THERMAL COMFORT EVALUATION IN INTELLIGENT BUILDINGS; CASE STUDY IN DARÜŞŞAFAKA RESIDENCE

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ABSTRACT

THERMAL COMFORT EVALUATION IN INTELLIGENT BUILDINGS; CASE STUDY IN DARÜŞŞAFAKA RESIDENCE

Building performance evaluation studies has been an important research area in recent years. Technologic developments, increasing demands of users, complexity of buildings, increasing energy consumption in complex buildings and economic factors force designers to find new solutions. There are several studies in literature using building evaluation techniques to suggest standard values for comfort conditions. Intelligent buildings, that have purpose to fulfill comfort conditions effectively while minimizing energy consumption, take an important part in performance evaluation studies.

The main objective of this study is evaluating the indoor thermal comfort conditions in a selected building, in terms of thermal comfort requirements. An Intelligent building; Darüşşafaka Residence selected as a case building. The research aims to reach the refined and precise knowledge about thermal comfort requirements. Complex structures and intelligent buildings are often preferred in building evaluation studies. In this study the research field is a residential building, a kind of dormitory for old people over the age of 65. Thermal comfort evaluation of the building has been conducted in two ways namely objective analysis and subjective analysis. Objective analysis includes field measurements of variables that affect thermal comfort. Measurements done by specific equipment called data logger. Subjective data analysis acquired by occupant's ideas with interviews. Quantitative data obtained from the objective analysis supported by the qualitative data acquired from individuals. Thus, the results of thermal comfort conditions are interpreted with respect to various thermal sensations of old people. Using both objective and subjective results permitted to evaluate the thermal perception of users.

ÖZET

AKILLI BİNALARDA ISIL KONFOR DEĞERLENDİRMESİ; DARÜŞŞAFAKA REZİDANS

Bina performansını değerlendirmeye yönelik çalışmalar son yıllarda önemli bir çalışma alanı olmuştur. Teknolojik gelişmeler, sürekli artan kulllanıcı istekleri, gelişen ve karmaşık fonksiyonları üstlenen gelişmiş yapıların ortaya çıkması, bu değişimlere bağlı olarak artan enerji ihtiyacı ve bunun yanısıra ekonomik faktörler bina tasarımcılarının etkili ve yeni çözümler geliştirmesini zorunlu kılmaktadır. Bina performansını değerlendirmeye ve bu sayede geliştirmeye olanak sağlayan çalışmalar, konfor kavramının son yıllarda önem kazanması ile bina yapım sürecinde yer alan aktörler tarafından da önemle ihtiyaç duyulur hale gelmiştir. Literatür çalışmaları incelendiğinde de bu alandaki çalışmaların arttığı görülmektedir.

Bu çalışmada, seçilen örnek bir binada, çevresel koşulların ısıl konfor kavramı altında incelenmesi amaçlanmaktadır. Akıllı bina otomasyon sistemlerinin uygulandığı nitelikli bir yapı olarak Darüşşafaka Urla Rezidans, çalışmanın inceleme alanı olarak seçilmiştir. Çalışmanın amacı doğru ve nitelikli bilgiye ulaşmanın yanı sıra bu bilgiyi güncel uygulamaların kullanımına sunabilmektir. Bina performansını değerlendirmeye yönelik çalışmalarda akıllı binalar ve karmaşık işlevlere sahip ofis binaları sıklıkla tercih edilen yapılar arasındadır. Ülkemizde örneklerine nadir olarak rastlanan bu tip yapılar genelde ofis binaları ve ticari binalardır. Darüşşafaka rezidans, gerek kullanıcıları tarafından konut niteliğinde kullanılmakta olan özel yaşam alanı olması, gerek kullanıcıların 65 yaş üstü özel bir grubu temsil etmesi bakımından önem taşımakta ve çalışma bu alandaki çalışmalara farklı bir uygulama örneği üzerinden veri sağlama olanağı sunmaktadır. Isıl konfor ölçümü çalışmaları iki temel yöntem ile gerçekleştirilmiştir. Birincisi termal konforu etkileyen değişkenlerin ölçümünü içeren ve sayısal verilerin elde edilmesini sağlayan nesnel araştırma yöntemi, ikincisi ise ortam koşullarını kullanıcı algısı üzerinden değerlendirmeyi sağlayan öznel yöntemdir. Öznel yöntemde açık uçlu sorularla oluşturulmuş mülakat yöntemi kullanılmıştır.

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CHAPTER 1

INTRODUCTION

In this chapter are presented the general idea and framework of the study. Arguments are explained in relation to previous researches about similar subjects. Objectives are mentioned as primary and secondary objectives. The procedure of the study is explained in the next part, and finally the contents of the study were briefly explained under disposition.

1.1. Argument

Comfort may generally defined as that condition of mind which expresses satisfaction with the environment with regards to the five elemental parameters, namely, thermal, acoustical, visual, indoor air and spatial (Wong and Jan, 2002). The appearance of intelligent buildings at the end of the 20th century has been with the purpose of meeting these parameters effectively while minimizing energy consumption. However, the performance in practice of high-tech automation systems are yet a topic which is being analyzing by academic studies.

The present study aimed to contribute to this research field by an environmental evaluation study which was done in an intelligent building. An intelligent building, Darüşşafaka Residence, selected as a case building. The research field was both a living area and a kind of dormitory for old people over the age 65. So, the results taken from this analysis was specialized for this type of buildings and various thermal sensations of old people. Through this study both objective and subjective field evaluations were constructed.

Evaluating building performance has been an important research area in recent years. There are several studies utilizing building evaluation techniques to suggest standard values for comfort conditions (Wong and Jan, 2002). Thermal comfort is one of the main characteristics of a building. Researchers work on thermal physiological models in order to achieve a better understanding of thermal preconditions offered in spaces. User satisfaction within a building is largely determined by the quality of the

thermal indoor climate. This implies that designers should have directions at their disposal that give them an insight into people's expectations of indoor climate (Doukas et al. 2006).

Applying total building performance studies on buildings, can improve 'quality of life' which is defined as occupant satisfaction, health and productivity; also, can reduce energy consumption in the buildings (Baird et al. 1996).

The emphasis of the use of artificial conditioning technology for comfort becomes widespread especially in developed countries. Technological developments, increasing demands of users, complexity of buildings, increasing energy consumption in complex buildings and economic factors force the designers to find new solutions. Intelligent buildings occur in building industry in order to meet these requirements (Ochoa and Capeluto, 2008). Intelligent buildings have the ability to adapt themselves to the varying conditions and to control their environment. These buildings should work without interference when the data of expected conditions and requirements loaded. In order to reach the definition of that expected comfort conditions, imputing the correct data has a significant importance (Zağpus, 2002). Achieving comfort conditions while minimizing energy consumption is the aim of constructing intelligent buildings (Ochoa and Capeluto, 2008).

Comfort conditions influence humans by both psychologically and physiologically. There is no precise and definite method to state what kind of thermal environmental condition and how it will affect comfort sensations of a human. It is difficult to specify a single physical quantity for evaluating human comfort. Individuals have different needs at different times and therefore one size fits all approaches may be rejected by occupants (Fanger, 1970). One of the main characteristics of a building is its thermal indoor climate. The indoor climate should support the activities of people within the buildings. There are lists with recommended indoor temperatures until 1970's. And still, many researchers are working on thermal-physiological models in order to achieve a better understanding of the thermal preconditions offered in living places. Even though several dynamic models existed, the model of Fanger was mainly used in the construction industry as it was convenient in practice (Linden et.al. 2002).

In order to devote to the advancement of indoor-environment-control technology in the heating, ventilation, and air conditioning (HVAC) industry, two basic standards and guidelines were in use, one is the ASHRAE Standard 55, while the other is ISO 7730. ASHRAE Standard 55 presents the thermal environmental conditions for human

occupancy. On the other hand, human thermal comfort is defined by ASHRAE as the state of mind that expresses satisfaction with the surrounding environment. The existing Thermal Comfort Standard EN ISO 7730 is proposed and supported by a document that explains the requirement and scope of the proposed standard. It describes the PMV and PPD indices and specifies acceptable conditions for thermal comfort. The indices are exactly stated as described by Fanger (ASHRAE, 2003; Olesen and Parsons, 2002). In order to define such comfort conditions in existing buildings and compare them according to above standards and guidelines, building evaluation techniques should be developed.

In view of these requirements, building performance evaluation has been well established as a concept in recent years. People need to get commercial, organizational, operational knowledge, and make successful decisions about their environments and buildings, and operations within buildings. In that sense, total building performance studies can be seen as a whole building approach and process to determine and evaluate the values in buildings. One of the benefits of such studies is the increased user satisfaction. Others are improved productivity, effective management and design decision making and high returns on investment in buildings (Baird et al. 1996)

There has been a growing interest among architects and building contractors to product intelligent buildings. The evaluations for an intelligent building are important to represent the high tech automated systems performance in practice. Through this study it is expected to investigate the effectiveness of this intelligent system by the observational and interview methods through user's perspective, by measurements through standards and guidelines. Users have possibility to control indoor conditions. Evaluating the level of the satisfaction will give a conclusion to the designers about the success of the system.

1.2. Objectives

Objectives of this study were formulated under the purpose of developing an evaluation method that may be used for future researchers to determine thermal comfort levels in intelligent buildings and user preferences for elderly. There were two main objectives defined; one being the primary and the other being the secondary.

The two primary objectives were:

a. to refine precise knowledge about thermal comfort requirements in intelligent buildings, then,
b. to give it back to the system to provide a feedback mechanism between designer and user,
c. to obtain knowledge about elderly people's opinions and their preferences about their thermal environment
d. To evoke awareness among researchers about the thermal comfort conditions in intelligent buildings and user opinions' evaluations in thermal comfort studies in the field of architecture.

The secondary objectives of the study were:

a. to discover intelligent buildings' and thermal comfort issues, together with building performance evaluation techniques,
b. to perform a walkthrough survey for making observations in the case building,
c. to perform field measurements in order to determine quantified values for temperature, humidity and lighting levels,
d. to determine users' opinions and preferences by preparing an unstructured interview with open-ended questions,
e. To explore the building performance in terms of both objective and subjective findings.

1.3. Procedure

This thesis aimed to reach a conclusion by determining thermal comfort conditions in an intelligent building under the light of field measurements and their comparison by general standards and norms. It also aimed to reach a conclusion about users' preferences for their thermal environment. Prior to doing so the study was carried out in five phases:

In the first, a general survey of intelligent buildings, thermal comfort issues and building evaluation techniques was conducted. Design principles of intelligent building and several parameters affecting thermal comfort conditions were obtained and presented.

In the second, a field study was planned in an intelligent building which belongs to Darüşşafaka in Urla, Izmir, to measure such thermal comfort parameters,

temperature, humidity and lighting levels by data loggers and to conduct an interview with users, namely elderly people living in this dormitory. All architectural drawings of the building were obtained from the Directory of Darüşşafaka Residence. A walk-through survey was conducted also to make observations. This part of the study was called as Objective Study.

