

A SURVEY OF THE USE OF IT IN BUILDING PRODUCT INFORMATION ACQUISITION IN TURKEY

SUBMITTED: November 2006

REVISED: April 2007

PUBLISHED: May 2007 at <http://itcon.org/2007/22/>

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SUMMARY: *A survey about the current and planned use of information technology (IT) and its impact on the construction industry in Turkey has been conducted so as to help in the choice of acquiring building products. The survey was applied to two groups. The first group is the supply side (manufacturers) that produces or imports building products in Turkey, and the second group is the demand side (architects) that chooses building products. The characteristics and importance of these products when giving information and the criteria for choosing building products are evaluated. With the help of the survey, the methods and reasons for giving and receiving building product information in Turkey for both sides have been demonstrated. It was found that the current level of usage and the future expectations for building product information system have newly become widespread in Turkey. Although, as the designer of the project architects are very effective, they have to use different methods, and work hard to get the information. As information systems are not used effectively, it is difficult not only to reach the information, but also to reach it up-to-date, correctly and timely. As a result, the development of building product information systems, which collect all data in a single source, classify and transform it by recording and processing it, and then distributing it in detail and on time is said to be an important step to solve many problems in this field.*

KEYWORDS: *information technology, construction industry, building product, survey, Turkey.*

1. INTRODUCTION

Today, technology has been improving at a very rapid rate, and this speed has been accelerating day by day. Now it is easier to reach information and share it. Of course, not being lost in so much information is as important as assessing it. In all these developments, we come face to face with some systems that arrange information flow while providing coordination and ease of accessibility. These systems are referred to as information systems. We can separate these systems into software and hardware. Thus, information technology is a software and hardware system that accommodates information necessity.

As projects become more extensive and complicated, it is imperative to use information technology. In all industries and production activities IT usage is very common. We can see its applications in nearly all industries. One of which is the construction industry.

1.1 Background

In this industry, various usages of IT can be seen. First of all is the use of computers and software such as Computer-Aided Design (CAD), 3D Modeling, Computer-Aided Facility Management, project planning and programming software, scheduling, costing and budgeting programs. The second place it can be seen is in communications such as access of internet, web portals, shared databases and distribution of documents in digital format. By using these, time, paper and cost savings are gained and project progress speed is increased.

Several studies have been conducted to demonstrate the use of IT in the construction industry. A survey was made as an IT-barometer to ascertain its use in the construction industry in Scandinavia (Howard et al., 1998). The survey was repeated as an IT-barometer in 2000 to determine the use of IT in the Nordic construction

industry (Samuelson, 2002). The aim of these studies was to create a method and perform a survey for measuring the use of information technologies in the construction industry. These surveys were carried out in 2000 in Sweden and in 2001 in Denmark and Finland. Knowledge about access to computers, software and equipment, use of computers and software, communications, effects and strategies were gathered from the surveys. Advantages and disadvantages of IT were put forward by comparing the survey results from 2000 and 1998. Then, the results from the comparison between the countries were presented. A survey in Canada was developed from the IT-barometer and conducted in order to see the current and planned use of IT and its impact on architecture, engineering and construction (AEC) industry (Rivard, 2000). Results of the survey were presented including topics such as computer availability, computer usage, computer-aided drafting, networks and communications.

A similar study was made in the US construction industry about e-business implementation (Issa et al., 2003). The study focused on determining the level of adoption of e-business within project management systems by general contractors. In the scope of the survey, e-business, e-procurement, e-marketplace and their practices in the US construction industry were researched. Another study emphasized internet usage and the potential impact of e-commerce on information intermediation services in the construction industry (Finne, 2003). A series of case studies was made on the use of IT in the Canadian construction industry (Rivard et al., 2004). Architects, engineers, general contractors and owners were included in the scope of the study. Eleven construction projects were selected so as to define the practices and benefits of information technologies. Several types of technologies such as 3D, CAD, custom web sites, commercial web portals and in-house software development were found to be used in the projects.

