	47	86	61	53
% government	15	25	28	6	25	25

*including real estate companies

The repartition of construction works is changing in each country. It depends on the evolution of the demand of the different clients. Currently, if we do not take into account the specific case of Lithuania, the share of government varies from 15 to 25 %, the share of households is particularly weak in Sweden.

The functions of the system are the same, the actors may be different

The construction sector system functions are the same in the nine countries, but the actors implementing those functions may be different. For instance, general contracting has been the dominant business system in UK since the beginning of the 19th century (Winch, 2000b), while separated trades are common on the European Continent. In front of the general contractor, the anglo-saxon client is advised by Quantity surveyors. This profession does not exist in other countries.

Controllers are often public, they are private in France. French "Bureaux de contrôle" have no equivalent in other countries. In France, land developers are different from buildings developers. Such distinction does not exist in UK. Cooperatives for building and managing built facilities are strong in Denmark, Germany and Sweden. They are weak or absent in the other countries.

Even when an actor has the same name in the different countries, his/her role may be different. The role of the architect is stronger in UK, Germany, Denmark than in France or Sweden. In Canada, the role of architects and design ingeneers has become more important with the increasing popularity of design-build contracts.

The construction business systems may be very different. "Perhaps the most radical innovation in the UK construction industry for 200 years is the introduction of concession contracting" (Winch, 2000b, p.153), whereas the concession contracting has been implemented in France since the 16th century.

Construction industry weight is decreasing, construction sector system is twice as big

The share of the construction added value in GDP is declining in all countries, except Portugal and Lithuania. Bon (1997) and Ruddock (1999) noticed the link between economic level and construction industry weight. Most of the time, construction industry's share is declining in very developed countries and is increasing in other countries. The Portuguese and Lithuanian economic levels are lower than in the other countries. Due to characteristic features of the transitional period (rapid political, economic, legal, infrastructural and other changes) from 1990 to 2000 Lithuania had the greatest fluctuation in construction added value in GDP (198 %) compared to the very

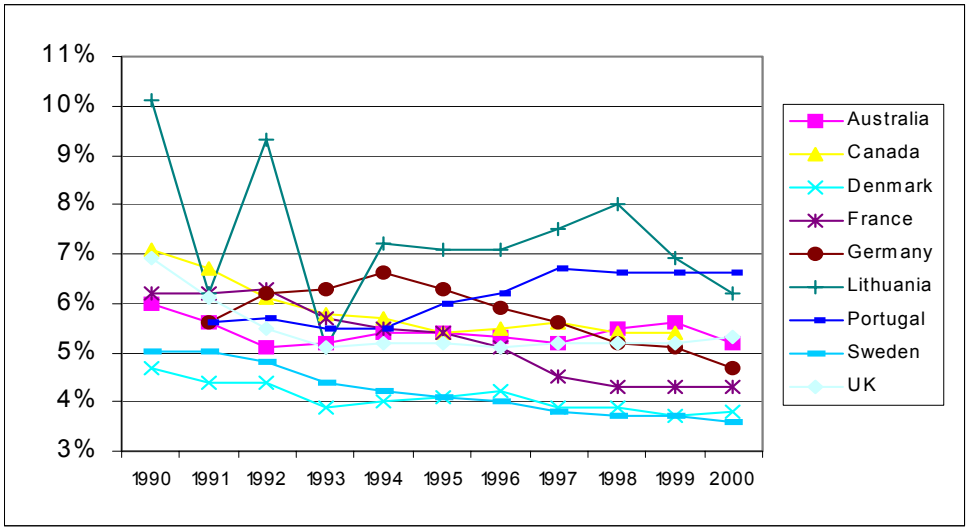
developed countries of the world. The construction added value in GDP in these countries during the same period fluctuated by 127-147 per cent (see Figure 1).

In very developed countries, the general trend is simultaneous with the rising of the tertiary sector. In several countries (France, Germany, UK), manufacturing industry share is also declining in GDP.

Within this common trend, conjuncture may be different from a country to another, depending on the construction business cycle. In 1997-1999, construction added value increased in Australia and Canada, but shrinks in Sweden and Denmark. Even between two close countries, construction cycles can be very different: in 2000, increasing was high in France, while declining was strong in Germany.

