

AGEING CHALLENGES IN THE CONSTRUCTION SECTOR

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ABSTRACT. Ageing population and ageing infrastructure are two significant socioeconomic challenges, and business opportunities, for the construction sector in Europe. Utilisation of ICT in daily living is one of the future technology drivers. The principles of the Design for All (universal design) help to develop the built environment and its technologies in such a way that cities will be pleasant and supportive places for everybody. This paper considers the potential of new types of services and networking, which are very much under development at the moment and also under lively debate. The cost-effectiveness - and so the availability - of the home delivered services will be dependent on the accessibility of the urban areas.

KEYWORDS: Ageing population; Design for All; Built environment

1. INTRODUCTION

The inhabitants of the European countries are migrating to large cities and their metropolitan areas, which are typically the oldest and biggest ones. There are about 40 cities in Western Europe that have more than 500 000 inhabitants, among them Amsterdam, Madrid, Paris, Rome and Vienna (Dwelling in European cities, 2000). There are also several smaller centres that draw people from the rural areas. However, simply the lack of the appropriate dwellings does not represent the whole picture of the housing problem in cities. The demographic transition underway is rapidly increasing the proportion of elderly people. Their needs are a concern for all European Member States. For sustainable urban development, upgrading and social innovations are needed in housing, traffic and services.

Modern ICT offers new kinds of opportunities for responsive and supportive housing. It may widen the individual communication opportunities and provide assistance in everyday tasks. However, benefits of advanced technologies are possible only if residential surround-

ings and dwellings allow for their application.

2. NEW NEEDS OF THE ELDERLY PEOPLE

Nowadays, more than 90% of elderly people live in their own home, either as an owner or a tenant (Housing of the older people, 1999). This figure is anticipated to be increased, according to the goals of social and political decision makers. The United Nations General Assembly adopted the UN Principles for Older People, in the year 1991. These call for action in many areas, among them including: Independence, Participation, Care, Self-fulfilment and Dignity.

Within a few generations, the demographic change is rapidly increasing the proportion of persons aged 60 years and above. In the countries of the Organisation for Economic Cooperation and Development (OECD), it is expected that this proportion will account for 1 person in 3 by the year 2030. At the same time, the share of the young people in the population is decreasing and the share of the very old - more

than 80 years - people is increasing (<http://www.un.org/ecosocdev/geninfo/ageing/ageing-e.htm>). Changing dependency ratios - in terms of the number of old people depending for their material safety on younger, economically active and wage-earning people - are bound to influence the development of any country.

However, the trend in housing and care services for the elderly people is "ageing at home", in familiar surroundings. Adaptations to the home, the provision of practical domestic aids to daily living and appropriately designed household equipment can make it easier for those elderly people whose mobility is restricted or who are otherwise disabled to continue to live in their own homes. Special attention should be paid to environmental problems and to designing a living environment that would take into account the functional capacity of the elderly and facilitate mobility and communication through the provision of adequate means of transport (Vienna International Plan of Action, 1982).

Many EU funded research programmes have focused on the principles and practices of planning, design and building of environments that fulfil the topical social and human needs. The European Commission has supported the multinational work of a widely accepted document on the accessibility concept (European Concept, 1996). Aspects of the more user-friendly building have already been present in the building codes of the Member States - based upon either the Construction Product Directive or the national strategy and laws. CEN and CENELEC have contributed to new Guidelines for standards developers to address the needs of older persons and persons with disabilities, under mandates from the Commission and EFTA Secretariat. A part of these guidelines covers the built environment.

For the residential construction sector this situation means there is also a great market potential - as there are growing needs to build new residential buildings and to renovate the already existing ones for these special needs (Siekkinen, 2003).

3. ACCESSIBILITY AS A CHALLENGE FOR URBAN DEVELOPMENT

As one expression of the new kind of integration of different aspects of urban development, a collaboration project "*Accessible and Safe Entrance Home - Accessible Footpath in a New Building Stock*" was carried out at VTT Building and Transport together with VTT Information Technology and LT Consultants Ltd (Koukkari *et al.*, 2001). The project was initiated during brainstorming meetings at the Future Home Institute at the Helsinki University of Art and Design. The background of the project was similar to the research project *House_?* at the Massachusetts Institute of Technology; this was focused to study how the home and its related technologies, products, and services should evolve to better meet the opportunities and challenges of the future.