The importance of IT in the Turkish construction industry is also emphasized by presenting different kinds of information systems. One of these is a study that aims to design a conceptual framework and develop a computerized model for recording, organizing and delivering information efficiently in order to provide effective management functions. The outcome of this study is a computer-based information system called ASAP – Automation System for Architectural Practices – that was developed to respond to the stated problem of large architectural offices (Kanoglu and Arditi, 2001). This system was developed in order to help to manage the information flow among the participants who face serious management-related problems in the design process because of a lack of an efficient information system. Another similar information system model, MITOS – Multi-phase Integrated Automation System – was designed for design/build firms (Kanoglu, 2003). An experience-based computational model was used for the estimation of the duration of construction projects, and the performance results were discussed. MITOS was developed in response to the need expressed by a large, well-established Turkish design/build firm that undertakes projects in cooperation with international partners. It is a performance-based duration estimation model integrated with an automation system model and a comprehensive model that attempts to solve the integration problem in design/build organizations.

1.2 The Use of IT in Building Product Information

All of the studies were conducted to determine the use of information technologies, benefits and obstacles. As can be seen from the studies, information technology is widespread in different parts of the construction industry. As one of the most important parts of construction activities, the building product sector has been growing parallel to the technological developments in the construction industry. Although it can be seen that there are various usages of IT in construction activities, it is not like that when gathering building product information. While internet accessing and electronic source usage is quite common in the building product information sector, these technologies have not been used sufficiently. Building product information has generally gained in paper form; e.g. brochures, catalogues, etc.

However, experts predict that electronic dissemination of product information will become dominant over the paper medium within the next few years. Various researches have been made to improve the information flow and facilitate product selection from e-catalogues (Jain and Augenbroe, 2000). The research provided an analysis of the process involved in product searches and selection. Existing e-catalogues, searching methods and their limitations were examined and researched both on the supply side (manufacturers) and the demand side (design firms). Approaches and methodologies for product selection from e-catalogues were studied. Finally, an alternate approach for developing e-catalogues for the construction industry has been described as *The Performance Approach* (Jain and Augenbroe, 2003).

An inquiry was made into building product information acquisition and processing by architects and building owners in Austria (Mahdavi et al., 2004). Architects' and building owners' building product information acquisition and processing habits were investigated. The result of the study showed that there are considerable differences between the two groups with respect to information needs and usages. However, it can be seen that both architects and building owners prefer paper-based product information and personal conversations over electronic media sources (internet and CD-ROMs). Another result is that catalogues and brochures are still the dominant source of information for both architects and building owners.

2. THE TURKISH CONSTRUCTION INDUSTRY

Recently, it has become very important that the field of building products gradually develop in terms of the number of products that have been presented and the opportunity for users to choose. However, the fact that many types of building products are displayed together makes the architect, who plays an effective role in the decision making, have a much more responsible role. In addition there are lots of sources which transfer the necessary information about choosing materials; manufacturers have to put much effort and deal with much expenditure to inform users about the products they have been making. Nevertheless, it is not easy to reach this up-to-date, necessary information correctly and efficiently for the architect as a decision maker.

There is need for an information system which helps the decision makers and users in the acquisition of building products information in Turkey. Data about materials need to be collected in a single source, transforming the data as information by recording and processing it, then using the gained information. In order to satisfy this need, a research project, "*Design of a Building Material Information System on a Relational Data-Based Structure in the Context of Turkey (BMIS)*" has been conducted by the Construction Management and Cost Research Center in Istanbul Technical University. In the progress of the research various studies made in order to determine manufacturers' criteria and methods of informing users; in addition, architects' criteria and methods in reaching correct, sufficient, functional, up-to-date information and choosing the products conscientiously are noted. One of these studies is a survey conducted on a large scale around Turkey in order to determine the applied methods and frequency of usage in presenting and receiving building product information, their characteristics and importance and the interest and point of view in building product information systems, which is mostly used abroad, but newly in Turkey. All data gained from the survey are evaluated and used for the progressive model of the research project *BMIS*. This survey is conducted with the support of the "*Building Information Centre*"* which is a member of the *International Union of Building Centres (UICB)* and is an extensive information center for building products. The centre forms a common platform between producers and users, and organizes fairs, publishes technical journals and periodicals, provides professional information, organizes technical trips, meetings and symposiums.

2.1 Supply Side: Manufacturers

2.1.1 Approach

The survey's first group is the supply side and its presentation of building product information:

- to determine applied methods and frequency of usage,
- to determine characteristics and importance of products in presenting information,
- to determine interest and usage level of information systems, which gives an opportunity to the people who play roles in the construction industry to get all information from a single source.