Figure 1 Construction added value share in GDP

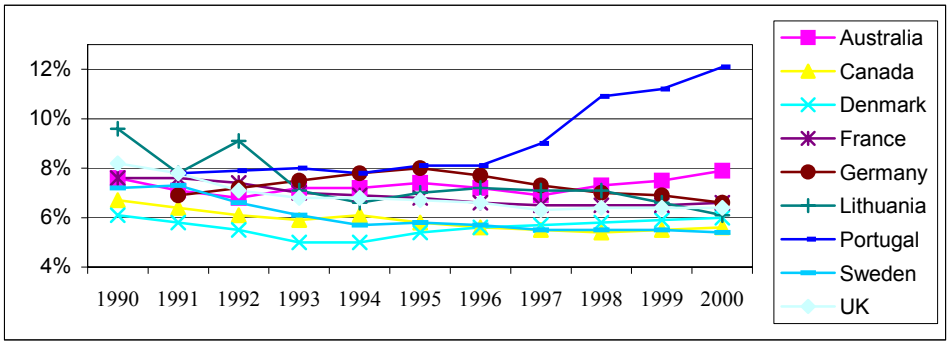
(1990-2000 constant prices)



At the beginning of 21st century, construction industry share is round 4 to 5 % of GDP in the more developed studied countries. Construction sector system is about twice as big as construction industry. In Canada, for instance, construction firms added value is 5,4 % of GDP in 1999. Building products, construction equipment, design, technical services, built facilities operation and maintenance would count up for about 6 %.

Since 1990, construction employment share in national employment increases in Portugal, but not in Lithuania. In the most developed countries, the share of construction is steady. The fluctuation of the percentage of construction employment in national employment in Lithuania during the time of reforms of transitional period, however, was higher than in the very developed countries (157 % and 121-135 % respectively) (see Figure 2).

Figure 2 Construction employment share (construction firms) in national employment (1990-2000)



In the more developed studied countries, construction industry employment represents round 6 % of total employment (a little more in Australia). The construction sector system employment is more than twice as big. In Canada, construction industry workers are 900 000 in 2000. Design and engineering employees are 180 000, building products and equipment workers 275 000, facilities services employees 400 000. Should be added in-house construction and maintenance activities, which represent roughly one-third of total construction.

Increasing importance of managing existing stock

Repair and maintenance represent more than 45 % of construction work in the major part of the studied countries. This percentage is lower in Germany and Canada, but is not less than 23%. It seems lower in Portugal. Repair and maintenance activity is not as well covered as new construction due to do-it-yourself activity and black economy. In western Europe, it represents often the half of the construction works. It is high in building activity, especially in housing.

Table 3 Parts of new construction and repair & maintenance (percentages of the value of the total construction production). Total per column= 100 %

	Australia Estimate	Canada (1997)	Denmark (2000)	France (2002)	Germany (1999)	Lithuania (1999)	Portugal (2000)	Sweden (2000)	UK (2001)
% new construction building	36	41	33	41	51	20	68	25	44
% repair & maintenance building	38	21	38	37	34	27	6	53	24*
% new construction civil engineering	20	36	17	14	11	17	24	17	10
% repair & maintenance civil engineering	6	2	12	8	4	36	2	5	23*

* figure for building includes only residential R&M, and the figure for civil engineering includes all non-residential R&M (including commercial etc).

The volume of construction of new buildings, repair and maintenance of civil engineering in Lithuania differs from that in developed countries of the world (see

Table 3). For example, the volume of new construction building is inadequately low (neither state nor private citizens have enough financial resources), and repair and maintenance of civil engineering is much more active than in developed countries of the world. During the period of planned economy civil engineering construction was rather active; recently, however, it failed to meet all the applicable requirements. Thanks to considerable investments made by the EU and the Lithuanian government the situation with regard to repair and maintenance for civil engineering has been improved.

Beyond repair and maintenance, managing the existing stock is becoming a strategic issue for companies and government. The exploding Facilities management and Public Private Partnership are strong signs of this trend.

The existing stock is easy to assess for housing. Non residential buildings and civil engineering infrastructures are difficult to evaluate and are often underestimated. Estimation methods are not the same from a country to another. Total construction stock represents from 1,5 times to 5 times the GDP.

Table 4 Value of stock

	Australia (2000) Aus$ Billion	Canada (2001) Can $ Billion	Denmark (2000) EUR Billion	France (2000) EUR Billion	Germany (2000) EUR Billion	Lithuania (1997) Litas Billion	Portugal (2001) EUR Billion	Sweden (2000) EUR Billion	UK (2001) £ Billion
Residential stock	582	953	242	2979	4183	74	255,5	222	2266
Non residential and civil engineering stock	720	953	105	1523	3810	35	137,6	143	1348
Compared to GDP	2	2,01	1,96	3,2	4	2,83	3,5	1,61	2,4

Unit: Euro for Euroland or local currency

Big companies coexist with a very fragmented construction sector system

Fragmentation of construction industry and construction sector system is a common characteristic of all countries.