In the third, after the survey, the collected data was combined with the weather data obtained from Weather Station in the Department of Architecture in Izmir Institute of Technology. All data was recorded and arranged according to each measurement day.

In the fourth, the measured and collected data was arranged by graphical representation to make comparisons among parameters and according to certain thermal comfort design standards.

In the fifth, an unstructured interview with open-ended questions was constructed and a total of 9 elderly was participated to these interviews. These were done in participants' rooms. As two of them were couples, seven rooms together with three common areas, restaurants, lobby and tea saloon, were the subject areas. This part of the study was called as Subjective Study.

In the sixth, several tables were constructed to evaluate findings from interview questions; and regression analyses were used to determine correlations between outdoor temperature and indoor temperatures; indoor temperatures and lighting intensity; indoor temperatures and humidity. Such analyses were carried out by the assistance of the Microsoft Word and Excel.

1.4. Disposition

This report is composed of five chapters, of which the first one is the 'Introduction.' In this chapter, the definition of comfort conditions, their validity and importance in intelligent buildings are explained firstly. Then the emphasis of technological improvements in intelligent buildings to satisfy comfort conditions is mentioned. Several standards and design guidelines for thermal comfort of humans are introduced. Buildings evaluation techniques are focused to be familiar of several techniques. The argument consisting of these above issues are followed by the objectives of the study and the steps of the procedure.

In the second chapter, which is the 'Literature Survey,' general aspects of intelligent buildings and benefits are identified at first hand. In this chapter definition of intelligent buildings is covered first and then definitions of thermal comfort parameters and how to evaluate such conditions are clarified briefly. Finally, building evaluation techniques in general were analyzed and an example of intelligent buildings was presented in terms of their comfort condition as a selected methodology.

In the third chapter which is named 'Material and Method', the objective study and the interview model construction as subjective study are explained. Firstly the case office building is described and the materials (areas such as rooms, suites, restaurant, and lobby and tea salon) for the field measurements are clarified. Then the general information about interview techniques for various studies is defined. At the end of this chapter the interview questions for this study is presented.

In the fourth chapter the results and discussions of the study is displayed. The results of field measurements are given by several graphical representations and tables; and interview answers for each participant are mentioned by the assistance of the tables. At the discussions part accuracy of the results are interpreted.

In the last chapter, namely the 'Conclusion,' is presented the concluding remarks of survey and model and wider issues are also discussed.

CHAPTER 2

LITERATURE SURVEY

In this chapter, a survey of literature about building performance that comprises its definition and tendency on its recent use in architectural studies is presented. Methods of building performance analysis are then clarified. Following sections include general information about intelligent buildings, their design principles and general concepts. Thermal comfort concept is introduced with general principles and selected research methods used to evaluate thermal comfort. This chapter concludes with several standards and norms to express thermal comfort models.

2.1. Building Performance

Building performance is defined as "The behavior in service of a construction as a whole or of the building components" in annual book of ASTM Standards. Total Building Performance studies, on the other hand, is the recognized as the whole building approach and process to determine and evaluate the all values in buildings (Wong and Jan, 2003). Building performance evaluation has been well established as a concept in recent years. People intend to get commercial, organizational, operational, and design intelligence and also make successful decisions about buildings and operations within buildings (Baird et al. 1996).

2.1.1. The Tendency on Building Performance Analysis in Recent Years

Total Building Performance is a comprehensive use of both objective and subjective field evaluations in all performance areas. It serves to understand the critical balance needed to simultaneously ensure all building performance mandates (Wong and Jan, 2003). According to National Climate Change Committee, its analysis consists of five broad categories. In the first, building performance mandates include indoor air

quality, acoustical quality, visual quality, thermal comfort quality, spatial quality, energy and building integrity. In the second, functional requirements resemble the fitness for use in terms of supportiveness, responsiveness and effectiveness. In the third, aesthetics means the impression of building and interior space considerations. In the forth, these should be maintainability meaning that ease of maintenance and the associated cost. In the fifth, cost consideration involves cost density, social cost (i.e. relationship between building and immediate environment), revenue and market value (Wong and Jan, 2003).

Due to intense commercial competition, rapidly developing information technology, changing user expectations, and increasing need for ecologic sustainability, it is essential to make the right decisions about our buildings (Baird et.al., 1996). Building performance evaluation provides to deliver benefits for building owners, managers and occupants. The benefits can be ordered as; better matching demand and supply, improved productivity within the workplace, minimizing the occupancy costs, increased user satisfaction, effective management and design decision making, higher returns on investment in buildings and people.

2.1.2. Emergence of Intelligent Buildings

Advances in buildings system technology have led to the widespread development of Intelligent Buildings. Intelligent Buildings are the ones that use technology to automate the operation of building systems. These building systems work in order to enhance the safety, efficiency, and comfort of occupants. Intelligent Buildings utilize technology to monitor facility systems and make any necessary adjustments. The goal of an Intelligent Building is using computers and software to control lighting, alarm systems, HVAC (heating, ventilation, air-conditioning), and other systems through a single computer interface (BOMI, 2007).

Intelligent buildings are those composed of smart devices to maintain the optimal indoor environment. They are intelligent since they should be aware of what is happening at the surrounding; they should give decisions to maintain a comfortable environment in the most efficient way; and they should be responsive to occupants' needs. An intelligent building contains building automation systems to respond to exterior conditions such as climatic, fire, and security protection. The system

simultaneously senses, controls and monitors the indoor environment. It obtains and stores data as a means of building performance. It uses a central computer system to fulfill this function (Atkin, 1988).

As the emergence of these buildings was rapid and their notion is related with a large group of business in the world market, there is an increasing demand for such technological buildings. Although several systems such as HVAC, lighting, power, elevators, and security systems are applied in recent buildings, they are not integrated well for the benefit of users. Some integrated ones have not been functioning properly due to occupants' interference. They are mostly for local comfort conditions. Utilizing the sensors to obtain environmental conditions, local controllers are used for varying demands according to responses of the occupants. This should result in lower energy consumption and wastage (Atkin, 1988).

However it is difficult to define a universal standard of an Intelligent Building, there are some common characteristics that most Intelligent Buildings share. In general, such abilities are expected from Intelligent Buildings :

- An intelligient building should have ability to control major building systems. The basic function requested from an Intelligent Building is to control the major building systems that impact safety, efficiency, and occupant comfort. Those systems include HVAC, fire and life safety systems, alarms, access control, or any other system recognized as critical for facility operation.
- Intelligient building should coordinate the actions between multiple systems.There must be an ability to control multiple systems in concert to achieve a single, coordinated action.
- An Intelligent Building should be able to manage systems according to both preset and variable schedules, environmental conditions, and emergency events.
- Intelligient building systems should supply communication and report opportunity. These systems are able to generate customized, detailed information and reports using modern connectivity practices (BOMI, 2007).

The design and construction of modern buildings should adapt themselves according to varying demands of their occupants. Thus, designers should be aware of these buildings for future implications of such controlled environments.

2.1.3. Methods Used in Building Performance Analysis

Building evaluation is the systematic assessment of building performance relative to defined objectives and requirements. It is important to define "Whose requirements should be considered when assessing?" The users of the building are either the providers (owners) or occupants (tenants, visitors). When proposing a method to evaluate the building's performance, a fundamental decision is necessary whether to assess according to owners' requirements or occupants' requirements (Baird et.al., 1996). There are several tools frequently used in building performance evaluation studies. Some of them are; r*equirements analysis*, simulation, subjective evaluation (use of people to evaluate performance), walkthrough measurements, questionnaire, interview(obtaining verbal descriptions of users' responses to a facility), behavior mapping, checklists, instrumental measurements (the general use of instruments for measuring building and facility performance), environmental measurements (quantitative information on spatial and sensory aspects of the building and its internal environment), climatic monitoring (instrumentation can be used to record temperature, humidity, direct sunshine, and diffuse solar radiation, wind, rain) etc.

2.1.4. Qualitative Research Methods

This section includes the general description of qualitative study, methods of subjective study, and three versions of interview data which are applicable in building performance analyses. Structure and the purpose of the subjective data were explained. Most common data gathering instruments were introduced in terms of subjective data. Strong and weak aspects of these tools were discussed.

2.1.4.1. Qualitative Study

Research is defined as a process of collecting, analyzing, evaluating and reporting the data, in order to find reliable solutions to the problems in a planned and systematic manner. Most common research method in natural sciences is quantitative method. But human behaviors should be studied with a flexible and holistic approach.

In these approaches experiments and opinions of the individuals are very important. The knowledge obtained by quantitative method gave us data about number of people which has been in the same manner but not the reasons of their attitudes. It is difficult to explain human behaviors with numbers. Perceptions and events are exhibited in a realistic and holistic manner in their natural environment. Qualitative study intends to investigate and explain the cases in their respective surrounding areas (Silverman, 2001).

> Quantitative information allows a more precise and specific performance evaluation. However, some factors are not amenable or are less appropriate for quantitative analysis and informed judgment is required. Qualitative information tends to be subjective, and quantitative information is commonly taken to be objective. However, qualitative factors can be introduced into apparently rigorous measurements by both the choice of what is measured and how measurements are interpreted. But the distinction is never entirely clear cut. Ideally, qualitative and subjective information should be complementary and in agreement with quantitative and objective information. If the two forms of knowledge are in disagreement, then the subjective evaluations should be listened (Baird et al. 1996).

Differences between quantitative methods and qualitative methods are summarized as follows;

In quantitative method variables can be identified with clear boundaries and the relationship between variables are measurable. In quantitative approach variables are intertwined and it is difficult to measure relationship between them. In quantitative approach, researchers look at events and facts and develop an objective attitude. In qualitative approach, the researchers closely follow the events and the facts, and then behave in a participatory manner. Qualitative research method is different from quantitative research due to its purpose of doing depth descriptions instead of doing generalizations. In qualitative researches the data are portrayed in all the depth and richness instead of being reduced to quantitative indicator (Altındağ, 2005).

Qualitative and quantitative research methods are settled on two different paradigms. It would be wrong to compare these two paradigms, by the way defining the one as good and the other as bad. Each one has its own strengths and weaknesses. Therefore, these two research methods must be considered as mutually complementary methods (Yıldırım and Şimşek, 2000).

As will be mentioned in following sections, thermal comfort evaluations include basically individual factors. That's why this research required a qualitative study.

Literature cites several methods such as interviews, document analyses, observations which may be used in a qualitative research method.

2.1.4.2. Methods of Subjective Study

There are two main methods which are frequently used in subjective studies namely, questionnaire and interview.