2.1.2 Hypothesis

Firms that produce or import building products give really great importance to building product presentation. Nevertheless, they prefer printed and visual methods when giving information about their products. They mostly give product information by using building product catalogues, presentation brochures, local fairs, field publications and newspaper/review advertisements. Most large scale firms have their own web sites. However, these web sites and methods which they have been using mostly have the purpose of advertisement and do not contain much technical information. Technical product information can only be gained by firm visits of marketing staff or presentation demos and seminars as far as it is demanded.

* www.yem.net

The current building product information systems in Turkey are formed by collecting printed data – building product catalogues and presentation brochures – and transforming them into electronic media sources. Therefore, firms consider the current building product information systems in Turkey as limited studies in terms of comparison with international ones. As a result, it has been thought that firms want to take part in an extensive BMIS, be developed in the future which collects all data in a single source.

2.1.3 Method

The survey is applied to the supply side, which produces or imports building products. The manufacturers have contributed to the “*Istanbul Building Fair*” which is arranged through “*The Building Information Centre*”. All well-known and large scale firms that produce or import building products around Turkey contribute to the fair which is considered to be the most important construction fair in Turkey. The interviews were conducted face-to-face and one-on-one with authorized people. The target population of the survey was 207. However, the number of firms that are evaluated is 203, 4 of them are not included. They were not evaluated because it is thought they had not answered questions correctly. The questionnaire is divided into 3 groups:

- The first group concerns the presentation of the firm. It aims to give information about the size of the firm and the building products that are produced or imported.
- The second group concerns the firm’s criteria and methods of disseminating information about its products. With these questions, it was also asked as to whether this information satisfied demand side’s requirements about getting building product information. For this reason, some questions were asked about the budget for the presentation studies and the sales level earned from presentation methods.
- The last group is about the frequency of existing usage and dimensions of interest of the building product information system.

2.1.3 Results

2.1.3.1 Information about the Firm

The number of staff has been placed into 5 main groups (Fig. 1). At the end of the evaluation it is seen that the largest group has 11 to 50 staff with 37.4%. The firms have a balanced dispersion as there are enough numbers to represent each group.

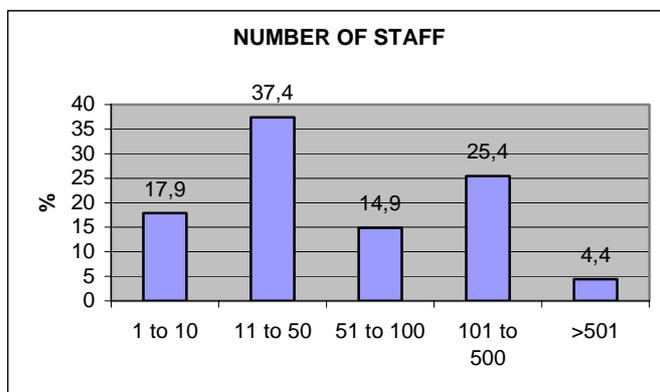


FIG. 1: Number of staff working in the firms

Firms show rather extensive dispersion about the time that they have been working in the building product field. For this reason, firms are put into definite groups in terms of the time they have been working. At the end of the evaluation, it is seen that 2 to 11 and 12 to 21 years are the most common groups (Fig. 2).

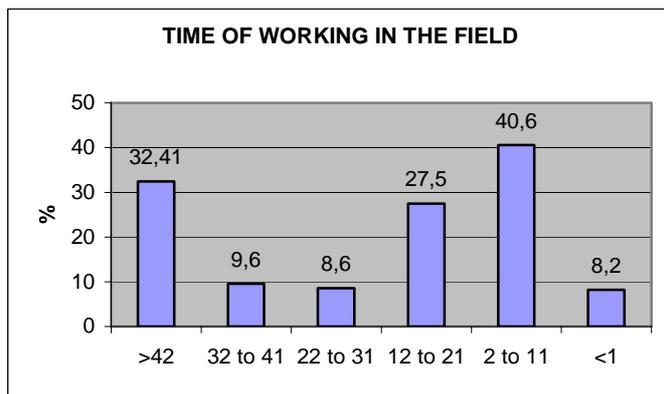


FIG. 2: Dispersion of time that firm's working

When analyzed about their products, firms that import products come in first. The second one is firms which produce locally and the third one is firms that either produce or import (Table 1).

