

# CIT2000

## CONSTRUCTION INFORMATION TECHNOLOGY 2000

taking the construction industry  
into the 21<sup>st</sup> century

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edited by  
Gudni Gudnason



Icelandic Building Research Institute

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# **CONSTRUCTION INFORMATION TECHNOLOGY 2000**

**Taking the Construction Industry into the 21<sup>st</sup> Century**

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# **THE CONTENT OF AN IDEAL WEB SITE FOR BUILDING MATERIALS INFORMATION IN THE WORLD WIDE WEB: A TURKISH PERSPECTIVE**

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*ABSTRACT: In this paper, authors tried to determine the content that should be taken into consideration in the planning phase of a web site, which would be used as an online information source in the field of building materials. The content of similar web sites is examined on the World Wide Web and findings evaluated in the Turkish perspective according to the characteristics of Turkish construction industry. The content of an ideal web site for building materials information in Turkish construction industry is defined and differences from that in other countries are discussed.*

*KEYWORDS: Building Materials Information, Web Site Design, World Wide Web, Information Systems, Information Technology.*

## **1. INTRODUCTION**

Decision makers who select building materials and define their proper use, target shortening the construction time, reducing the total building cost but maintaining a high quality standards. Since adequate and up-to-date information about building materials that exists in the highly competitive construction market is not always available or easily accessible even it exists, this goal cannot be easily achieved. "Traditional distribution means, such as hardcover catalogs, 800-line telemarketing and catalogs, like Sweet's, do not provide the latest information. Additionally, costly CD-ROM and custom computer programs do little to help the specifier get the data required" (Hernandez 1997).

Building materials manufacturers and suppliers should take the advantage of developing information technology and information systems to distribute the most accurate and up-to-date information to decision makers. In the rapidly changing and globalising construction market the World Wide Web and online databases, in other words the Internet, are being used by the professionals with the aid of developing information technology. The web sites in the field of building materials as an online information center and product selector are the most common tools worldwide, such as Sweet's Online, Architects First Source Online, AEC InfoCenter, RIBA Product Selector, ConNet etc.

## **2. THE WORLD'S ONLINE POPULATION AND TURKEY**

Two factors driving the evolution of the Internet are the dramatic increase in the number of the users and the qualitative change in the manner in which the Internet used. The number of Internet users around the world is growing at a steady exponential rate. *The Computer Industry Almanac* report shows that there will be nearly 350 million Internet users or 57.5 % per 1,000 people worldwide at year-end 2000 and over 765 million users or 118 per 1,000 people by year-end 2005. These numbers show only adult users over 16 years old with weekly usage in business and home. The top 15 countries, with the leading of United States and Japan, will account for nearly 82 % of these worldwide users including business, educational, and home Internet users (Computer Industry Almanac 1999a, 1999b).



On the other hand, "*The Emerging 20*" term is used for the countries all are in their technological infancy and all are headed by reform-minded governments that recognize the undeniable link between advanced communication systems and a vibrant economy in the new Internet frontier (McGarvey 1997). With over 62,5 million populations and as one of "*The Emerging 20s*", Turkey may prove to be the most lucrative markets going into the 21<sup>st</sup> century.

There is something like 600,000 Internet users at year-end 1999 in Turkey and the number rises all the time. It shows only the number of customers taken from major ISPs. It was 150,000 Internet users and 33 net hosts on 1998 (Global Reach, 1998). Additionally, an expansion plan costs US\$35 million is just completed by Turk Telekom, Turkey's telecommunications giant. The new system, TTnet is now in service with the other one Turnet, which was set up in 1995. Both of them currently provide links to Internet from all of the geographic regions of Turkey. This would dramatically increase the online population of Turkey in the virtual world.

### **3. THE INTERNET, WWW AND WEB DATABASES**

Though they are closely related, the World Wide Web is not the Internet, and vice versa. The Internet is a network in every sense of the word; the Web, however, is not only a network, it is also a distributed set of communications applications and systems software. On the other hand, the World Wide Web is now the most popular Internet application, with the others such as file transfer, Usenet or newsgroups, and e-mail applications. Taking the advantage of popularity of web applications most organizations, especially in business sector, tend to establish a web database to manage, distribute and use the information better in their large document-based databases.