Questionnaire survey is a method to collect data which can be used to take information on almost any aspects of participant's attitudes, behaviors, beliefs or experiences. The questionnaire is a basic research tool of social science which is capable to be adapted to the demands of almost all research topics. This method is preferred when it is intended to reach a large number of people. The approaches which should be done about the research topic at the beginning of the review are of great importance. Questions should be prepared initially, then it will be possible to decide whether it is the most accurate method to collect necessary information or not (Dyer, 1995).

An attitude scale is a rather specialized version of the questionnaire. It is used where the intention is to measure the strength with which one or more attitudes are held. Questionnaires with evaluation scales are often preferred in researches because of their reliability, ease of execution and capability to adapt to statistical analysis. There are several ways to reach respondents such as post-mail, telephone and internet. Besides, face to face meetings can be used to answer the questions. By this way it will be possible to explain the issues when respondents are disabling to understand. Answering rate can be increased and misunderstandings are prevented. However this can cause some unwilling situations. Researcher can be router to the respondents and affect their answers with his/her subjective perceptions. When the intent is to reach large numbers in questionnaire studies in order to obtain availability of the statistical data, face to face meetings are not preferred. If the survey includes a large domain, the costs per respondents would be high (Marshall, 2005).

Interview method is the most widely employed method in qualitative researches. Ethnography involves substantial amount of interviewing and this factor undoubtedly contributes to the wide spread use of the interview by qualitative researchers. Besides, flexibility of the interview makes it preferable and usable in several researches.

Interviewing, the transcription of interviews and the analysis of transcripts are very time consuming. Three types of interview are structured, semi structured and unstructured interviews. The term qualitative interview is often used to capture semi structured and unstructured interviews. Structured interviews are considered in terms of quantitative studies. However, structured interviews in some cases can also be used as a qualitative research methodology (Kvale, 2009).

a. Structured Interview is known as standardized interview. It is the one associated with quantitative research. They are considered as researcher administered survey. In quantitative research the approach is structured to maximize the reliability and validity of measurement of key concepts. It is also more structured because the researcher has a clearly specified set of research questions that are to be investigated. The structured interview is designed to answer these questions (Kvale, 2009).

In structured interviewing, interviewees are ordered to follow research schedule or a guide which has been designated by researcher. Interviewers are limited and cannot depart from the guide or the schedule which has been prepared before. Researchers cannot change the order of the questions and even vary the wording of the questions. The questions are generally answered within the same context. Structured interviews are typically inflexible because of the need to standardize the way in which each interviewee is dealt with (Kvale, 2009).

Structured interviews can also be used as a qualitative research methodology in some ways. These types of interviews are available for engaging in respondent or focus group studies. These studies are beneficial to compare participant responses in order to answer a research question (Kvale, 2009).

b.Unstructured Interviews provide insight into what the interviewee thinks as relevant and important. In this type of interview questions can be changed or adapted to meet the respondent's intelligence, understanding or beliefs. The process of listening in the individuals is of great importance. Un-structured interview does not offer limited, pre-determined answers for respondent to choose. Researchers use a brief set of prompts to him/her to deal with a certain range of topics. It is possible to conduct interview with a single question that the interviewer asks and the interviewee is then allowed to respond freely. There is an emphasis on greater generality in the formulation of initial research ideas and on interviewees own perspectives (Kvale, 2009).

c. Semi-structured interviews have a list of questions or fairly specific topics to be covered. Questions were often asked by referring to an interview guide. Interview guides help researchers to focus on the topics at hand without constraining them to a particular format. It is generally beneficial for interviewers to have an interview guide prepared, which is an informal "grouping of topics and questions that the interviewer can ask in different ways for different participants" (Lindlof and Taylor, 2002). Nevertheless, the interviewee has a great deal of flexibility in the way of answering the questions. Questions may not follow up the order that outlined on the schedule.

Semi structured interview allows new questions to be brought up during the interview as a result of what the interviewee says. Questions that are not included in the guide may be asked as they pick up on things said by interviewers. However, interviewer generally has a framework of themes to be explored. At the end all of the questions should be asked and a similar wording from interviewee to interviewee. If the researcher is beginning the investigation with a clear focus, rather than a general research topic, semi structured interviews would be preferable in these cases. By this way it is possible to address more specific issues (Kvale, 2009).

2.2. Thermal Comfort

This section comprises literature studies which deal with necessary conditions for optimal thermal environments. This part has three subsections. Firstly, Terms of Thermal Comfort includes the definition of thermal comfort and other terms that are related with thermal comfort concept. These terms are introduced in order to clarify the principles for the establishment of a detailed thermal analysis of any environment. Secondly, Thermal Comfort is explained under six parameters including four physical variables namely; air temperature, air velocity, mean radiant temperature, and relative humidity, and two personal variables clothing insulation and activity level. This section concludes with thermal comfort requirements. These are quantified by equations and comfort indices. Fanger's commonly used thermal comfort model called Predicted Mean Vote (PMV) is explained in terms of theoretical thermal models. International Standards that allow quantifying the preferred conditions are presented at the end.

2.2.1 General Terms for Thermal Comfort

Artificial Climate is a term which was derived from the growing mechanization and industrialization of society. So many people spend the greatest part of their lives (often more than 95%) in an artificial climate (Fanger, 1970). With respect to technological improvements, an increasing interest occurred to create artificial climates which are now a topic of thermal comfort. American Meteorological Society defines artificial climate as "Climate created or modified by human activity; usually used to refer to conditions in an enclosed space, not global or local external conditions" (Glossary of Atmospheric Terms, 1999). The aim is to create thermal environment which is well adapted so that each individual is in thermal comfort condition. However, it is well known that "no thermal environment can satisfy everybody". If a group of people is subject to the same room climate, it will not be possible, due to biological variances, to satisfy everyone at the same time (Fanger, 1970). So, Fanger (1970) recommends creating optimal thermal comfort for the group, i.e., a condition in which the highest possible percentage of the group is in thermal comfort.

Thermal Neutrality is one of the components of thermal comfort which helps to explain individual comfort. Thermal neutrality for a person is the defined as the condition in which the subject would prefer neither warmer nor cooler surroundings (Fanger, 1970). In order to maintain a balance between the heat produced by metabolism and the heat lost from the body, the human body employs physiological processes. Maintaining this heat balance is the first condition for achieving a neutral thermal sensation (Charles, 2003). The human body considered as a thermodynamic system produces mechanical work and low temperature heat using food and oxygen as inputs. This system requires in healthy conditions to maintain a constant internal temperature around 37 + 0.5ºC, heat generation of the body must be equal to the rate of heat loss from it to keep temperature constant. The job of our thermoregulatory system is to maintain the heat balance that is a fundamental condition for survival and necessary for comfort. On the other hand skin temperature is not constant, and it varies according to the part of the body and the air temperature; the absolute maximum and the minimum values, however, are 45 and +4ºC (Butera, 1998).

Thermal Indoor Climate is one of the main characteristics of a building. The indoor climate should optimally support the activities of the people within the building (Linden, et al. 2002). Fanger (1970) defines indoor climate as the collective whole of the physical properties in a room which influence a person via his heat loss and respiration. This definition includes also non-thermal factors.

As Linden et al. (2002) expressed 'Whether or not users are satisfied with a building is largely determined by the quality of the thermal indoor climate. This implies that designers should have directions at their disposal that give them an insight into people's expectations of the indoor climate. These directions should use a performance indicator that is not only valid and testable, but is also easy to use in the dialogue with building end-users and clients' (Linden, et al. 2002).

2.2.2. Thermal Comfort Parameters

Thermal comfort is defined as that condition of mind which expresses satisfaction with the thermal environment and is assessed by subjective evaluation (ASHRAE 55-2003). It is difficult to specify a single physical quantity for evaluating human comfort. However, Thermal comfort parameters can be determined by six variables that are classified in two major groups:

A. *Individual factors*
   - *Activity level*
   - *Clothing Insulation*

B. *Environmental factors*
   - *Air temperature*
   - *Mean Radiant Temperature,*
   - *Relative Humidity*
   - *Air Speed*

In order to form a knowledge and consciousness about thermal comfort concept, terms of environmental thermal comfort will be defined in this part of the study.

Air temperature is the average temperature of the air surrounding an occupant. The average is with respect to location and time (ASHRAE Standard 55-2004). Felt air temperature is the measurement of how hot or cold something is, although the most immediate way in which we can measure it is by feeling it. It is a quantitative measure

in degrees of Celsius that indicates the amount of heat the human body loses outdoors in a given time and place. The factors contributing to the felt air temperature are air humidity, density, and the speed of wind at five feet from the ground where the average human face is (BBC, 2009). Mercury thermometer, a thermo couple or an electrical resistor sensor (including a thermostat) can be used to measure air temperature. The sensor will register the temperature between air temperatures and mean radiant temperature when placed in a room (Fanger, 1970).

Mean radiant temperature is simply the area weighted mean temperature of all the objects surrounding the body. Radiant temperature is usually measured with a globe thermometer. ASHRAE (2004) defines mean radiant temperature as the uniform surface temperature of an imaginary black enclosure in which an occupant would exchange the same amount of radiant heat as in the actual no uniform space. All objects give off radiation by electromagnetic waves due to their temperature. If a body is hotter than its surroundings it emits more radiation than it absorbs, and tends to cool, and the reverse is valid. It will eventually come to thermal equilibrium with its surrounding when absorption and emission of radiation are equal (Halliday, et al. 2003). Mean radiant temperature refers to shape of the human body and is difficult to measure precisely. There are several methods to measure mean radiant temperature. One method is to measure surface temperature of ceilings, walls and floors with thermocouples or with a thermo radiometer and then calculates the mean radiant temperature at the different locations by the use of the angle factor diagrams. On the other hand, obtaining the globe temperature, the air temperature and the air velocity, the mean radiant temperature can be calculated (Fanger, 1970).

Relative Humidity (RH) is the ratio of the partial pressure (or density) of the water vapor in the air to the saturation pressure (or density) of water vapor at the same temperature and the same total pressure**.** Humans are sensitive to humid air because the human body uses evaporative cooling as the primary mechanism to regulate temperature. Under humid conditions the rate that perspiration evaporates from the skin is lower than it would be under arid conditions. Because humans perceive the rate of heat transfer from the body rather than temperature itself human feel warmer when the relative humidity is high than when it is low. For example, if the air temperature is 24°C and the relative humidity is zero percent then the air temperature feels like 21 °C. At the same air temperature if the relative humidity is 100 percent then we feel like it is 27 °C. In other words, if the air is 24 °C and saturated with water vapor, then the human

body cools itself at the same rate as it would if it were 27 °C and dry**.** The vapor pressure is same all over the room. By this reason it is sufficient to measure the humidity at only one location. The measurement is done with a psycho meter, dew point apparatus, hair hygrometer or electrolytic hygrometer. Fanger proposes, to take a rough measurement for the determination of the predicted mean vote but for other reasons it can of course be required to measure the humidity with greater accuracy (Fanger, 1970).