TABLE 1: The building products of firms

PRODUCT OF FIRMS	
Imported	38.0%
Local production	32.0%
Local production+imported	21.1%
Local production under foreign patent	04.3%
Local production+foreign patent, local production+imported	02.3%
Local production+foreign patent, local production	01.3%
Foreign patent, local production+imported	01.0%
TOTAL	100%

2.1.3.2 Methods About Giving Product Information

In this part of the survey, characteristics, importance, frequency of usage and methods of giving information about products are determined. These questions are also asked to the demand side in order to compare the two sides about the methods of gaining building product information and the frequency of usage. The table can be found in the following parts.

- The Dispersion of Presentation Budget / Ratio of Product Sale in Terms of Methods of Giving Building Product Information:

TABLE 2: Supply sides' methods/amount of budget- in giving building product information

METHODS OF GIVING PRODUCT INFORMATION	AMOUNT FOR PRESENTATION BUDGET (%)	RATIO OF SALES AFFECTED (%)
Local fairs	28.32	24.50
Presentation brochures	20.30	18.37
Firm visits of marketing staff	15.82	24.42
Building product catalogues	07.12	06.73
Field publications	06.71	05.55
Newspaper/review advertisements	05.45	04.18
Firm web sites	04.32	03.51
Foreign fairs	04.05	03.45
Presentation demos and seminars	03.73	04.56
TV+radio advertisements	01.35	01.64
Billboards/posters	00.97	00.83
Sponsorship	00.90	00.58
Advertisements on other web sites	00.50	00.39
Other	00.46	01.25

In this part, the budget amount for the presentation and the sales level earned after this presentation are queried in terms of searching the supply side methods in giving building product information and whether this information can be an answer for the demand side. The average of answers can be seen in Table 2. According to the answers the most effective method is considered to be marketing staff who visit firms and architects for presenting their products. The reason is that the ratio of sales affected by this method is the highest with respect to the ratio of the amount for presentation budget.

2.1.3.3 The Success of Building Product Information System as a Method of Product Presentation

The supply side was asked whether they considered the internet a successful method. The aim of this question is to understand the difference between the budget amount for presentation on the internet and the ratio of sales affected by it. Although there is a negative difference between them, 80% of the supply side stated that they consider the internet a successful method for product presentation (Fig. 3). They explained that it is caused by the increase of internet usage all over the world and consider the internet the presentation method of the future. 2.6% said it was partly successful and 17.6% that it was not. They explained that few people in Turkey use this information technology, and there has not been enough research on this subject.

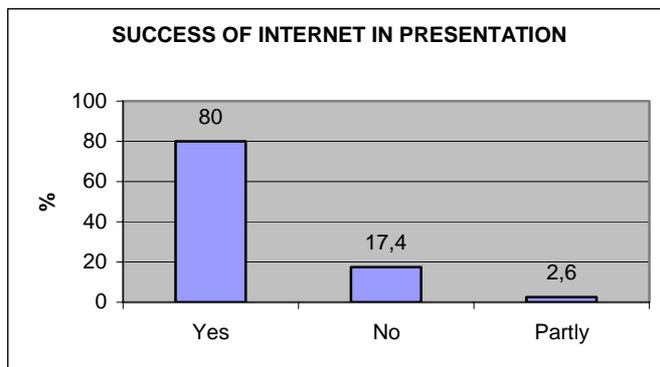


FIG. 3: Success of internet in presentation of building products

Fig. 4 shows that 57.5% of the supply side benefit from information technology when choosing products. 36.1% do not benefit and 6.4% sometimes benefit. They explained that they do not or sometimes use this technology; as studies about this subject are new, everyone does not have a computer and the usage of computers is not widespread in Turkey. They also added that this technology is not used much in the building product field, and the product has to be addressed visually to the user.

