Research & Development Highlights

Technical Series
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Technology Transfer and Innovation in the Canadian Residential Construction Industry

Introduction

Innovations in the housing industry, both in terms of building materials and techniques, and of marketing and associated services, are not adopted quickly and do not spread widely.

CMIHC sought to identify measures which the government and industry can use to encourage the diffusion and adoption of new technology in the residential construction industry.

Research Program

The objectives of this project were to identify the workings of the technology diffusion process, the pace of adoption of new technology, impediments and factors conducive to technology diffusion, and ways in which both government and industry can work to encourage the effective dissemination and adoption of new technologies. Elements of the diffusion process were identified primarily through the study of the introduction of 19 quite different products (see table for list). The pace of adoption and impeding and conducive factors were analysed using a model of the process which transfers an idea from its conception through to its commercial viability.

Innovations can be put on two continuums:

1) From fundamental to adaptive and functional:

- Fundamental innovations either fulfill a need which was not being satisfied before or fuffill a given need in a completely novel way.
- Adaptive innovations are innovations which already exist in one industry sector and are being adapted for use in another sector.
- Functional innovations occur naturally in the evolution of a product and involve the use of a known product in a related field in the same industry.

2) From direct substitutes to visible cosmetics and invisible innovations:

- Direct substitutes maintain all the essential characteristics of the previous products while adding one or more comparative advantages.
- Visible cosmetics are fashion or fad items.
- Invisible innovations have no immediate or obvious comparative advantage over the products they are suposed to replace.

The R-2000 program is included as an example of an integrated technology development, transfer and diffusion program from which many diffusion-related lessons can be learnei

Findings

- Innovators are not as skilled as they need to be in assessing and refining their innovations.
- There is a lack of money to develop innovations.
- A lack of knowledge on the part of house buyers precludes the ultimate purchasers of housing from contributing to technological trends.
- Builders are averse to risk and resist incorporating innovations into their building processes unless there are well-proven and demonstrated advantages.

Recommendations

The report presents nine recommendations:

- Government and industry should concentrate on developing communications on new products.
- The industry should use builders' conferences to inform builders on technological innovations.
- CMHC and industry associations should further strengthen the regional/local networks of local builders.
- Builders should be informed of actual market penetrations of new technology (who is using what, where and their experience).
- Building Centres should be established as vehicles for the transfer of new ideas.
- CMiHC should initiate demonstration programs to demonstrate worthwhile innovations in techniques and products.
- The government should educate consumers to create market pull.
- Government and industry should describe new ideas and techniques in job-site terms for delivery to the trades.
- Efforts to facilitate technology transfer must adopt a multi-pronged and fully integrated approach.

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The Pace of Innovation

Product	Earliest marketing worldwide	Earliest marketing in Canada	Significant diffusion In Canada	World related pace	Canadian pace
Drywall	1910	1930's	1960	50 years	30 years
Aluminumwiring	1934	1948	1965	31 years	l7years
ABSdrain,wasteandventpipes	1960	1965	1968	8years	3years
CPVC pipes	1975	1975	not reached	–	–
Polybutylene pipes	1972	1975	not reached	–	
Heat recovery ventilation systems	–	1976	not reached	–	
Manufactured windows	–	1945	1955	–	10 years
Insulated sheathing	–	1980	1987	–	7 years
Modular homes	–	1945	not reached	–	
Telescopic cranes	–	1950	1980	–	30 years
Articulated cranes	1945	1955	1985	40 years	30 years
Manufactured chimneys	1933	1933	1965	32 years	32 years
Air-source heat pumps		1970	not reached	–	
Tool and equipment rental	–	1945	1965	–	20 years
Conan counter tops	1972	1974	1987	15 years	13 years
Active solar heating systems	1960	1975	not reached	–	
Tyvek air barrier	1982	1983	not reached	–	
Computer use by building contractors	1973	1974	1988	15 years	14 years
The National Building Code	–	1941	1965	–	24 years

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Research Report: Technology Transfer and Innovation in the Canadian Residential Construction Industry

Research Consultant: Hickling and Rostene

A full report on this research project is available from the Canadian Housing Information Centre at the address below.

Housing Research at CMHC

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