Air speed is the rate of air movement at a point, without regard to direction. Precise relationships between increased air speed and improved comfort have not been established. However, elevated air speed may be used to increase the maximum temperature for acceptability if the affected occupants are able to control the air speed (ASHRAE, 2003). The combinations of air speed according to temperature increase results in similar heat loss values from the skin. The required air speed may not be higher than 0.8 m/s. Large individual differences exist between people with regard to the preferred air speed. The instrument most commonly used for measuring air speed is the thermal anemometer of a type suitable for measuring the small velocities which normally occur in rooms (0- 0.5 m/s) (Fanger, 1970).

2.2.3. Thermal Comfort Studies

Over the years a considerable number of studies have been carried out with the purpose of defining thermal comfort requirements in order to create comfortable environments. The main reason to satisfy thermal comfort is to determine man's desire to feel thermally comfortable. In addition, thermal comfort can be justified from the point of view of human performance. Man's intellectual manual, and perceptual performance are to be the highest when he is in thermal comfort. Whether thermal comfort is a necessary condition for optimal human health, is difficult to say with certainty. However as the problem regarding a connection between health and comfort is unsolved, only the two above-mentioned reasons for creating thermal comfort will be referred to (Fanger, 1970).

2.2.3.1. Thermal Comfort Studies of Fanger

A general comfort equation has been set up for optimal thermal comfort for human beings, by Fanger's well known study. With the purpose of reaching optimal comfort conditions analyzing requirements and quantifying the variables are of great importance. Fanger carried out number of studies as field experiments, the surrounding variables have been measured under practical conditions, and at the same time people has been asked to vote on their thermal sensation on suitable psycho-physical scale (Fanger, 1970).

The equation gives the relative and absolute influence of the different variables that has been solved on a digital computer. They have been represented in the numerous diagrams and designed for direct practical use in engineering. The comfort equation is of importance for engineering calculations and the operation of all existing forms of thermal comfort installations and it will also be importance in the development of completive new systems (Fanger, 1970).

Industrial studies and engineering works use the data for calculations and practical applications. For practical applications preferred conditions have to be quantified by reliable techniques. It is therefore obvious that quantitatively expressed comfort conditions are of great importance. Reliable quantitative conditions that obtained by rational calculations can be used for operation of existing forms of environmental systems, and also for the development of completely new systems.

In order to give direct information on man's thermal sensation in a climate which deviates from the optimum, thermal sensation index revealed. This index is the basis for the introduction of a rational method for rating a quality of thermal environments. With the aid of the index which combines the same six variables as the comfort equation it is possible, quantitatively, to evaluate how any thermal climate influences the thermal sensation of persons in the room. The comfort equation only indicates how the variables should be combined in order to obtain optimal thermal comfort. But the index gives psycho-physical scale the 'Predicted Mean Vote' (PMV) of a large group of persons exposed to actual environment (Charles, 2003; Fanger, 1970).

Fanger's Predicted Mean Vote (PMV) is commonly used thermal comfort model. Model, combines four physical variables namely; air temperature, air velocity,

mean radiant temperature, and relative humidity, and two personal variables; clothing insulation and activity level into an index that can be used to predict the average thermal sensation of a large group of people (Charles, 2003). It is very unlikely that subjective and environmental conditions are such that equations are simultaneously satisfied and, therefore, perfect comfort is experienced. Most likely sweating rate and/or average skin temperatures will be very close but not coincident with the comfort ones. In this case, how uncomfortable does a person feel? In order to face this problem, Predicted Mean Vote (PMV) is proposed (Butera, 1998). So, PMV is an index that predicts the mean value of the votes of a large group of people on a seven-point thermal sensation scale. (Table 2.1)

Table 2.1. Thermal sensation scale
(Source:Fanger, 1970)

+	3	Hot
+	2	Warm
+	1	Slightly warm
	0	Neutral
-	1	Slightly Cool
-	2	Cool
-	3	Cold

It is possible to determine the predicted percentage of dissatisfied occupants, using the diagram constructed from analyses of experimental data including 1300 subjects. Since, it is actually the dissatisfied persons who in practice will be inclined to complain about the thermal environment, the magnitude of the 'Predicted Percentage of Dissatisfied' (PPD) would seem to be meaningful. In rating the thermal quality of a given indoor climate the more non-uniform of thermal field in a room, the greater the number of dissatisfied persons to be expected. The method thus makes possible partly a prediction of how many dissatisfied can be expected for the conditions under which the measurements are taken, and partly an estimation of how low it is at all possible to bring the percentage of dissatisfied in the given room by using the actual heating on air conditioning system (Fanger, 1970).

PPD (Predicted percentage of dissatisfied) index is related to the PMV, is based on the assumption that people voting +2, +3, –2, or –3 on the thermal sensation scale are dissatisfied, and the simplification that PPD is symmetric around a neutral PMV (ASHRAE Standard 55-2004). (Figure 2.1)

The combined effects of environmental and individual factors can be presented on a psychometric chart. Basically, the psychometric chart presents air temperature (dry bulb) along the X axis at 0% RH and then curves of equal humidity.

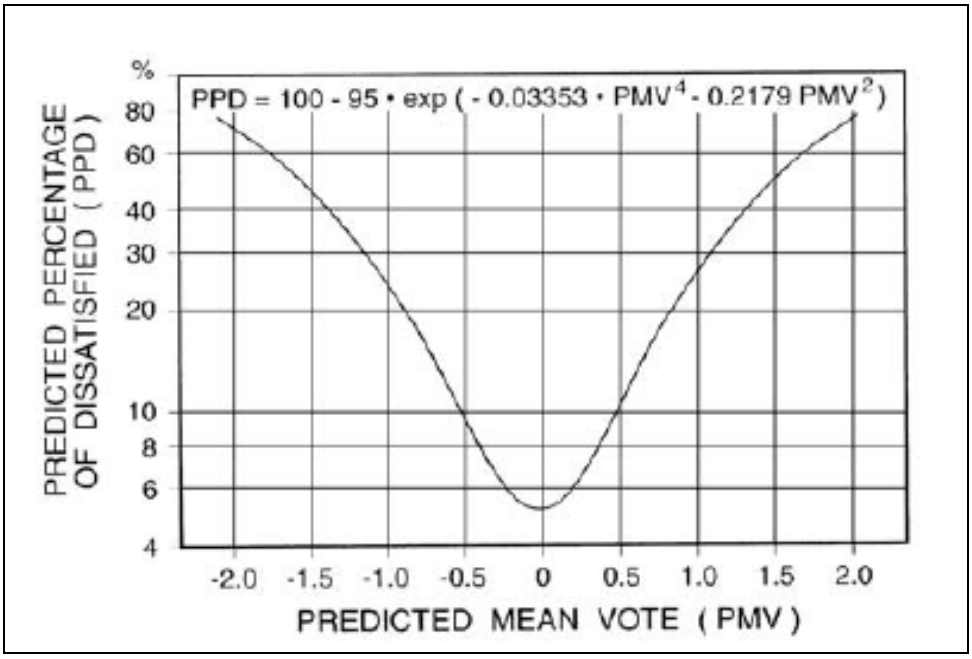

Figure 2.1. PPD as a function of PMV
(Source:Fanger, 1970)

The comfort zone is defined by the combinations of air temperature and mean radiant temperature for which the PMV is within the recommended limits specified in Figure 2.2. Acceptable Thermal environment for general comfort is defined with PPD<10 and -0.5<PMV<+0.5.

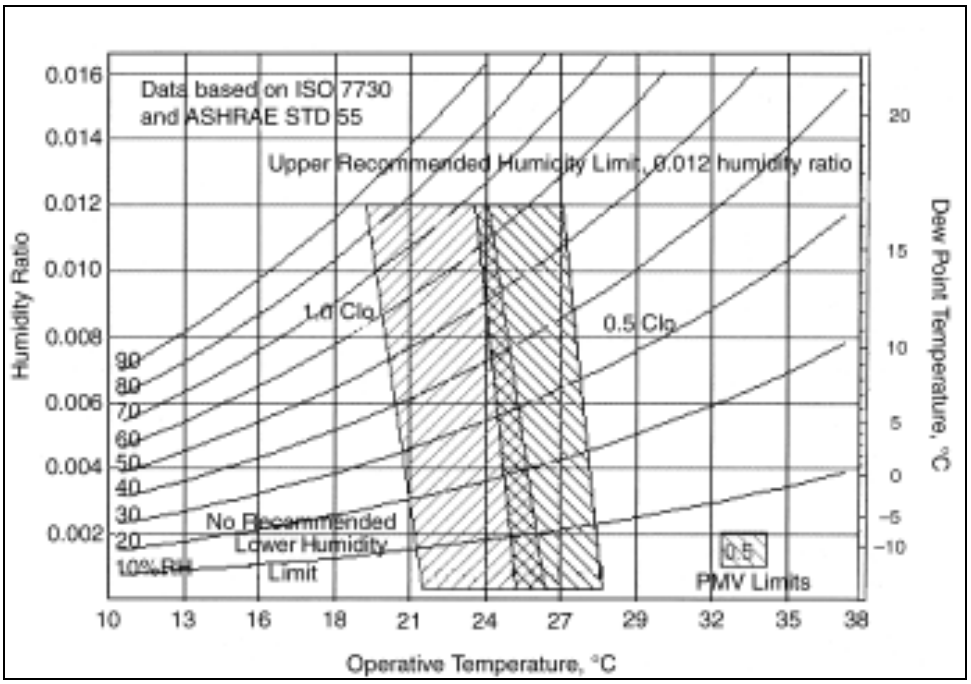

Figure 2.2. Comfort Zone
(Source:Fanger, 1970)

In addition to differences between actual and predicted neutral temperatures, several field studies have suggested that occupants' sensitivity to changes in temperature differ from those predicted from PMV. For example, Dear et.al. (1993) found that, although observed neutral temperatures were largely consistent with those predicted by PMV, predicted and actual thermal sensation differed for non-neutral conditions, and got larger the further away from neutrality occupants were. These findings suggested that occupants were more sensitive to changes in temperature than the PMV model would predict. A number of other studies also support this conclusion. PMV model is not always a good predictor of actual thermal sensation, particularly in field study settings. Discrepancies between actual and predicted thermal sensations reflect, in part, the difficulties inherent in obtaining accurate measures of clothing insulation and activity level. In most practical settings, poor estimations of these two variables are likely to reduce the accuracy of PMV predictions. (Charles, 2003)

2.2.3.2. An Example Case Study About Thermal Comfort

In a study by Karjalianen and Koistinen (2007), a field study was conducted to evaluate the impact of user control on thermal comfort. They selected sample office buildings. One argument was that individual thermal control was important to obtain personal thermal comfort. In addition, individual thermal control is needed to improve comfort, health and productivity in office buildings.