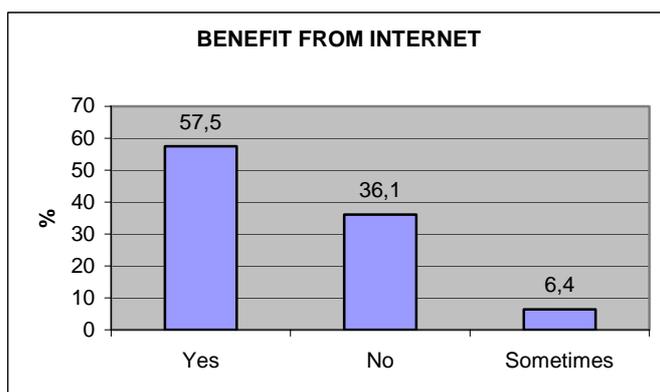


FIG. 4: Benefit from internet for choosing building products

The supply side indicated that 91% think using IT to give information is beneficial, also they think this technology is very useful and the future's presentation method. The factor given for the reason that IT is preferred for product presentation is that it is easily accessed, fast, complete, up-to-date, reliable and economical. 9% of them said they do not use this technology because the studies about it are too new, this technology is not used much in the field, not everyone has a computer, the usage of computers is not widespread in Turkey, the product has to address visually to the user and it does not assist in sales as rivals are on the same web site with the same products.

2.2. Demand Side: Architects

2.2.1 Approach

The second part of the survey was applied to the architects who are the main decision makers. This part of the survey is to determine how architects conscientiously choose building product information, which is really related with the sub-processes of the design phase; as a correct, sufficient, functional and up-to-date form. Thus, the survey aims to determine:

- architects' methods,
- the criteria when choosing a product,
- a point of view about the reliability and level of acquired information,
- the level of usage and expectations about building product information systems which gives and opportunity to gain all information from a single source.

2.2.2 Hypothesis

Architects are the main decision makers in terms of choosing building products in the building construction process. They mostly reach printed or visual building product information has the purpose of advertisement. This information mostly does not contain sufficient technical information. Moreover, they cannot get information on the expected level and in time. They have to make complicated studies, which costs them extra effort and time, in order to reach correct and up-to-date information quickly.

In today's conditions they prefer to use printed and visual methods. When choosing building products, they consider the performance of the materials, the aesthetic characteristics and cost criteria. They hesitate to depend on the reliability and up-to-dateness of acquired product information. It was thought that the internet has been widely used by architects for the acquisition of product information, but they generally use foreign web sites because the number of Turkish web sites is not enough. As a result, an extensive BMIS, be developed in the future which collects all data in a single source can be a solution in order to help the demand side.

2.2.3 Method

The second survey was given to participants of the fair arranged by the "*Building Information Centre*". Questionnaires were filled out individually and sent in. The target of the survey was 233. However, 39 were not used because the respondents were not architects. 194 of questionnaires were evaluated. Questions are gathered in 3 groups:

- The first group is the introductory questions which aim to get information about the architect who participated in the survey. It includes the architect's age, field of work, period of job experience and information of the firm where the architect works.
- The second group is about the criteria and methods when choosing a product and level of acquired information.
- The last group aims to determine the level of using building product information systems in the progress of choosing a product and the interest of the architect.

2.2.3 Results

2.2.3.1 Information About the Architect

Architects who participated in the survey are put into 7 groups according to their ages with respect to the relationship between age and tendency of internet usage. If the participants are considered by age, 74% are under the age of 50 (Fig. 5). It can be said that this group has much more tendency for computer and internet usage. The largest group that participated in the survey consists of the firms that conduct both design and built activities (Fig. 6).