There are two major reasons for the acceptance and widespread use of web database technology in the business sector: the first one is that businesses are used to working with databases and the latter is web browsers offer a common user interface for web-based applications. Then, web interfaces provide an exceptionally useful front end for accessing applications over the web, particularly older database systems that use proprietary user interfaces (Ashenfelter, 1998).

The web is a great medium for distributing information and databases are the perfect medium for managing information. So, a database can be used to manage the "back-end" mechanics of an information delivery system, while the web is used to handle the "front-end" user interface. In addition, there are a number of ways that databases can be used on the web, which can be grouped into three major types of applications: dynamic publishing, information transactions, and data storage and analysis.

### **4. THE AEC COMMUNITY AND THE WEB TECHNOLOGY**

The Architecture/Engineering/Construction (AEC) community is taking the advantages of tools and services presented by ever-increasingly developing communication and information technology especially for past decade and a half. However, at the very beginning of a new century, construction parties are still seeking better solutions for the information exchange and communication problem between them. Because, it is agreed that accuracy, availability, timeliness and quality of information are the key factors in the productivity of the construction industry. In addition, difficulties in obtaining information cause conflicts between parties, losing valuable time and increasing cost.

The web technology or in other words, the electronic data and information exchange could be the solution to the communication problem for all those seeking information on building materials and other construction related matters. The distance could be no matter for the one who working on a construction site abroad very far from his or her head office to send daily progress report or a purchase order by e-mail, discuss the technical data with their colleagues via NetMeeting or make a phone call via Internet phone.

Due to unorganized data sources and poor links amongst them, the decision makers in a construction project may not easily obtain enough information about building materials or access to every data when they need them. The other help of the web technology is distributing the fast, most accurate and up-to-date information about building materials and suppliers available in construction market to decision makers 24 hours a day, seven days in a week wherever they are.

##### **5. THE IMPORTANCE OF BUILDING MATERIALS INFORMATION WEB SITES**

The web sites in the field of building materials information support decision makers in many respects. In fact, building materials information web sites that exist on the World Wide Web environment shortens labor and time, consequently decreases cost on both sides; buyers' and sellers'. On the buyers' side, these are primarily used to compare and select between alternative products on the market. On the sellers' or manufacturers' side, these are used to announce or introduce the new products to the market and to give detailed technical information about products. On the other hand, e-commerce potential between suppliers and contractors, and supply chains between manufacturers is fueling the rapid growth of the Internet in the construction industry.

The major sign of this conclusion is the increasing number of web sites and online databases that belong to building materials manufacturers, suppliers, representative companies and the firms that deal with AEC matters in countries where Internet services are recently developing.

Currently, hundreds of web sites serve to AEC community in order to present building materials information all around the world. Some of them are just individual web sites belong to companies and institutions, giving detailed or broad definitions and scanned brochures of building materials. Some of them are product selectors, providing all of the information about building materials via a search engine. The structure of a web site depends on the factors such as, the facilities and financial support of the company or institution that maintains it, user requirements, user profiles, capacity, scale and characteristics of the construction industry they serve, etc.

In order to evaluate the structure of the web sites that present building materials information on the World Wide Web environment, the authors of this paper carried out a study. (TAS Et Al., 1999) During the research of "the web sites and online databases" that serves to AEC industry, 88 web sites of 27 countries were examined. Since every country might have problems of its own with different solutions to those problems, web sites belong to different countries were intentionally evaluated. From five different countries, 10 web sites totally devoted to building materials selection were examined in detail. These web sites were analyzed as a system on conceptual basis according to four major components:

- General information,
- Product profile,
- Services and
- Communication facilities and web links.

Then, components of the system and relationship between them were defined. A synthesis was carried out according to these definitions. It is concluded that:

- Ease of use, in other words being user friendly,
- Finding information quickly,
- Product classification system in which the building materials classified,
- Having a fast search engine and a comprehensive database,
- Information density, quality and actuality,
- Having services like technical specification data, etc.
- Other services and communication facilities besides online services are the key factors for a successful web site in the field of building materials information.

In this paper, it is aimed to determine the content that should be taken into consideration in the planning phase of a web site, which would be used as an online information source in the field of building materials for Turkish construction industry. The structure of the web sites examined before will be the building block of the web site. Before going through further, it is necessary to review the characteristics of the Turkish construction industry.