As the authors mention that there are individual differences in experiencing thermal comfort. Perception of thermal comfort changes from person to person. As decleared in literature 'No thermal environment can satisfy eveybody'. Related with this comfort problem, the authors suggests that thermal satisfaction will be improved with individual thermal control, by handling personel differences in thermal preferences.

Individual thermal control, can also improve health and productivity. It is one of the main issues for office buildings, improving working conditions and productivity. However it is predicted that giving people local temperature control will improve thermal comfort, results gained by some field studies done by researches, show that thermal comfort was not better in buildings equipped with room thermostats, than the ones with more limited posibilities of temperature control. Acccording to several preceeding studies in literature, the reasons why the personel temperature control could not succeed were simply listed as below;

1. The interface was so obscure that the control options were not understandable by most of the users
2. Room thermostates were often installed so high up on the wall that they could not be reached easily.
3. Problems with the terminology of temperature controls. Many air-conditioning users were not aware their units had thermostats.

With respect to this arguements the main purpose of the study is to understand the actual use of temperature controls in offfices. In addition to this, researchers aimed to understand how people act when they feel discomfort to get their comfort back and how they obstruct the discomfort conditions.

Method of the study:

Contextual techniques are used to get knowledge about user problems about individual thermal control. The research method was similar to contextual inquiry. Observations take an important part in the interview. Firstly, researchers interested in building as a whole by observations, then they focused on temperature controls and other controls. An interview study conducted with office workers. Issues discussed in interview were;

- How people use the controls?
- How people act when they feel thermal discomfort due to cold or hot?
- What kind of problems do the users have while they are using the controls?

An interview study with open ended questions carried out with 27 interviewees. The research has conducted in 13 office buildings in Finland. Firstly a pilot interview has been prepeared. In this first part of the study researchers intervieweed with 12 people. Detailed information about interviewees are shown with a table which shows age gender, occupation, time worked in the building, avarage part of working hours spent in own room(%).

In the article buildings are described as new buildings which represents the best current practice and which are equipped with mechanic systems for ventilation and heated by water radiator. Most of the buildings have a cooling system in addition to heating systems. As mentioned in the article, in this study authors did not need to investigate the systems in the buildings. More often it is intended to understand the ways of using the controls, so the building services were not generally studied. Study focuses on user controls which office occupants have for their personel use.

Results and Discussions

Interviewees asked about their satisfaction from thermal comfort and use of controls. As the results analysed interviewees are divided into seven groups. In this classification there are three level of satisfaction, namely; Satisfied, Mostly Satisfied and Dissatisfied. While dissatisfied people have major problems due to cold or hot, mostly satisfied people have temporal or small problems. The people who are mostly satisfied were divided in two groups due to use of temperature control. First group of

people were the ones who use individual temperature control and the second group were the ones who don't use.

Dissatisfied people are divided in three group. In addition to ones who 'use' or 'does not use' a group of dissatisfied people listed as the ones who 'does not have temperature control'. Results related with these two issues are analysed and showed with a table. As seen from the results significance of user controls of temperature for thermal comfort is low.

Thirdly, interviewees were asked about problems which they have while using temperature controls. Typical problems are listed in a table. Results show that problems are generally arise from the obscure user interface and from the system which is evaluated by users as inadequate for cooling and heating.

Interviewees were asked how they act when they feel discomfort due to hot or cold. Actions were listed as; Openning windows, Openning doors to corridors, Using temperature control or checking the settings, Contacting building service personel or management, Taking a walk, Taking a hot/cold drink. These actions were evaluated seperately as actions when feeling cold and actions when feeling hot. The preferences of people in such discomfort conditions are analysed and results demonstrated with a table. It has been observed that thermal discomfort leads to a multitude of actions but most popular actions were dressing less or more, as the dress code allows. User problems with temperature control cause thermal discomfort, in addition to this waste heating and cooling energy. However, the most appropriate action should be reducing the heating to cool room air during the heating period, people attempt to open the windows instead using temperature controls.

As it has been understood that individual temperature control is low, and the people do not use the room thermostate and thermostatic valves, the reasons behind this problem is studied. Problems of occupants with temperature control are defined as a list and proposed solutions are stated.

In order to control room air effectively and energy efficiently users should be able to find the equipment easily and also understand its purpose. Temperature controls should be installed so as to be clearly visible and easily reachable. It is observed that some users are not aware that there is an individual control in the room. Room thermostates in case buildings were not found well designed. Systems should be improved with a better user interface. Lights and other symbols in user interface are not

often understood correctly. It is not always known whether the temperature control is operating or not.

Researchers discussed that systems are planned and discussed without a realistic view of their users. Systems are designed by assuming that user's have knowledge about that systems.In this research it is investigated that users are not aware of the facilities of the system. As a final it is mentioned in the article that; 'The users should be studied and more effort should be put into user interface development' for previous researches.

2.2.4. International Standards about Thermal Comfort

To determine optimal thermal conditions, practitioners refer to standards such as ASHRAE Standard 55 - 2004 and ISO Standard 7730. These standards are based on primarily mathematical models, developed by Fanger and colleagues on the basis of laboratory studies.

ASHRAE (*American Society of Heating, Refrigerating, and Air-Conditioning Engineers):*

ASHRAE is an organization devoted to the advancement of indoor-environment-control technology in the heating, ventilation, and air conditioning (HVAC) industry. It was founded in 1894 to serve as a source of technical standards and guidelines. In time, it has grown into an international society that offers educational information and publications. The organization also developed a code of ethics for HVAC professionals and provides relation with the general public (ASHRAE Standard 55, 2003).

ASHRAE Standard 55 presents the thermal environmental conditions for human occupancy. This standard promoted to specify the combinations of indoor space environment and personal factors "that will produce thermal environmental conditions acceptable to 80% or more of the occupants within a space" (ASHRAE Standard 55, 2003). Maintaining thermal comfort for occupants of buildings or other enclosures is one of the important goals of HVAC design engineers. They are periodically reviewed,

revised, and published, so the year of publication of a particular standard is important for code compliance.

The Standard is based on the heat balance model of the human body, which assumes that thermal sensation is influenced by four environmental factors; temperature, thermal radiation, humidity, air speed; and two personal factors; activity, clothing. Different requirements are determined for several spaces such as; Houses, Commercial buildings, Hotels and Dormitories, School buildings, Hospitals etc. Requirements for Hotels and Dormitories used in order to evaluate the thermal comfort for this building.

Table 2.2. Recommended Indoor Design Parameters
(Source:ASHRAE, 2003)

	Winter Conditions		Summer Conditions	
	Temperature ºC	RH %	Temperature ºC	RH %
Rooms	23ºC-24ºC	%30-%35	23ºC-26ºC	%50-%60
Lobies	20ºC-23ºC	%30-%35	23ºC-26ºC	%40-%60
Meeting Halls	20ºC-23ºC	%30-%35	23ºC-26ºC	%40-%60

ISO: (International Standards Organization:

The International Standards Organization (ISO) was set up in 1947 and has over 130 member countries. ISO Standards are produced by experts from participating countries according to agreed rules and a system of voting (Olesen and Parsons, 2002). Standards concerned with Thermal Comfort are produced by ISO/TC 159 SC5 WG1. The main thermal comfort standard is ISO 7730. ISO Standards should be valid, reliable, usable and with sufficient scope for practical application. The existing Thermal Comfort Standard EN ISO 7730 is considered in terms of these criteria. It is proposed and supported by a document that explains the requirement, the rationale and scope of the proposed standard. This standard describes the PMV and PPD indices and specifies acceptable conditions for thermal comfort. The indices are exactly as described by Fanger (Olesen and Parsons, 2002)

CHAPTER 3

MATERIAL

This study has been carried out in a residential building which belongs to Darüşşafaka Cemiyeti. It is called Darüşşafaka Residence. It is an intelligent building selected for analysis of the influence of automated systems on user's thermal comfort. Firstly, the physical environment of the building is explained in this section in order to realize building through the evaluation of thermal comfort.

3.1. Climatic Conditions

The case building is located on a site in Urla, İzmir (latitude 38° 30'; longitude 27° 1'. Regional Climate type is called "Cfa" according to Köppen classification. This climate type is described as humid-subtropical (mild with no dry season, hot summer, lat. 20-35°N) (ASHRAE, 2001).

Nevertheless, ASHRAE Standards 90.1-2004 and 90.2-2004 Climate Zone classifies climate type of Izmir as "4A" which is humid subtropical. This is defined according to design conditions mentioned in World Climate Design Data 2001 ASHRAE Handbook.

Table 3.1. Monthly Statistics showing dry-bulb temperatures (°C) for Izmir (Source:World Climate Design Data 2001 ASHRAE Handbook)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature. °C	Minimum	-0.2	-2.6	-1.2	5	7	11.3	15	16	11	7	0	**-3.2**
	Maximum	16.8	17	22.3	27	34.2	41	38.2	35	34.4	28	21	19.3
	Daily Average	8.9	**8.4**	10.7	14.4	21	24.4	**25.8**	25.4	23	16.9	11.4	9.8

According to Table 3.1 during the very short winter, the coldest month is February with daily average temperatures of 8.4°C. Minimum dry-bulb temperature of -3.2°C was measured in December. The mean annual temperature is calculated as 16.7

°C. The hottest month is July, with a mean temperature of 25.8°C. Maximum dry-bulb temperature is measured as 41.0°C in June. Unbearably hot and dry periods occur in summer, but passive cooling is possible. While maximum wind speed reaches to the value of 18.0 m/s in November, annual average wind speed is 4.4 m/s as shown in Table 3.2. In general, it is clear that north wind is effective in İzmir throughout the year, as shown in Table 3.3. By analyzing the Table 3.4, it was concluded that annual average relative humidity (RH) is 62%. RH value reaches at 100% on rainy months like February, March, October, November and December. And in extreme cases possibility to reach absolute minimum of 21% RH values is observed.