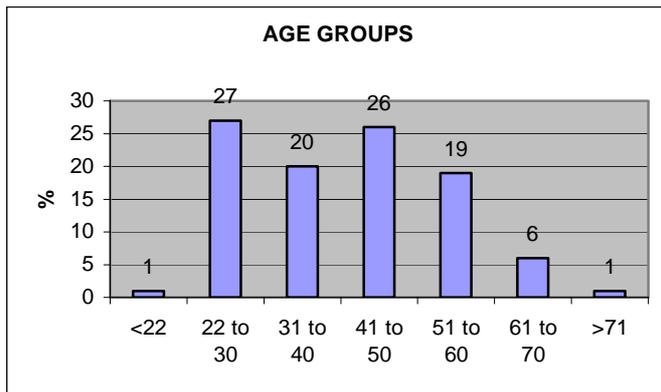


FIG. 5: Age groups of architects

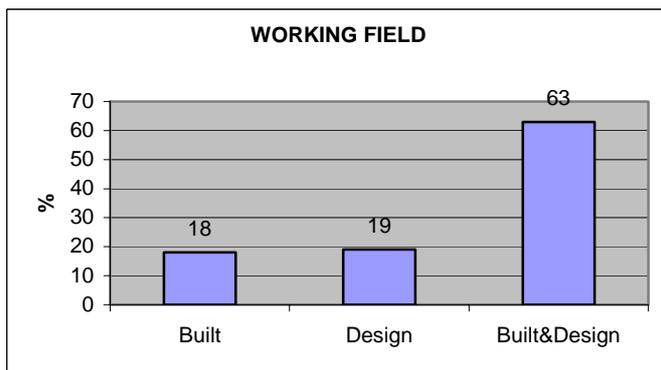


FIG. 6: Working fields of architects

2.2.3.2 Methods About Gaining Building Product Information

Characteristics, importance, frequency of usage and methods of giving or receiving information about building products are determined by the questions asked to the supply side and are evaluated along with the demand sides' answers. The figure with the evaluations is shown in the last part of the article.

- Architect's Effect in Choosing a Product and Sources of Reaching Building Product Information.

The answers about the effect of architects in choosing a product are analyzed in Fig. 7; 36% think that the architect is the only person who affects the choice of products. The majority thinks that there are other factors and people who affect choice. Thus, it can be said that architects play a big role in choosing products.

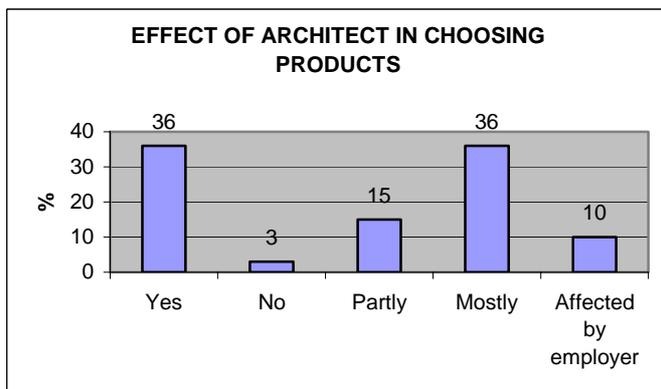


FIG. 7: Effect of architects in choosing building products

- Sufficiency of Information about Product Performance:

In Fig. 8, 58% of the architects state that they get sufficient information about product performance by benefiting from methods of giving building product information.

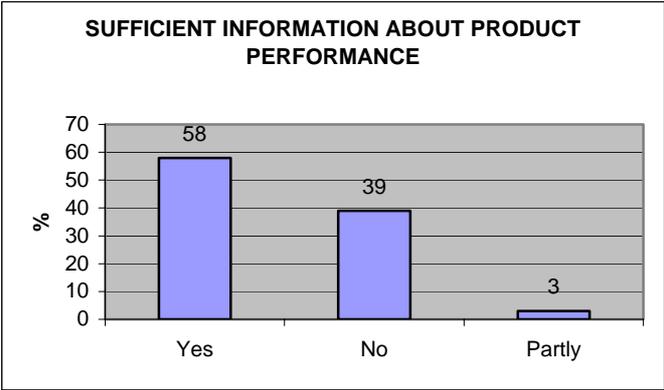


FIG. 8: Reaching sufficient information about building product performance

64% of the participants indicated that they rely on information from brochures, advertisements and presentations that are prepared by manufacturers. Architects, who say that they do not rely or partly rely, explained this situation by stating that they have to as there is no other choice; they rely by testing and trying them or they rely only on the information given by known and high-quality manufacturers. The results are shown in Fig. 9.