## 6. THE CHARACTERISTICS OF THE TURKISH CONSTRUCTION INDUSTRY

Turkish economy has been affected adversely by the world slowdown. Respectively Russian and emerging-market crisis were the main reasons in the recession of Turkish construction industry last year. The collapse of Russian market in 1998 affected negatively Turkish contractors working in Russia and Central Asian republics. The effects of the crisis are gradually diminishing with the help of measures taken by the Turkish government. Indicators are the production growth in manufacturing industry related to construction such as building materials, furniture and banking sectors.

Most of the newly built housing units in Turkey are flats as the urbanization process continues to concentrate the people in the country's largest cities, thus increasing the need for housing in and around these big Turkish cities. Already there is a need about 500,000 housing units, and the need is getting bigger and bigger due to the population growth of 1.200.000 every year. Therefore, considerable amount of financial support need to be transferred to Turkish construction industry both from inadequate public and private sector sources not only for housing projects, but also for commercial, office building and civil engineering projects.

On the other hand, when we look at the foreign capital operating in Turkey, it seems that there is a long way to reach the end of the tunnel. *The Treasury Undersecretary* published the data that shows "sectoral distribution of foreign capital companies" operating in Turkey. In construction services sector, there are 143 firms, with present foreign capital of nearly US\$ 12.5 million operating in Turkey. This is just the 0.87 % of the total foreign capital. It shows that Turkish construction industry suffers from restricted investment.

Moreover, high inflation rate is the other factor, which affects the Turkish construction industry seriously. When we consider the "1999 Wholesale Price Index" data published monthly by the *Istanbul Chamber of Commerce*, rate of change over the same month of the previous year on building materials is 62.8 %. Average annual rate of change by month is 45.2 %. In the group of building materials cement, lime, timber, iron beam, nail and glass prices are observed monthly. Figure 1 shows that the building materials' prices increase parallel with the wholesale price month by month. On the other hand, according to the data published by *The State Institute of Statistics*, "Building Construction Cost Index" increased 56 % and "Building Materials Cost Index" increased 48.1 % in 1999.

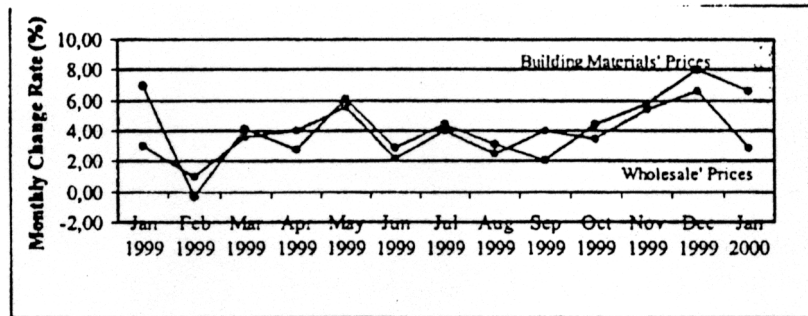


Figure 1- Monthly change rate of building materials' and wholesale prices in Turkey.

Due to the high inflation rate building materials prices changes every month and indices need to be updated. It is crucial for a contractor being informed of the latest market prices, in order not to face with unforeseen negative cash flow movements on the contracts. On the client's side, it is very important to have the current market prices in order to calculate the total building cost accurately.

The construction industry is a critical one especially for developing countries like Turkey. There is a big potential for construction activities associated with both expanding population requirements and economic reforms. Growth in construction industry needs financial investment and creates many opportunities and employment. However, it also causes many problems like high inflation and lost opportunities in the other sectors.

## 7. BUILDING MATERIALS INFORMATION SOURCES IN THE TURKISH CONSTRUCTION INDUSTRY

Currently, there are numerous manufacturing companies serving to decision makers to introduce their building materials both on printed and electronic format in Turkey. Taking the advantage of storage capacity and versatility CD-ROMs are the most preferred ones. In addition, directories and catalog files which organized, indexed and bound collection of manufacturers' catalogs prepared by public and private sector companies are the other decision-making sources for design and construction professionals. However, not all of these sources are enough to compare, evaluate and select the building materials as a whole. It would be clear when we examine the major information sources of Turkish construction industry in the field of building materials.