Table 5 Number and size of construction firms in European Union in 2000 (Total per country = 100 %)

	Number Of firms (thousands)	Less than 10 employees	From 10 to 49 employees	50 employees and more
Germany	279	82,0 %	16,2 %	1,8 %
Italy	282	87,0 %	11,8 %	1,2 %
France	320	92,3 %	7,0 %	0,7 %
United Kingdom	511	95,5 %	4,3 %	0,2 %
Spain	191	90,3 %	8,5 %	1,2 %
Other EU countries	324	89,6 %	9,2 %	1,2 %
EU Total	1907	90,0 %	9,0 %	1,0 %

Sources: Eurostat, Ministère de l'Equipement, des Transports et du Logement, Direction des Affaires Economiques et Internationales, «Données : La construction en Europe », 2003

In Australia, 94% of construction companies have less than 5 employees in 1997. In Canada, 96 % of firms get annual revenue under Canadian $2M in 2000. This fragmentation characterises construction industry in a market economy. In Lithuania, which is going from a planned economy to a market economy, the number of construction firms exploded from 1286 to 3452 between 1991 and 1999.

Figures of table 5 seem to underestimate the number of very small companies in Germany, but a German specificity is the weight of medium sized companies (10 to 49 employees). It can be explained by the heaviness of separate trades tenders and by local construction markets in every state.

Table 6 Construction activity depending the size of construction firms in European Union in 2000 (Total per country = 100 %)

	Less than 10 employees	From 10 to 49 employees	From 50 to 249 employees	250 employees and more
Germany	26 %	34 %	22 %	18 %
Italy	24 %	38 %	17 %	21 %
France	34 %	30 %	17 %	19 %
United Kingdom	54 %	28 %	10 %	8 %
Spain	28 %	19 %	18 %	35 %
Other EU countries	26 %	29 %	20 %	25 %
EU Total	31 %	29 %	18 %	22 %

Sources: Eurostat, Ministère de l'Equipement, des Transports et du Logement, Direction des Affaires Economiques et Internationales, «Données : La construction en Europe », 2001

This fragmentation is simultaneous with very big construction companies.

Table 7 The first fifteen construction companies in Europe in 2002.

	Turn over (EUR billions)	Share of exportations (% of turn over)	Employees (thousands)
1 Bouygues (France)	18,3	32 %	112
2 Vinci (France)	17,6	41 %	127
3 Skanska (Sweden)	15,9	83 %	76
4 Hochtief (Germany)	12,8	84 %	33
5 Amec (United Kingdom)	6,9	61 %	23
5 Eiffage (France)	6,9	16 %	46
7 FCC (Spain)	5,5	14 %	55
7 Dragados (Spain)	5,5	20 %	59
7 Balfour Beatty (UK)	5,5	29 %	28
10 HBG (Netherlands)	5,3	na	19
10 Ban Holding Strabag (Austria)	5,3	45 %	31
12 Ferrovial (Spain)	5,0	28 %	23
13 NCC (Sweden)	4,9	60 %	26
13 Bilfinger & Berger(Germany)	4,9	63 %	50
15 ACS (Spain)	4,2	12 %	31

Source : Ministère de l'Equipement, des Transports et du Logement, Direction des Affaires Economiques et Internationales, «Données : La construction en Europe », 2003
na : not available

Most of those companies have a "construction sector system" approach, including services activities. To get more recurrent profits, they develop road construction and maintenance, electricity works, concession contracting, Facilities management.

An approach for the future

The construction sector system approach allows to get a view of the construction industry suitable to 21st century in four topics: statistical and economical analysis, firms strategy, sustainable development and innovation.

Firstly, the construction sector system approach highlights the need to improve statistical data about construction and to link building and property economics. The main lacks of statistical data concern non residential stock's characteristics on the one hand and companies and government in-house construction and maintenance departments on the other hand. Those lacks are crucially important, as, at the beginning of the 21st century, one new role for construction industry is to improve the efficiency of this stock and of its managing systems.

On an academic point of view, separation between building economics and property economics is becoming obsolete. Recent Public Private Partnership contracts, especially in UK, underline the needs of clients, dealing not only with design and build, but also with stock demolition, project financing and long term maintenance[28]. The opposition between building economics and property economics is currently of no use.