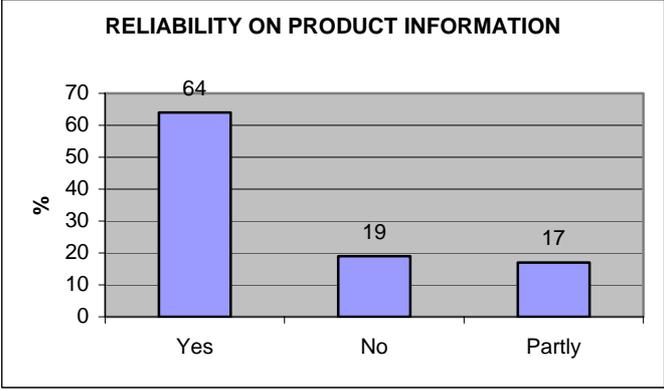


FIG. 9: Reliability of the information given about building products

2.2.3.3 Gaining Product Information by Using Building Product Information Systems

As it is shown in Fig. 10, 59% of the architects' state that they research building products by using information systems; but those not finding these web sites sufficient is 55% (Fig. 11).

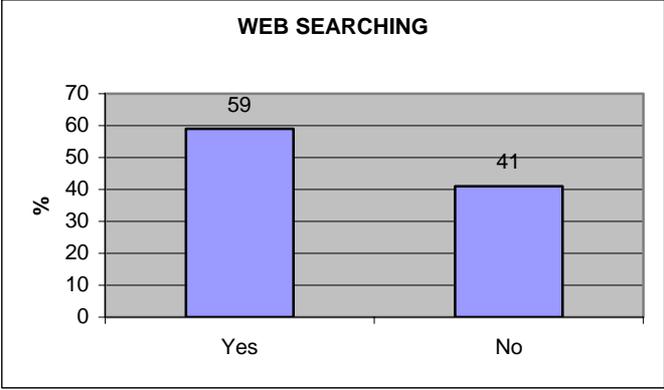


FIG. 10: Web searching on building product information

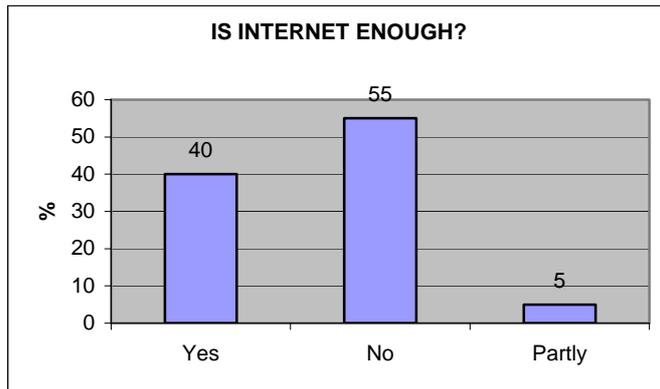


FIG. 11: If internet is enough for building product information

2.3 Comparison between Supply Side and Demand Side about the Methods and Criteria in Building Product Information

Supply side's methods in giving product information and demand side's methods in receiving it has been determined by asking different questions in this survey. The methods about giving and getting this information are evaluated together with their frequency of usage on a scale from 1 to 5 as in Table 3.

TABLE 3: Comparison between supply side and demand side about the methods in giving/gaining - building product information and usage frequency

GIVING/GAINING METHODS OF PRODUCT INFORMATION	SUPPLY SIDE	DEMAND SIDE
MOST	-Presentation brochures -Firm visits of marketing staff -Local fairs	
OFTEN	-Firm web sites -Building product catalogues	-Building product catalogues -Presentation brochures
GENERALLY	-Field publications -Presentation demos and seminars	-Colleague advices -Showroom visits -Meeting with firm representatives -Source books -Field publications -Firm web sites -Press advertisements
SOMETIMES	-Newspaper/review advertisements -Foreign fairs	-Presentation demos and seminars -Billboards/posters
RARELY	-Advertisements on web sites -Sponsorship -Billboards/ posters -Press advertisements -Mailing/ specification -Promotion -Presentations on vehicles -Firm periodicals	-Foreign fairs -International reviews -Distribution of samples -Presentation CDs -Professional support from the firm when asked

The characteristics and importance of building products when giving information and the criteria about choosing them are evaluated together with their grades of importance on a scale from 1 to 5 and are shown in Table 4.