### 7.1 <http://www.yem.net>

This is a web site being prepared in the field of building materials, application and services by YAPI ENDUSTRI MERKEZI (THE BUILDING INDUSTRY CENTER), namely YEM. It is just under construction. There is no data about building materials on the web site yet. YEM is a private sector information center providing services to all users of building materials, including companies engaged in the production of goods and services, professionals, executives, architects, engineers and contractors. The Center forms a common platform between manufacturers and users and organizes sectoral fairs, publishes technical journals and periodicals, provides professional information, organizes technical journals and periodicals, provides professional information, organizes technical trips, meetings and symposium. "The Turkish Building Catalogue" is published biennially by YEM both in Turkish and in English since 1973. The five volumes catalogue consists of 426 manufacturers' products form Turkey and abroad. Furthermore, the catalogue is also



displayed in CD-ROM. YEM also publishes "*The Dekora Catalogue*" contains products and services relating to interior decoration and design, "*Installations & Electro Technique Catalogue*" and "*Turkey in the CIS Market Catalogue*" biennially.

**7.2 <http://www.uby.com.tr>**

This web site is prepared by UB&Y DIS TICARET (UB&Y FOREIGN TRADE LIMITED). The company publishes building materials catalogues on CD-ROMs and technical periodicals since 1987. The web site contains summaries of topics and selected articles from periodical "*Insaat & Malzeme*" (The Construction & Materials), a technical magazine in the field of building materials and their applications. On the web site current market prices of some building materials, such as steel, cement, ready mixed concrete, timber, brick, glass are listed as well.

**7.3 <http://www.bi.net.tr/BasinAjans/index.html>**

This web site is prepared by BASIN TANITIM DANISMANLIK (PRESS PROMOTION CONSULTANTS LIMITED). The company organizes, publishes and distributes sectoral catalogues with the collaborations of related chambers of commerce. Companies in the online catalogue are indexed on sectoral basis. Companies can be listed alphabetically or on the sectoral basis. There is a search engine working on product name, company name and sector name basis. In the database, there are only company names, detailed addresses, telephone and facsimile numbers, e-mail addresses, and links to web sites of the building materials manufacturers'. Addresses and telephone numbers of the representatives of the participant companies are available on the web site as well.

**7.4 <http://www.inssaat-yapi.gen.tr/>**

This web site is a service of *Turkish Chambers of Civil Engineers* and it is prepared and published with the contribution of OMNI LIMITED. This is the online version of the "*Building and Construction Turkey*" catalogue, which is published both on paper since 1970 and on CD-ROM. There are 8000 companies in the catalogue indexed on main activities, such as project planning and technical consultancy, floor coverings, kitchen equipments etc. User can make a search following main activity list and activity details list of companies. It is possible to search the nearest supplier company along with the cities in Turkey. At the end of the search, the user can find general information about companies, detailed addresses, telephone and facsimile numbers, brand names and if available images of products, e-mail addresses, and links to web sites of the companies. The major difference of the web site among others is the link between products and the code definitions and numbers of "*Building Operation Unit Prices*" declared by *The Ministry of Public Works and Resettlement*. These code definitions and numbers are used in public sector contracts. It is possible to search a product using these code definitions and numbers as keywords. There are notes for quality standards approved by *Turkish Standardization Institute* (TSEK) for some products as well.

**7.5 <http://www.yapkat.com/>**

This is the one and only building materials catalogue, which is classified using an international system, CI/SfB. The "*Building Materials Catalogue*" is prepared and published annually by *Turkish Chambers of Architects* Istanbul Branch since 1999. The online version of the catalogue is under construction. It contains 450 companies. User can find company names, detailed addresses, telephone and facsimile numbers, e-mail addresses, links to web sites, products and services of the building materials manufacturers' by following CI/SfB codes found on main page. There is a search engine working on keyword basis. It will be possible to find technical information, CAD drawings, prices and marketing conditions of some of the products and services in the near future on the web site. Furthermore, there is a

short list of "Building Operation Unit Prices for 1999" declared by "*The Ministry of Public Works and Resettlement*" on the web site.

Almost all of the sources mentioned above, whether on paper or electronic media consist of scanned data sheets and brochures of manufacturers, classified in terms of the companies' experiences, except the last one. One of them is based on an international classification system. Some of them are published biennially. Thus, it is not practical and out-of-dated for dynamic and rapidly changing Turkish construction industry. Web site contents and links are very poor. Most of them are under construction. Though it is very important, current market prices of building materials are not included, except the list of "Building Operation Unit Prices".