Secondly, firms strategic analysis needs a wider approach than the construction industry one. The construction sector system one, including materials industry, existing stock management and services provided by built facilities is more appropriate to companies needs. It is obvious for big construction companies. They need to deal with the whole

[28] See for instance in 2002, the 705 Euros millions British Home Office contract with HSBC and Bouygues, concerning the demolition of a property in London, design and build of new headquarters and housing estate, financing through bond loans and 26 years facilities management of the new property.

construction sector system to obtain more regular profits, and to invest in activities with recurrent profits, such as road maintenance, electricity works, concession contracting and Facilities management.

Construction SMEs are also more and more interested in a wider approach, to deal not only with new construction, but also refurbishment, maintenance and operation. Such a wider approach may attract non construction companies, interested in new opportunities. Facilities management catches the attention not only of construction firms, but also of hotels companies, services firms and banks.

Thirdly, the construction sector system approach, based on the built facilities life cycle and its comprehensive players system, is an excellent starting point for sustainable development analysis in the construction field. Safety, health and environmental issues will be essential during the 21st century. Public regulation is currently focused on new construction rules. The sector system analysis emphasizes the importance of existing stock for real improvement in the safety, health and environmental issues. It gives a new framework for sustainable development, not only in terms of analysis but also in terms of public regulation.

Eventually, a construction sector system approach is particularly helpful for understanding innovation processes and changes in the industry. We may briefly mention key roles of the following related sectors to construction:

- Architects and engineers in designing new structures integrating new materials and using new construction equipment;
- Facility owners and managers in demanding new types of buildings or facilities for new functionality or usage as well as for improved performance in operating and maintaining these facilities;
- Public authorities and policies in promoting improved practices and products for security and environmental aspects;
- Manufacturing suppliers - with competition from other material and suppliers - in developing new construction products and services
- Research and education institutions for ensuring development of a sustainable competitive industry, with the help of developing strategic knowledge, new technologies and highly skilled personnel.

Without taking into consideration these actors, changes and improvement in the construction industry can hardly be understood. These actors are closely linked and work together as partners in a number of projects.

REFERENCES

- Boyer, R., 1996, Le capitalisme à la française à la croisée des chemins, in Crouch C. and Streeck W. (edited by), *Les capitalismes en Europe* (Paris: La Découverte).

- Bon, R., 1997, *Whither global construction ?* ECERU Opinions Surveys 1992-1997. Reading.

- Ministère de l'Equipement, des Transports et du Logement, 2001, *La construction en Europe en 2000*, Direction des Affaires Economiques et Internationales, Paris.

- Ruddock, L., 1999, Optimising the construction sector. A macro economic appraisal. In *Macreconomic issues, models and methodologies for the construction sector* (edited by L. Ruddock). CIB, Publication 240, Rotterdam, pp 68-80.

- Winch, G., 2000a, Construction business systems in the European Union, *Building Research and Information,* **28** (2), pp. 88-97.

- Winch, G., 2000b, Institutional reform in British construction: partnering and private finance, *Building Research and Information,* **28** (2), pp. 141-155.

AUTHORS

Niclas Andersson, is senior lecturer at the Department of Construction Management at Lund University, Sweden. Niclas has a Licentiate Degree in construction management. He has lately been doing research on matters of the integration of the Swedish and Danish construction sectors and takes active part in teaching.

Niclas Andersson
Department of Construction Management
School of Civil Engineering
Lund University
P.O. Box 118
S-221 00 Lund
Sweden
Tel: +46 (0)46 222 94 49
Fax: +46 (0)46 222 44 14
E-mail: niclas.andersson@bekon.lth.se

Jean Carassus is the co-ordinator of the CIB W55 W65 "Construction Industry Comparative Analysis" Project Group, which has elaborated the present work. He is the Head of Economics and Human Sciences Department of the Centre Scientifique et Technique du Bâtiment in Paris. He is Professor of Construction Economics in the Ecole Nationale des Ponts et Chaussées (ENPC). He published in 2002 "Construction : la mutation. De l'ouvrage au service". Presses des Ponts et Chaussées. Paris.

Jean Carassus
Economics and Human Sciences Department
Centre Scientifique et Technique du Bâtiment
4, avenue du Recteur Poiincaré
F-75782 Paris cedex 16
Tel. : + 33 1 40 50 29 24 / 29 16
Fax : + 33 1 40 50 29 10
Mailto : carassus@cstb.fr
Web : http://www.cstb.fr

Jörge Clobes is a German research assistant visiting the Department of Construction Management at Lund University.