Table 3.2. Monthly Statistics showing wind speed (m/s) for Izmir
(Source:World Climate Design Data 2001 ASHRAE Handbook)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	0	0	0	0	0	0	0	0	0	0	0	0
Maximum	13.4	12.4	10.3	13.3	15.9	10.2	12.9	11.8	10.3	12.4	18	14.9
Daily Average	4.5	5	4.2	3.8	3.7	3.8	5.5	4.1	3.7	4.4	4.5	5.5

Table 3.3. Monthly Statistics showing wind direction (%) for Izmir
(Source: World Climate Design Data 2001 ASHRAE Handbook)

Wind Direction %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
North	32	17	27	23	22	44	60	44	37	54	45	24
Northeast	2	26	1	2	3	2	4	2	2	7	4	4
East	3	12	16	4	2	1	1	1	1	1	8	3
Southeast	43	9	5	25	28	10	4	3	16	12	26	56
South	5	23	3	5	7	3	1	1	2	6	4	7
Southwest	2	7	4	7	5	6	1	2	8	1	1	1
West	3	4	7	11	17	14	7	9	14	5	4	1
Northwest	10	2	37	23	17	20	21	37	20	15	9	5

Table 3.4. Monthly Statistics showing relative Humidity (%) for Izmir.
(Source:World Climate Design Data 2001 ASHRAE Handbook)

Monthly Average Daily Relative Humidity %													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RH%	Average	71	68.5	66.5	60.5	59	61	54	56	57.5	63.5	66	63.5
	Maximum	97	100	100	95	94	100	88	89	94	100	100	100
	Minimum	45	37	33	26	24	22	20	23	21	27	32	27

Table 3.5. Extreme and Average Outdoor Temperatures according to Seasons
(Source:World Climate Design Data 2001 ASHRAE Handbook)

Summer is June July August					
Extreme Summer Week (nearest maximum temperature for summer)			Typical Summer Week (nearest average temperature for summer)		
Extreme Hot Week Period selected	Temp.(max)	Deviation	Typical Week Period selected	Temp. (Average)	Deviation
Jun22:Jun28,	41.00°C,	|11.979|°C	Aug17:Aug23	25.22°C	| 0.297|°C
Winter is December, January, February					
Extreme Winter Week (nearest Minimum Temperature for winter)			Typical Winter Week (nearest Average Temperature for winter)		
Extreme Cold Week Period selected:	Temp. (Minimum)	Deviation	Typical Week Period selected	Temp. (Average)	Deviation
Jan 27:Feb .2	-3.20°C	| 9.079|°C	Feb 3:Feb 9	9.04°C	| 0.512|°C
Autumn is September October November					
Typical Autumn Week (nearest average Temperature for Autumn)					
Typical Week Period selected		Temperature. (Average)		Deviation	
October 20 - October 26		17.4°C		| 0.566|°C	
Spring is March, April, May					
Typical Spring Week (nearest average Temperature for Spring)					
Typical Week Period selected		Temperature. (Average)		Deviation	
April 5 - April 11		15.34°C		| 0.990|°C	

3.2. Site Analysis

The Darüşşafaka Urla Residence is situated in the north side of the Urla-Çeşme road, about 1 km north inside the main road. This area has been planned as a complex with two residential blocks and a hospital. The buildings are surrounded by a small forest with palm trees. The domain is 52.000m2. There is a slope rough ground in this field and it is nearly 55 m above from the sea level.

There are two group of blocks named as Block A and B. Construction of the Block A has almost completed, Hospital Building construction started but hasn't completed yet. The field study was carried out in Block B. It is composed of five blocks named as B1, B2, B3, B4 and B5 (Figure 3.1). These parts are interconnected within the building. The core units of the building, stairs and elevators take part in the intersection of these blocks and the blocks are related to the others. They differ from each other according to their heights, as seen in Figure 3.2 and Figure 3.3.

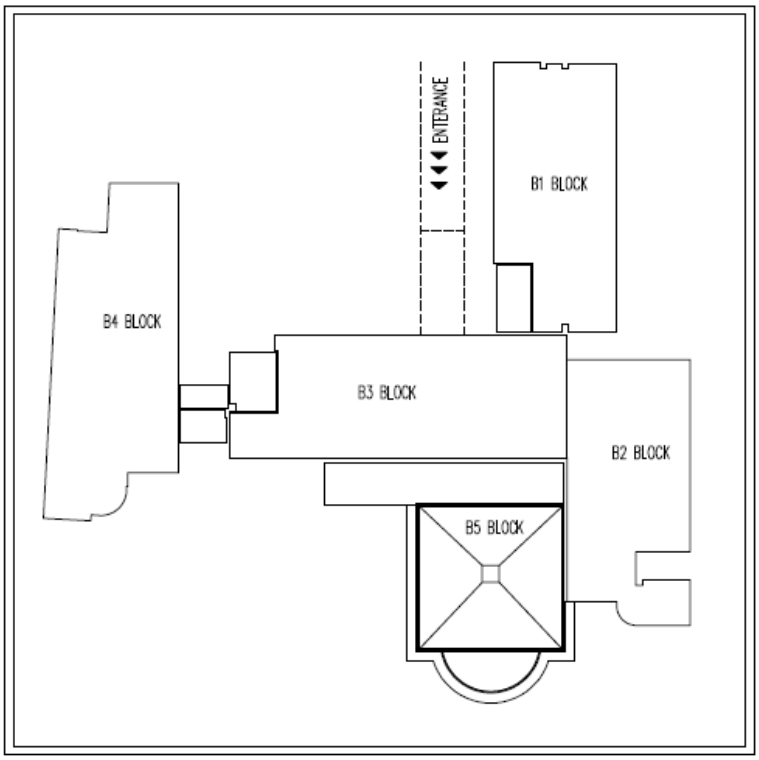

Figure 3.1. Site Location of Blocks

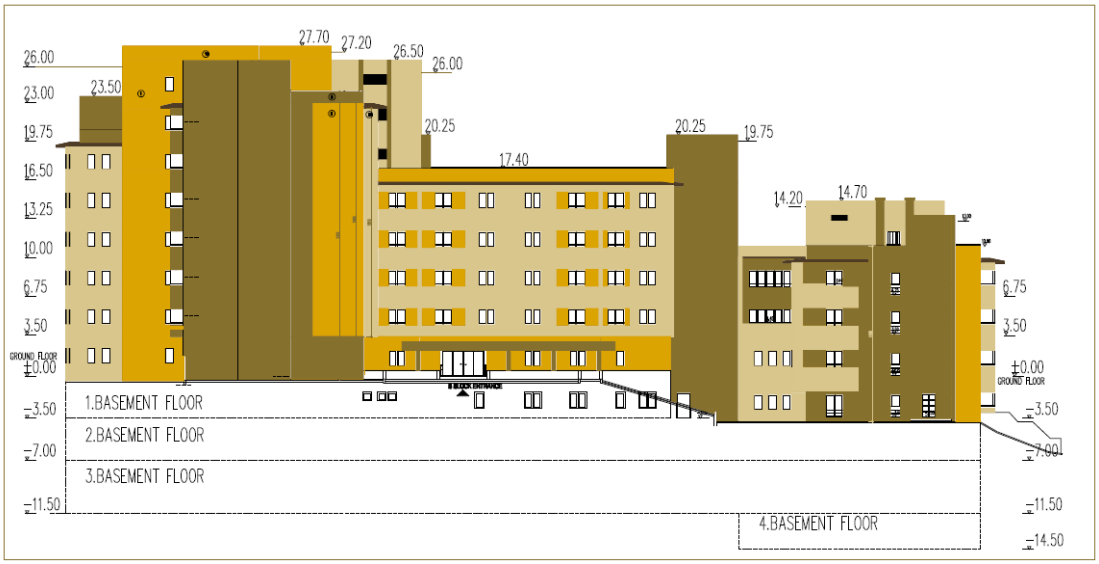

Figure 3.2. Front View of Block B

Figure 3.3. View from Entrance of Block B

3.3. Description of Case Building Darüşşafaka Residence in Urla

Construction of the building started in 2004 and completed in 2007. There are 40 occupants accommodating in the residence since 2007. The occupants of the building are basically owners of the suites. Other users include administrative staff, technical staff and maintenance personnel etc. The building designed to meet the whole requirements of people in the building. Comfort becomes an important issue in these residences. In this respect building owners pay much attention to obtain high comfort standards. The Residence features automated HVAC systems in order to obtain better thermal environment.

Table 3.6. Distribution of the Floor Areas of each Storey

Floor ID	-4	-3	-2	-1	0	1	2	3	4	5	6
Floor Area	627 m^2	2809 m^2	2665 m^2	2287 m^2	2384 m^2	2370 m^2	2374 m^2	1848 m^2	1598 m^2	1105 m^2	800 m^2

The total floor area of the building is 20.871 m2. The building settles on 2665 m^2 area on the basement and each floor has various surface areas. The building consists of 5 blocks namely B1, B2, B3, B4 and B5. Block B1 has 11 floors in total with four underground floors and the maximum height is 23 meters on the top of the building. The slope of the building domain prevents to have useable basement floors. Each block has various heights as seen in Figure 3.4.

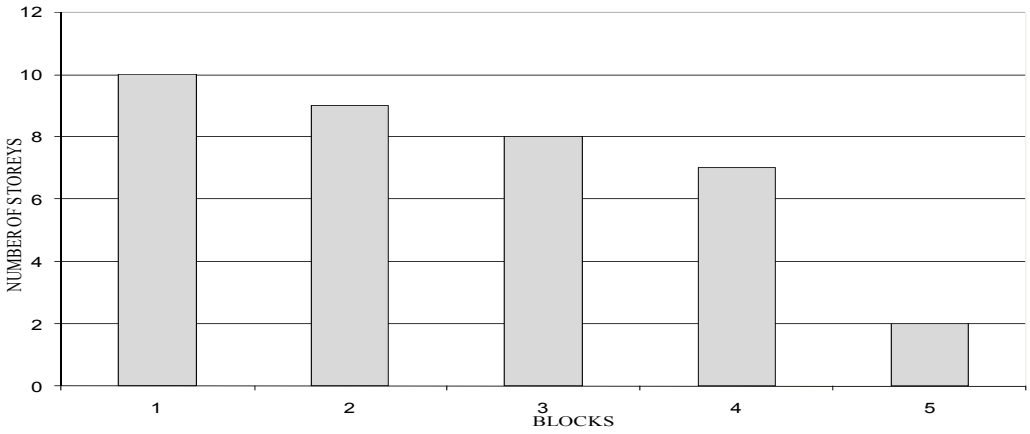

Figure 3.4. Number of Storey's for Each Block

Table 3.7. Description of Spaces Located on each Floor in Each block.