Finally, it is clear that, Turkey does not have a comprehensive and up-to-date source in the field of building materials information yet as we see in Europe and USA etc.

In order to establish a building materials information system that will serve to Turkish construction industry, a research project was started by the authors of the paper. The aims of the research project were:

- Gathering all available data in the field of building materials in a single database,
- Classifying and processing data into information,
- Presenting information to facilitate the preliminary design phase by providing the alternative building materials with their current price lists to decision makers,
- Providing detailed information about the application of the building materials,
- Updating the database continuously to reflect the new products and suppliers,
- At the end of the research project, building a web site that will support the decision makers in the field of building materials.

Currently, the preparation and data definition phases are finished. Currently, data collection studies are going on. On the other hand, the research team is working on building a web site mentioned above. The content of the web site on conceptual basis is the major subject that the team works on at present.

## **8. THE CONTENT OF AN IDEAL WEB SITE**

Physical design of the web site, in other words being a web site whether text based or graphical based, frames on pages and their properties are not the subject of this paper. Although appearance of a web site is very important for users, one should first focus on "*the content*" of the site in the planning phase. In general, the scope of the web site forms the content. Whether as an information center or a product selector the content of a web site should be:

- Comprehensive,
- Accurate,
- Up-to-date,
- Accessible at any time.

When we consider the structure of the sites on the World Wide Web examined before, it can be said that the content should comprise the whole technical and the other related information about building materials the decision makers looks for. In general, the web site should consist of:

- Product and company information of the building materials,
- Other services and communication facilities,
- Links to construction parties on both public and private sector.

We will discuss these heading according to the characteristics of Turkish construction industry in detail, recalling the content of the information sources available in the market.

### **8.1 Product and company information**

Product information consists of brand name, product data sheets, technical data sheets, other information sheets, images of products, current market prices for standard applications of the building materials, marketing and sale conditions, packaging and shipment information, application guidelines for users written by experienced professionals, videos of application and usage of product, CAD drawings, documents about quality standards, etc. Product information can be enhanced regarding to the structure of the web site. If it will work as an information center, only general information about products, some images and a web link to manufacturers or suppliers' web site can be enough. However, if the web site will work as a product selector, the content should be comprehensive enough to satisfy the user requirements.

Company information consists of company names, company logo, detailed addresses, telephone and facsimile numbers, e-mail addresses of the authorized personnel, a link to manufacturers or suppliers' web site, a brief products and services list, a reference list about company's previous works, certifications given to the company, etc.

All the information regarding building materials should be classified by means of a building product classification system, e.g. CSI MasterFormat, CI/SfB. A classification system is not only needed to classify building products and services but also to have a well-organized web site structure and navigation. Using an international classification system increases comprehension and makes the web site as a worldwide information center.

Product classification system chosen previously would form the search engine service. Product name, brand name, company name, and keywords used in descriptions of materials could be the major fields to help the user in seeking database. A regional search would help the user to locate the nearest manufacturer or supplier.

When we consider the characteristics of Turkish construction industry, the content of the web site would have some differences from the others. Some of them are:

#### **8.1.1 Building materials unit prices**

In Turkey, "*The Ministry of Public Works and Resettlement*" declares annually on January 1 "Building Materials Current Prices" and "Building Operation Unit Prices" that will be applicable for public sector contracts. Due to high inflation rate, these unit prices become out of date at the end of the first month. Conversely, building materials unit prices used on private sector contracts are determined on market and these are normally higher from the unit prices used on public sector.

Therefore, there should be two different unit price fields, one for public sector, the other one for private sector contracts. Furthermore, it is crucial to update unit prices on the database monthly, at least quarterly depending on an index.

#### **8.1.2 Product Classification System**

Since no product classification system is accepted and widely used throughout the country, it is essential to establish a product classification system in common with a working group consists of authorities, representatives of construction parties on both private and public sector. Then, the adaptation process of the new product classification system with the

international ones, such as MASTERFORMAT or UNISIB, should be done. Instead, selecting and adapting an international product classification system for Turkish construction industry would lessen the work. This would help the integration of the Turkish construction industry with the other countries.