The goal of the Finnish project was to present recommendations and solutions for a modern city environment, particularly with respect to the usability, safety and functionality of pedestrian and traffic routes. The project was carried out in close collaboration with its financiers, the City Office of Helsinki; housing contractors Asuntosäätiö and VVO Group Oy; manufacturer of keys, Abloy Oy and manufacturer of elevators, Kone Corporation; and the Waste Disposal Service of Helsinki Metropolitan Area Council. Interaction with the social and housing organisations took place in workshops and discussion groups.

The project identified future needs of inclusive design of urban areas. Service capability of residential quarters can be improved by developing accessible pathways. This calls for coordination between architecture and technology. User-oriented design methods should be applied both in planning and building design as well as in user interfaces related to ICT in home environments.

Most people live in a domestic environment poorly tailored to their needs: living among technologies that are merely irrelevant gadgets, which meet no fundamental need and

have been developed out of context. Furthermore, as was concluded in the project on accessible and safe pathways, the whole living environment and traffic connections need to be re-evaluated.

The ageing of the building stock and urban infrastructure, together with the ageing of society, call for rethinking of the strategies as well as development of the processes and products of the construction sector. In an old building stock, planning and building of new routes, networks and equipment presumes a special know-how of the refurbishment methods and costs. Also, home automation technologies that adapt to the mainstream housing stock are needed in order to diffuse modern technologies to serve the elderly.

4. REAL ESTATE DEVELOPMENT IN TRANSITION

Internationalisation and professionalism have raised interest and also concern to elaborate processes and tools in real estate finance and management (Nummelin, 2003). Real estate issues constitute an important part of sustainable development. The needs for development, related to real estates, have been recognised in recent years. Changes in business environment have been dramatic in many sectors and have had impacts on real estate business as well. Technologies have been developed but the amount of break-through innovations in the real estate sector has been limited. An ability to adopt new way of thinking should be developed.

There is a transition going on in Europe concerning corporate ownership and governance. New ways to deliver services, at global and regional levels, together with customer focus, have formulated new partnerships. Much research work has to be done concerning services within the real estate cluster. Until now, services and technical devices have been developed separately but the situation is gradually changing. Services are more often seen as combinations of services and physical products.

This will lead to integrated services for specific customers.

The real estate and building cluster is partly evolving into a service business where physical facilities are considered as part of a service system. Applications of new technologies have mainly been directed to new buildings but new technologies for service provision should also be applied in old housing stock, since new construction production is decreasing in Western Europe. New services to residential buildings are sought after, as the population is ageing.

5. HOME SERVICE CONCEPTS AND BUSINESS MODELS

The key of HOMEDOOR Project, funded by European Commission under the Fifth Framework Programme, is in integrating existing and new buildings to the global e-commerce network by providing the logistics solution for multi-storey and other buildings. It is expected to give growth impulses to traditional building business sectors in building rehabilitation and modernisation as well as to new service sectors. Within the project, a review entitled "*Home Service Concept - Technology, Logistics and Business Models*" was made of an open service concept and related business models (Andelin, 2004). The theme was approached from the real estate point of view. Various services in multi-storey residential buildings are addressed, combining approaches for technological development and business development.

The study addresses different home services provided to multi-storey residential buildings; stakeholders of services and their relationships; and the technology and logistics of the service. The key focus is on business models of home services, to find the business logic behind the home service.

Apparently, home services are needed in future. Potential customer segments are families, wealthy adults seeking high quality services, elderly and disabled people. But to create efficiency and turnover, services need a large customer density, which means that ser-