		B1	B2	B3	B4	B5
-4	-14.5	-	-	-	Shelter	-
-3	-11.0	Billard,Art, Fitness Halls	Technical Service Personnel Rooms	Turkish bath, Fitness Hall HVAC Central	Laundry	Body Care Units
-2	-7.0	Personnel refectory, Technical Rooms	Kitchen of Restaurant, Dishes... etc. ,	TV Saloon Hobby Room Restaurant entrance	Spa Restaurant A Type Suits (7)	Restaurant
-1	-3.5	Swimming Pool, Dressing Rooms, Care Units	A Type Suits(8)	Game Hall, Hotel Rooms, Nursery, Doctor, WC (general)	A Type Suits(10)	Roof Terrace
0	+0.00	Resting Hall	A Type Suits(8)	Entrance, Lobby, Administrative Offices	A Type Suits(10)	-
1	+3.5	S2 Type Suits(2) S1 Type Suits(4)	A Type Suits(8)	A Type Suits(3) S1TypeSuit (6)	A Type Suits(10)	-
2	+6.75	S2 Type Suits(2) S1 Type Suits(4)	A Type Suits(8)	A Type Suits(3) S1TypeSuit (6)	A Type Suits(10)	-
3	+10.0	S2 Type Suits(2) S1 Type Suits(4)	A Type Suits(8)	A Type Suits(1) S1TypeSuit (7)	Techn. depot Roof Terrace	-
4	+13.25	S2 Type Suits(2) S1 Type Suits(4)	A Type Suits(6) S1TypeSuit (1)	A Type Suits(1) S1TypeSuit (7)	-	-
5	+16.5	S2 Type Suits(2) S1 Type Suits(4)	A Type Suits(6) S1TypeSuit (1)	Technical depot Roof Terrace	-	-
6	+19.75	S2 Type Suits(2) S1 Type Suits(4)	Technical depot Roof Terrace	Technical depot Electric depot	-	-

Horizontal and vertical circulation areas occupy a wide space within the total floor area of the building. They include six main stairs, which are designed with the principles of fire safety and five elevators for occupants. Blocks are connected with two major Core Units which also provides vertical circulation. Elevators and two of the stairs are situated in these units. One of these Core unit takes part in the intersection of B1, B2 and B3 Blocks, and the other is between B3 and B4 (Figure3.5).

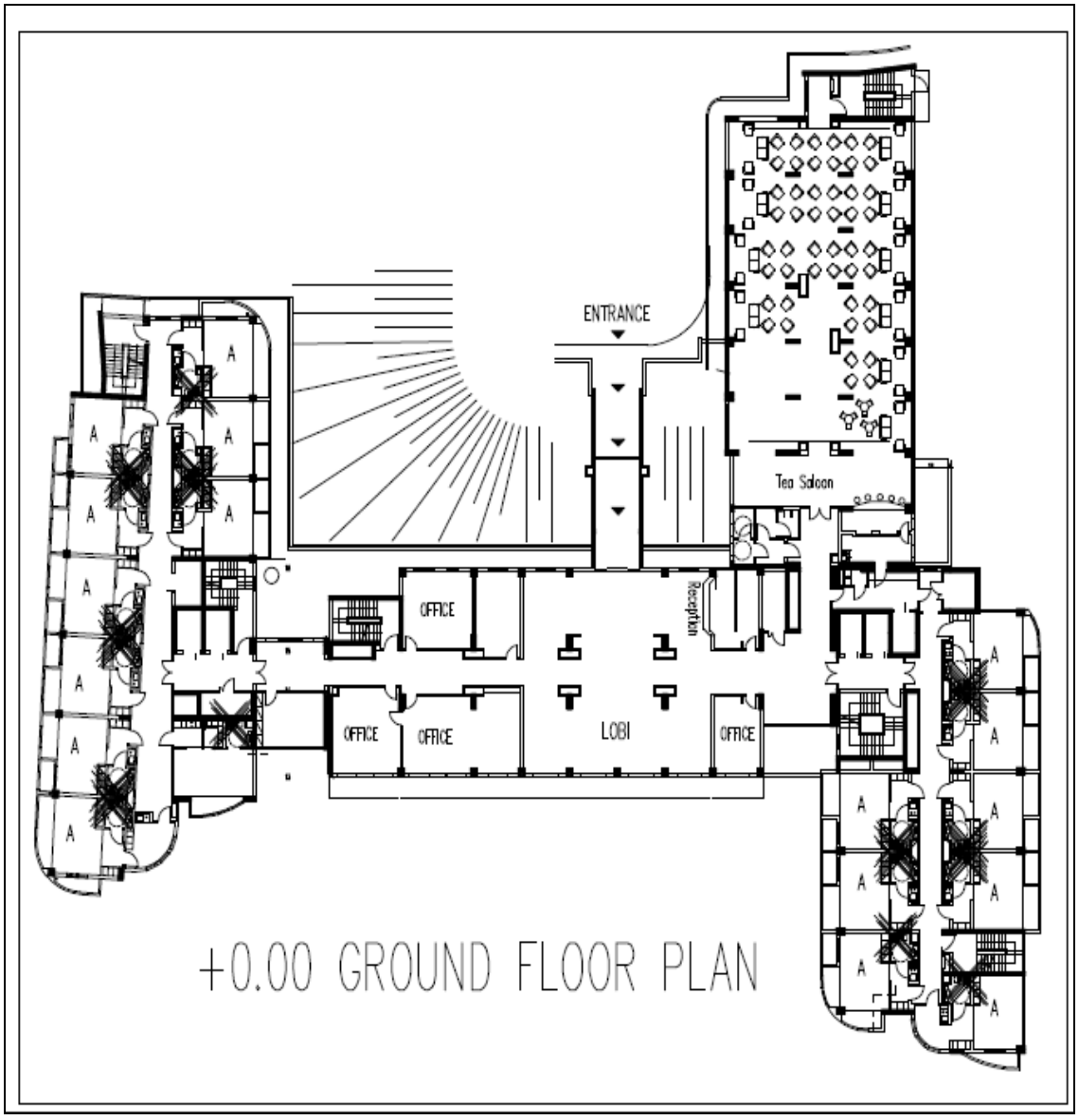

Figure 3.5. Ground floor plan of Block B's.

The entrance of the building is on the ground floor including administration offices, reception and lobby in this floor. Still the building works with low capacity and many parts of the building is out of use. Hence, Block B4 is out of use completely but other blocks are partly in use. The occupied suits have been gathered in Block B2 and B3. Ground floor, first floor and second floor of these two blocks have been accommodated by the elderly occupants.

In general, spaces in the case building may be classified into three groups; accommodation rooms, social activity areas, and health facilities. Accommodation rooms are designed as suites.

There are 171 suits including three types which are coded as A1, S1 and S2. A1 suites have an average of 40m2 net floor areas including a bath, kitchen niche, and a bedroom. There are totally 110 ones in the whole blocks. S1 suites have an average of 55m2 net floor area, including a bath, kitchen niche, a living room, and a bedroom with a small dressing part. These rooms are suitable for couples. 49 of the rooms are designed as S1 suites. S2 suites have an average of 80m2 net floor area, with a kitchen niche, a living room and two bedrooms each with a bathroom and small dressing part. There are only 12 rooms that are designed as S2 suites and all of them are situated in B4. All the rooms are equipped with central heating ventilating and cooling systems. There are thermostats in the rooms which allow the occupants to provide their personal environmental thermal comfort. The system is monitoring by computers in the center which is located on third basement floor of B3 block. By using thermostats, it is possible to control the temperature of the suites and also the fun speed and air movement. This building is being classified as an intelligent building with respect to its automated systems.

Social activity areas involve mainly; the restaurant, tea saloon, entrance lobby, etc. There is a big restaurant which is settled on the (-2) second basement floor. Its net floor area is about 403 m2, except other service areas like kitchen and food storage area etc. Three facade of the hall is full of wide windows which are open to outside green environment. Tea saloon is the second main social area which is commonly used by elderly occupants. Its facade surface area is about 394 m2. Other common spaces are fitness center, swimming pool, activity rooms for art and craftworks.

In nursery unit, elderly occupants can be treated by doctors. There are also intensive care rooms for extreme cases; occupants can take medical treatment in these units. There are also hotel rooms for visitors and companions for elderly occupants who

are taking medical treatment. In addition, Turkish Bath, Spa, Massage rooms and body care units are serving occupants all time.

3.4. Occupants Definition

There are 40 elderly living in Darüşşafaka Residence. They occupy in A1 and S1 suites located in B3, and B2 blocks. Their age changes in a range starting from 65 to 93. There were 9 of them who participated in this study. So Table 3.8 shows description of their profiles.

Table 3.8. Description of elderly occupants' profile.

	Room ID	**Floor No**	**Age**	**Gender**	**Occupation**	**Health Problem**	**Room Direction**
[I01]	105	4	79	F	Retired Bank Officer	Tiroid	B2 Block South East
[I02]	Z07	3	70	F	Retired Teacher	Romatoid asthma Walking Obstacle	B2 Block South East
[I03]	104	4	85	F	Retired Teacher	-	B2 Block South East South and West
[I04] (couple)	1B07 1B08	2	72 & 75	M & F	Engineer & Musician	-	B2 Block South East
[I05]	115	4	68	M	Electrical Engineer	-	
[I06] (couple)	232	5	93 & 74	M & F	Public prosecutor & Notary Public	Asthma - Walking Obstacle	South West
[I07]	1B05	2	66	M	Inspector	-	B2 Block South East

CHAPTER 4

METHOD

Method of this study was presented in this section, in order to explain how the assessment of current thermal performance of the building was conducted. The aim was to collect relevant information about thermal comfort conditions to build a picture of the field study. Several measurements and evaluation techniques were conducted in order to obtain this information.

The first step in data collection process was arranging initial contact with administration of the building. Structure and the purpose of the study have told to them. From this contact, it has been possible to reach senior managers. Aim and the scope of the field study have explained. Required permissions for field measurements have taken after official correspondences. The data collection has done in three levels including Collecting the documented data, objective data and the subjective data. Through this section, approaches are classified under two basic titles namely Objective Data Analysis and Subjective Data Analysis.

4.1. Objective Data Collection and Analysis

Objective data analysis included walkthrough survey and field measurements. Measurements were done in order to obtain quantitative information about current performance of buildings. In addition, it may be possible to predict estimated performance of buildings in future by utilizing the quantitative information. Literature mentions several techniques about obtaining objective data. The techniques include walk-through, visual inspection and instrumented measurements, etc. In this study, walkthrough and instrumented measurements were used to obtain objective data.

The documented data included architectural drawings showing all floor plans, sections and elevations. Necessary information such as functional distinction of spaces, space locations, room dimensions, window dimensions, etc. were noted from these drawings. Plans and specifications have taken from the archive of the Darüşşafaka Urla Residence Construction management office. Such information together with

observations by walkthrough technique was used in decision making process for measurements and in constructing interview questions.

4.1.1. Walk Through

Walk-through in general includes a group of techniques based around a walkthrough of the building to be evaluated. The walk-through is an important technique for buildings facility evaluation. The main purpose is collecting information about the spaces in terms of thermal comfort. It is intended to form a basis, for more focused and instrumented research. Nevertheless, this survey is also necessary for selecting the research spaces for instrumental measurements. However the data depends on observations, it should be regarded as objective data because only the physical facilities of the spaces has been considered with quantitative and numerical explanations, such as net surface areas, window orientation, heating type, direction to the sun.etc. (Baird et al. 1996).