Jörg Clobes
Department of Construction Management
School of Civil Engineering
Lund University
P.O. Box 118
S-221 00 Lund
Sweden

Arturas Kaklauskas is a Professor in and Chairman of the Department of Construction Economics and Property Management. A.Kaklauskas is coordinator of a Study Group SG1 "Application of Internet Technologies in Building Economics" of the International Council for Research and Innovation in Building and Construction (CIB) from 2001. He is co-editor of Journal of Property Management and he is the author 82 research publications and 5 monographs.

Arturas Kaklauskas
Department of Construction Economics and Property Management
Faculty of Civil Engineering
Vilnius Gediminas Technical University
Sauletekio al. 11
LT-2040 Vilnius
Lithuania
Tel: +370 2 700119, Fax: + 370 2 700112
E-mail: Arturas.Kaklauskas@st.vtu.lt

Edmundas-Kazimieras Zavadskas is Rector of Vilnius Gediminas Technical University. Author of over 800 publications, including 74 separate issues, handbooks, monographs in Lithuanian, English, German, Russian.

Prof. Edmundas-Kazimieras Zavadskas
Vilnius Gediminas Technical University
Sauletekio al. 11
LT-2040 Vilnius
Lithuania
Tel: +370 2 700115, Fax: + 370 2 700114
E-mail: edmundas.zavadskas@adm.vtu.lt

Jorge Lopes has a Ph.D in Construction Economics, Surveying Department of the University of Salford, UK. He is Head of Department of Construction and Planning at the Polytechnic Institute of Bragança, Portugal. J. Lopes is a member of the Managing Committee of the CIB Task Group 31- Macroeconomic Information on the Construction Industry. He has several research publications on construction economics and property economics.

Dr. Jorge Lopes
Department of Construction and Planning
School of Technology and Management
Polytechnic Institute of Bragança, Portugal
Apartado 134, 5301-857, Bragança, Portugal
Tel: +351 273 303069 Fax: + 351 273 313051
E-mail: Lopes@ipb.pt

André Manseau is Program Account Director, Office of the Vice-President Technology and Industry Support of the National Research Council of Canada. Dr. Manseau has been coordinator of a special Task Group on Innovation Systems in Construction of the International Council for Research and Innovation in Building and Construction (CIB) from 1998 to 2001. Recent publications include Manseau A. and Seaden. G. (eds), *Innovation in Construction – An International Review of Public*

Policies, Taylor & Francis – Spon Press, 2001, Manseau A., *Les politiques publiques et l'innovation dans l'industrie de la construction*, Revue Travaux, 2001, and Seaden G. and Manseau A., *Public Policy and Construction Innovation*, Building Research and Information, 2001

Dr. André Manseau
National Research Council of Canada
Montreal Road Campus, Ottawa, Ontario
K1A 0R6
Tel: 1 (613) 990-9767 Fax: 1 (613) 993-7982
Email: **andre.manseau@nrc.ca**

Les Ruddock is Professor of Property and Construction Economics and is Director of the Research Institute for the Built and Human Environment at the University of Salford.
He is Coordinator of the CIB Task Group 31 concerned with 'Macro-Economic data for the Construction Industry'.

Prof. Les Ruddock
Research Institute for the Built and Human Environment
University of Salford
Salford. M5 4WT
Tel: +44 161 295 4208
Fax: +44 161 295 5011
E-mail: L.Ruddock@salford.ac.uk

Gerard de Valence is a Senior Lecturer in the Department of Project Management at the Faculty of Design Architecture and Building, University of Technology Sydney, in Australia. Between 1997 and 2002 he co-edited the three volume series Building in Value: Pre Design Issues; Design and Construction; and Workplace Strategies and Facilities Management. He is currently the Co-ordinator of CIB Working Commission 55 Building Economics.

Department of Project Management
University of Technology Sydney
PO Box 123
Broadway NSW
Australia 2007
Tel. : + 61 2 9514 8758
Fax : + 61 2 9514 8051
Mailto : g.devalence@uts.edu.au
Web : http://www.dab.uts.edu.au

Alex Wharton is a Research Fellow in the Research Institute for the Built and Human Environment at the University of Salford.

Alex Wharton
Research Centre for the Built and Human Environment
University of Salford
Salford. M5 4WT

Tel: +44 161 295 32048
Fax: +44 161 295 5011
E-mail: A.P.Wharton@salford.ac.uk