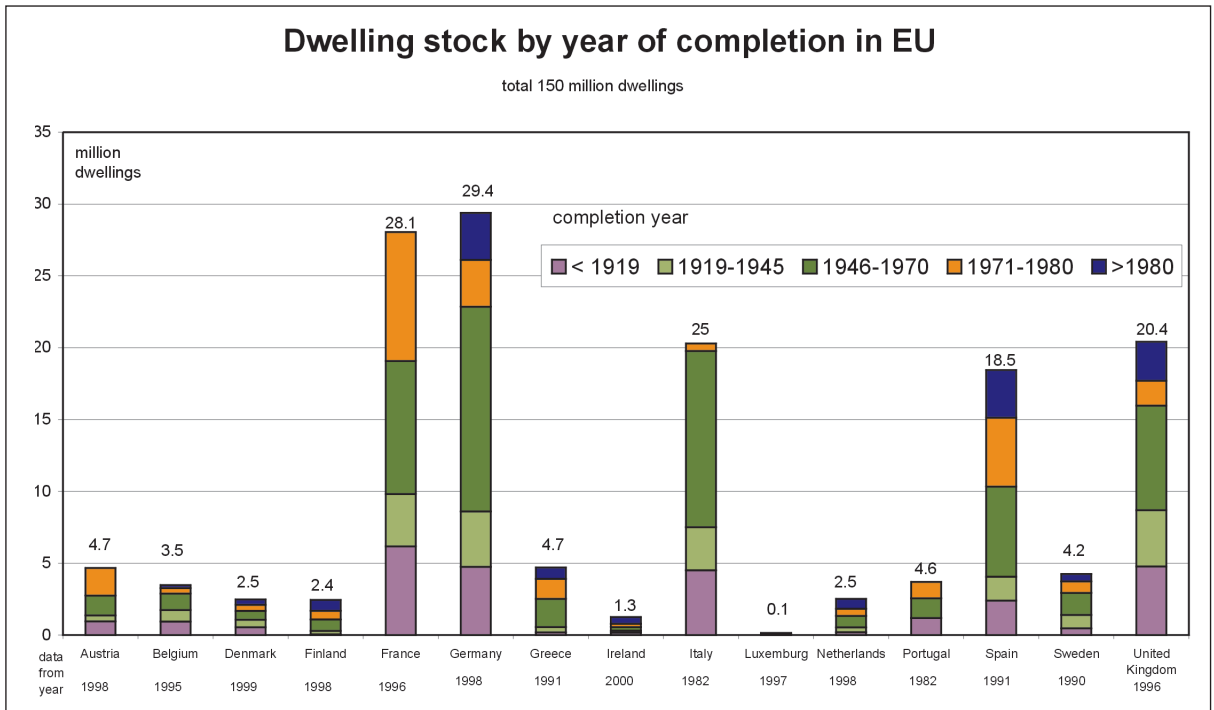
services should not be created for special groups but for everybody. The funding of services can be public, private or there can be a public-private partnership. There are three main interests to invest in home services and delivery: (1) services for inhabitants, (2) cost savings for haulier/ logistician and service provider, and (3) new services affecting the building image for builder / developer.

There is a fundamental challenge in new-product development, which involves taking a vague concept for a new service or product that a particular market or customer segment will find valuable and turning it into an actual ongoing business proposition. Multiple individuals, functions, and increasingly even separate companies contribute to the concept's realisation.

6. ADAPTING THE OLD CITIES TO NEW NEEDS

The time has passed when the production of new housing stock could meet the needs for adapted housing. Special and flexible housing has to be arranged in the old building stock. In residential areas, the public spaces and transport as well as the shops, are likely to develop accessibility before the dwellings, buildings and quarters. Good examples of this can already be seen in cities like Barcelona or Helsinki for example.

In EU countries there exist 150 million dwellings, which means 400 dwellings per 1000 inhabitants. Although the existing housing stock is quite young in relation to the age of the oldest city centres, there are several technical ageing symptoms that point to the need for major renovations. Over half of the stock was built after 1946 (see Figure 1). Every third



Source: European Housing Statistics

Figure 1. The size and age of housing stock in EU. Years 1971-1980 represent total of two newest age groups in Austria, France, Italy and Portugal

dwelling was built between 1946-1970. During that period, building methods and systems were largely aimed to quickly satisfy the huge demand for dwellings and the quality of construction remained questionable.

The present building stock needs refurbishment for several reasons and the proportion of refurbishment work is already about half of total input in the construction sector. The share of newer dwellings (completed after 1980) in the whole stock is less than 10%. From the point of view of the needs of the elderly people and the expansion of services brought to the home, the old building stock should be evaluated on the basis of accessibility for residents and visitors, availability and cost-effectiveness of the services and functionality of the dwelling. The methods of repair and refurbishment work are to be chosen with respect to the quality goals and overall costs, including the share of social costs.