In other words, the web site should have a product classification system that would be applicable for the all-geographic regions in Turkey and integrated with the world.

#### 8.1.3 Quality Standards

Building materials manufacturing is constantly growing in Turkey. Turkey is the leading country in cement production in Europe, the second in glass and the fourth in ceramic sanitary equipment. Nearly all of the building materials used in construction activities are manufactured in Turkey and some of them are exported. Although, most of the manufacturers have international quality standard certificates, there are also building materials which are manufactured environmentally unfriendly and do not have any quality standards.

Since the unit prices of those materials are cheap, the people who live in suburb prefer them. The urbanization process continues to concentrate the people in the country's largest cities. Most of the people who move from rural area to the largest cities are from low-income group. Therefore, construction activities concentrate on the suburbs, causing illegal settlement and uncontrolled building operations with the help of building materials that have no quality standards certifications.

Then, one of the advantages of the web site would be concentrating the decision makers to the importance of using building materials that have quality standards certifications. In other words, the web site should have only the building products that have quality standards certifications given by the *Turkish Standardization Institute (TSEK)*.

#### 8.2 Other services and communication facilities

As an online building materials information center the web site should have other services and communication facilities in order to establish and develop relationships between construction parties. A list of services that could be given by the web site serving as an online information center in the field of building materials is:

- Published building materials catalogues on paper,
- Building materials catalogues on CD-ROM,
- Information via floppy diskettes and electronic mail,
- Annual directories about architects, engineers, contractors, suppliers,
- Electronic magazines including technical articles and papers about building materials,
- Download facilities providing online demos and brief information about shareware or freeware software, and software ordering utilities on the subject of building materials,
- User registration, membership service,
- Interactive discussion forum about construction related subjects,
- Chat rooms about construction related subjects,
- Newsgroups about construction related subjects,
- Message center supporting the services of interactive discussion forum and newsgroups,
- Press releases containing the most current articles from newspapers and periodicals in the field,
- Free newsletters keeping the subscribers up-to-date about the latest product innovations and enhancement,
- Event calendar for symposiums, congresses and exhibitions,
- Frequently asked questions on applications of building materials, unit prices, etc.,

- Web page design and host service for manufacturers or suppliers,
- Free e-mail service for members,
- Store and bookstore,
- Online building materials ordering utilities,
- Permanent, temporary, traveling or virtual building product exhibitions.

Published building materials catalogues on both paper and CD-ROMs, and information on floppy diskettes are the common services given by examined Turkish web sites in the field of building materials. There is no other service, which helps to meet the user requirements in the field of building materials, though most of them are necessary for being an information center.

### **8.3 Links to construction parties on both public and private sector.**

Web links should provide direct links to related web sites to obtain extensive information such as:

- Environmental resources,
- Governmental agencies,
- Boards, Commissions and Committees,
- Associations,
- Bookstores,
- Constructors, trades, project managers,
- Architects, civil engineers,
- Councils,
- AEC institutes and foundations,
- Real estate companies,
- Construction consultants,
- Tender firms,
- Financial institutes, banks and firms,
- CAD drawing libraries,
- Electronic magazines,
- Architecture, construction and education institutions,
- National advisory organizations.

It is observed that web links are very poor by now. However, it should be remembered that most of the web sites, which serve to Turkish construction industry, are under construction.

### **CONCLUSION**

As one of the "Emerging 20" countries and a candidate of the European Community, Turkey is working hard to apply new technologies in order to take place in the global information society. "Think global and put into practice local" can be used as a keyword for those kinds of countries. The Internet is standing as a great tool for the adaptation and integration process of Turkey into the international markets. However, many structural works should be done to adapt new technologies on the industries, such as construction industry.

Authors of the paper examined online information sources for construction industry in the field of building materials in order to determine the content of an ideal web site for Turkish construction industry. Available online sources in Turkish construction industry were evaluated as well. Then, the findings from the World Wide Web were used as the building blocks of the ideal web site content for Turkish construction industry.

It is pointed out that a web site should consist of product and company information about building materials available on the market, other services and communication facilities, and links to construction parties on both public and private sector. However, it is noted that the web site structure should be evaluated by taking into consideration the characteristics of the construction industry. It is clear that each country has different problems with different solutions.

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