TABLE 4: Comparison between supply side and demand side about the criteria in giving/choosing building product information and usage frequency

CRITERIONS IN GIVING/CHOOSING PRODUCT INFORMATION	SUPPLY SIDE	DEMAND SIDE
MOST	-Performance -Firm opportunities (delivery on time, service-repair etc.) -Ease of application -Aesthetic characteristics	-Appropriateness of standards -Performance
OFTEN	-Availability in inventory -Appropriateness of standards	-Firm opportunities (delivery on time, service-repair etc.) -Easily procured -Ease of application -Aesthetic characteristics -Cost -Own experiences and habits
GENERALLY	-Cost -Being imported -Being just known	-Being local
SOMETIMES	-Being local	-Being just known -Being imported
RARELY	-Being guaranteed -Ease of usage -Having international certificate of quality -Safety, reliability, quality -Being a family company -Credit opportunities to users	

As seen in the tables, the supply side uses lots of different methods and works very hard in order to give information about their products. As a result, architects who play an important role in choosing building products; use all these resources for gaining building product information. However, it can be shown from these figures, the supply side's methods about giving information and the demand side's methods of receiving it can be different according to the frequency of usage of methods and the importance given to the information.

The supply side, which produces or imports products, prefers printed and visual methods such as presentation brochures, firm visits of marketing staff, local fairs, firm web sites and building product catalogues. For product presentation, they prefer using firm web sites to using building product information systems, where they acquire all information in a single source. In addition to this, they emphasize firm opportunities, product performances, aesthetic characteristics and ease of application of products.

Furthermore, the demand side pays much more attention to the usage of building product catalogues. The architects generally use local catalogues and rarely foreign ones. They mostly follow local fairs and stated that they can reach the expected information in these fairs by contacting firm authorities individually. Presentation brochures are also mostly preferred by architects. They pay much more attention to the performance and appropriateness of standards of products. They stated that the information about building products is reliable but not sufficient. Building product information systems have widespread use by architects. As Turkish web sites are not sufficient in both content and number, foreign web sites are generally used.

3. CONCLUSION

With the help of the survey, the case for building product information in Turkey has been put forward and the accuracy of the hypothesis has been tested. The behavior of both the supply side and the demand side about giving and receiving this information has been determined. The methods of the supply side and the frequency of usage of giving information and their characteristics and their importance have been determined. Whether information from the supply side can answer to the expectations of the demand side has been determined by researching the amount for presentation budgets and the ratio of sales. Supply side's behavior in giving building product information and demand side's methods of getting information, the frequency of usage, criteria and their

importance are queried. The current level of usage and future expectations about building product information systems, which are becoming widespread in Turkey have been determined.

If it is evaluated with respect to the hypothesis, the supply side which produces or imports building products in Turkey:

- pays attention to the product presentation and prefers printed and visual methods,
- mostly thinks that methods that are applied for presentation really affect product sales,
- generally has their own web sites; but these web sites mostly have the purpose of advertising and do not contain much technical information,
- does not use information technology effectively; however they consider the product presentation with using this technology really successful as they can be reached fast and easily and
- considers the current building product information systems in Turkey as limited studies in comparison with international ones and wants to take a part in an extensive BMIS to be developed in the future.

The same evaluation can also be made for the demand side which in Turkey:

- is the main decision makers in terms of choosing building products in the building construction process,
- cannot reach building product information on the expected level and in time and has to make serious studies in order to reach correct and up-to-date information quickly,
- prefers to use printed and visual methods,
- pays much more attention to the performance and appropriateness of standards of products when choosing building products,
- considers the information reliable but not sufficient and
- has been widely using the internet for the acquisition of product information; but generally uses foreign web sites because of the fact that the number of Turkish web sites is not enough.

Although these determinations confirm the hypothesis for the supply side, they do not completely confirm it for demand side. All determinations gained from the survey are evaluated and used for the progressive model of the research project “*Design of a Building Material Information System on a Relational Data-Based Structure in the Context of Turkey (BMIS)*”. This building product information system can be an answer several problems, such as:

- ease of use,
- quick access to information,
- obtaining of to standard information,
- information quality,
- reliable and up-to-date information,
- a fast search and query mechanism,
- a clear classification system,
- technical information service,
- online service,
- supplementary communication services,
- up-to-date price lists,
- a relational database,
- comparison and connection of international classification systems (e.g. MasterFormat, CI/SfB) with Turkish ones.

The development of building product information systems, which collect all data in a single source, classify and transform it by recording and processing it, and then distributing it in detail and on time is said to be an important step in solving many problems in this field. Having equal importance with the given and received information between the supply side and the demand side can be provided by more usage of building product information systems.

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