The vertical circulation is an essential element of a functional quarter. A passenger lift is the most common equipment to improve the quality of an old building with respect to logistics and accessibility. In Finland, the influence of a lift has been seen so essential that construction of a new lift is financially supported by the state up to 50%.

7. REPAIR CONCEPT AS A TOOL FOR MANAGEMENT AND DEVELOPMENT

VTT Building and Transport has been partner in the project *“Repair Concept - With Repair Construction Apartment for All Life Phases”*, in which tools for the evaluation of the quality and costs of a renovation work were

developed (Tiuri, Sarja and Laine, 2001). The concept is an adaptation of the principle of the open system building for a renovation project, especially in the prefabricated housing stock of the 1960's and 1970's. The emphasis is on the kinds of refurbishment and reconstruction methods that increase the independence of the technical systems from the supporting frame and the independence of one apartment from the others. The basis of the concept is the division of a building into the common and private spaces: the common spaces are to be designed suitable for all and the private spaces are to be designed adaptable.

The model solutions of repair and refurbishment work are the main tools in evaluation of the functional goals and methods. The models are alternate or completing methods of the realization of the accessibility, adaptability and convenience. The models are categorized in seven main classes (Table 1). In each class, several methods are presented for decision (Table 2). The models are also described with drawing examples and cost estimations.

8. CONCLUSIONS

The construction sector has already put efforts into the development of effective design and building methods that can satisfy the different needs of different customers now and in the future. The products and processes in relation to the open building, form the physical basis of the response to the market. The challenges for the construction sector are: How to transfer the new concepts into design of residential areas? How to include the customer

Table 1. The classification of the model solutions of the Repair Concept (Tiuri *et al.*, 2001)

I	Improvement of accessibility in the staircases
II III	Development of common service spaces
IV	Improvement of the division and total shape of the flats
V	Improvement of the outer spaces and holes of the flats
VI	Improvement of the accessibility inside the flats
VII	Improvement of the multifunctionality of the flats
VII	Improvement of the inside climate of the flats.

Table 2. Example of model solutions of the Repair Concept, class (Tiuri *et al.*, 2001)

I	Improvement of accessibility in the staircases	
I-1	Improvement of an old lift Completing methods	
	I-1.1	Enlarging of the door of the lift
	I.1-2	Enlarging of the lift basket
	I.1-3	Improving the exactness of the lift moving
I-2	Construction of a new lift inside the building Alternate methods	
	I-2.1	New lift stopping between the floors
	I-2.2	New lift by reducing the width of a stairs
	I-2.3	New lift and new stairs
I-3	Construction of new lift (or new staircase) outside the building Alternate methods	
	etc	etc
I-4	Improvement of walking routes Completing methods	
	etc	etc

needs of the weak groups in the processes? And how to enhance the special types of projects within common practice?

The European building stock should be adapted to the needs of people. The built environment for all to use, is a sum of decisions and actions of different authorities, policy makers and constructors as well as manufacturers of construction and consumer products. Legislation and regulations can only give minimum requirements. Thus the functionality of the completed surroundings becomes a result of complicated relations. Developing novel products, processes and services often involves great risks. Development needs co-operation between different parties. Exploitation of technologies offers opportunities but to make wise decisions for the long run is difficult.

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SANTRAUKA

SU SENĖJIMU SUSIJĘ IŠŠŪKIAI STATYBOS SEKTORIUI

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Gyventojų ir infrastruktūros senėjimas yra du reikšmingi socialiniai ekonominiai iššūkiai bei verslo galimybės statybos sektoriui Europoje. Informacinių ir komunikacijos technologijų (IKT) taikymas kasdiniame gyvenime yra vienas iš ateities technologijų variklių. Projektavimo visiems (universalus projektavimo) principai padeda kurti statybos aplinką ir jos technologijas taip, kad miestų aplinka visiems būtų maloni ir saugi. Šiame darbe aptariamas naujų paslaugų ir tinklų tipų, kurie šiuo metu yra plėtojami bei gyvai aptariami, potencialas. Pristatomų paslaugų kainų efektyvumas, taigi ir pasiūla priklausys nuo miesto teritorijų tinkamumo.