In this study, interior spaces defined under thermal comfort concepts. Besides, other physical environmental conditions have been noted according to spatial comfort parameters. Through the field survey following facilities and qualities about spaces has been explained;

- Location in the building
- Direction according to sun
- Size of the spaces
- Function
- Heating or Cooling devices
- Window orientation
- Occurrence of Cross Ventilation
- User interventions in the spaces
- Occupants frequency

Entrance of the building is facing to the east. There is an entrance vestibule made of glass and was attached to the main door of the building. It acts as a wind shield. This is a corridor of 8 m length and has two winged sliding doors. This section avoids the direct influence of the ambient air to inside and provides to keep indoor air temperatures constant as much as possible.

Lobby is located on the ground floor. It is just at the opposite direction from the entrance. There are windows on the west facade. Heating and cooling is provided by fans which are embedded within suspended ceiling floor.

Reception desk and the administrative offices are situated on the ground floor. Three of four administrative offices are facing to west and one of them is facing to east. Net floor areas of offices vary between 30-40m2. Heating and cooling are provided by fans which are embedded within the ceiling. Heating mechanism of these spaces is independent from the automation system. Indoor air temperature of each section can be determined by users with the thermo stated setting devices.

Tea saloon is located on the ground floor in B1 Block. It has 394 m2 net floor areas and has wide openings through north and south facades. Because of these wide openings designed as doors, cross ventilation occurs in this space. Heating and cooling are provided by fans within the ceiling.

There is no thermo stated devices in this space which allow user control. Indoor air temperature is being controlled by employees. Heating and cooling mechanism is not connected with the central automation system.

Corridors as circulation spaces are of prime importance in the building. Windows designed at the end of the corridor provide natural ventilation, while the direct influence of the ambient air decreases the indoor air temperature. It is observed that to prevent this, connection of core units with corridors is spitted by doors in order to control air flow in the building. Cross ventilation occurs when these doors are open. There are warnings on the doors which directs the users to keep the doors close, in order to prevent negative effect of the air movement on thermal comfort. During heating period, corridors are heated by fans which are recessed within the ceiling.

Entrance to the restaurant is provided at the second basement floor of Block B3. A waiting hall including WC's is designed adjacent to the restaurant. Another corridor containing game rooms and several rooms for various craft activities, ends to this waiting area. It is observed that, these spaces are generally out of use; so they are not heated regularly. Consequently, heating of these spaces done with user control by the thermo stated panels in each space, depending on need.

Block B5 which includes restaurant seems as a jointed part of the building with its contrary form. Restaurant has three facades facing north, west and south. Its net floor area is 403 m^2. There are wide windows on each facade coded as W1 which is 195 cm wide and 165cm high and W2 which is 135cm wide and, 165 cm high. Ceiling height of

the restaurant is 303 cm while at the centre of the space it reaches to 492 cm high. as shown in Figure 4.3.

Heating and cooling equipments are recessed in the suspended ceiling. Heating and Cooling mechanism is out of central automated system. It is being adjusted by employees. However, when necessary, it is controlled by its thermo stated panel.

Indoor swimming pool is located on the first basement floor of Block B1 Because of the depth of the pool and plumbing equipments, it also occupies the second basement floor. The pool has hot water and it is being heated during 24 hours. It has 69.3m2 area and the space which is surrounding the pool is 238.4 m2. This space is very hot and humid when compared with other parts of the building. The pool is linked to other service areas such as dressing rooms, WCs and barber. The pool is settled underground, consequently does not have opportunity to benefit from daylight and natural ventilation.

Health facilities take place on the first basement floor of Block B3. In addition to doctor and nurse rooms, patient treatment units are present. There are four intensive care rooms. Two of them face east and two of them face west. Hotel rooms in this floor which serves to the visitors, can be used by the relatives of the patients, for long term, when necessary. Heating and cooling mechanism consists of fan-coils that can be monitored and interfered by the computers from the automation centre.

Fitness center is an enclosed space which does not have opening to outside. That's why, benefiting from natural light and natural ventilation is not possible. These spaces are not being used frequently. Heating and cooling mechanism works when needed and it is being adjusted by users with the thermostatic control panels on the wall.

4.1.2. Instrumental Measurements

After analyzing thermal facilities of the field area, the measurements were conducted with specific equipment. Instruments transform the measurable characteristic of the building into information relevant to building performance. In this part of objective data analysis, data loggers used as measuring devices in order to measure determined environmental parameters. The entire name of the device is U12 type HOBO data logger which allows monitoring temperature, humidity and light intensity. U12 code defines the 12 bit resolution for detecting recorded data. There is a direct

USB connection to off load recorded data. It has 43 K measurement capacity. It is possible to regulate the Hobo to take data in a selected period. In this study, HOBO is programmed to capture 30 minute statistics of the measurements (Figure 4.1).

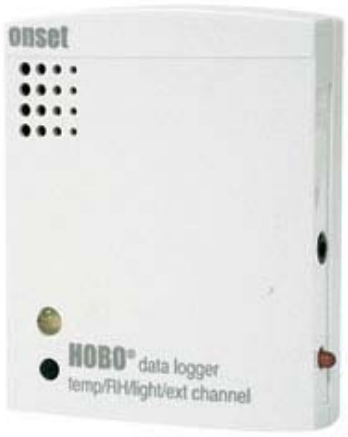

Figure 4.1. HOBO Data Logger

Measurements were conducted in a 28 day-period. Evaluation period started with data taken on 23 February 2009 at 23:40 and ended on 23 March 2009 at 23:40 midnight. Data loggers were mounted at 150 cm from the floor level, hanged to the wall surfaces. Location of the data loggers are different in all rooms but generally close to the entrance part of the living room. Location of the data loggers is demonstrated in figures between 4.2 and 4.11 . Recorded data was transmitted to computer by the help of its own onset Programmed. The measurements transferred to EXCEL as statistical dataset.

4.1.3. Physical Facilities for Measurements

It is intended to find out frequently used areas to conduct field survey, by instrumented measurements. As mentioned in material part, there are only 40 people in the building, however, it has 171 room capacities and it has been observed that occupants mostly spend their times in their own rooms. That's why; it is difficult to find out social spaces which are frequently used by occupants. Despite, there are some

spaces which are being used by occupants everyday in various times. Three social activity spaces determined to conduct thermal comfort evaluation.

Lobby was one of the spaces where measurement devices were fixed. The basic criteria for its selection were its frequent use by the occupants. It is situated near the entrance and also has close relation with circulation areas. These spatial conditions may have negative influence on thermal quality of the space. This was another reason for selecting the lobby for the thermal comfort evaluation (Figure 4.2).

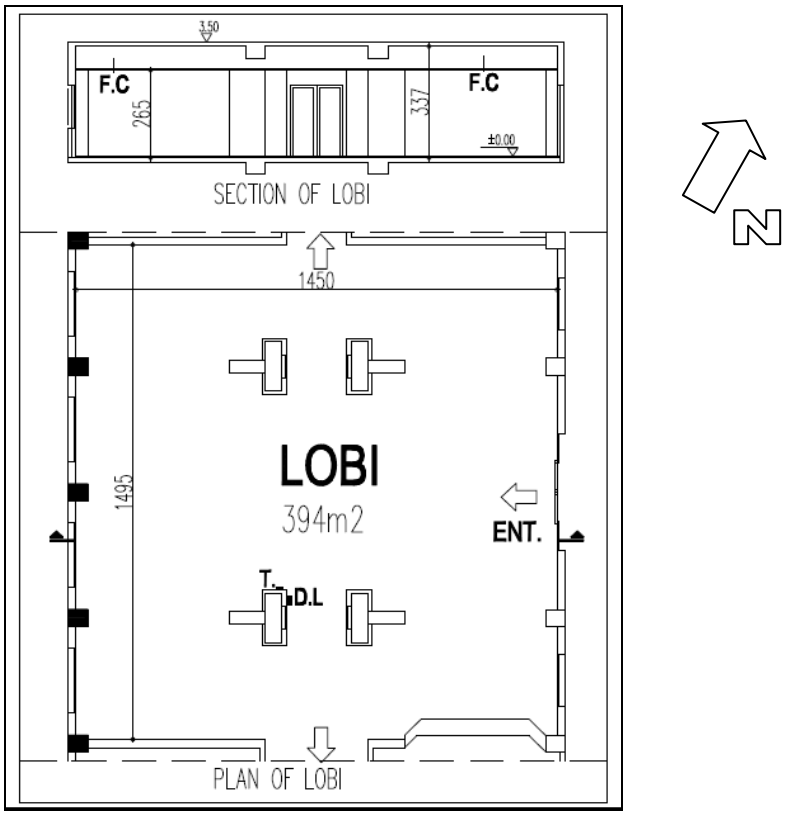

Figure 4.2. Plans and Section of Lobby

Table 4.1. Codes of Devices in the Figures

Device	Fun Coil	Water Radiator	Air Conditioner	Thermostat	Data Logger
Code	F.C	R.	A.C	T	D.L

Restaurant is the only social area which is used by occupant's everyday and in ordinary times. The occupants have their meals here, three times in a day, namely at breakfast, at lunch and at dinner time. (Figure 4.3). This space should be evaluated in terms of thermal comfort due to several reasons which are defined as below:

- It has a wide floor area and a high ceiling.
- It has a large window area
- It is the most frequently used space.
- Occupied time is constant everyday and it has been heated only in those hours.
- It is possible to make comparisons about thermal performance of the space when it is heated and not heated.

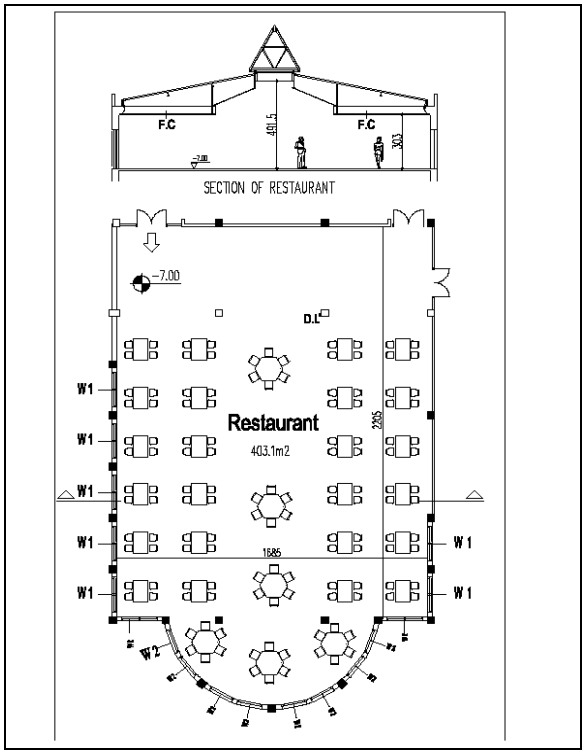

Figure 4.3. Plans and Section of Restaurant

Another frequently used space is Tea Saloon. It is situated on the ground floor and close to the corridors, stairs and elevators. That's why; the occupants can easily reach that area. It has large glazed openings designed as sliding doors facing to both east and west facades. These glazed units allow people to reach the outside garden which includes wide green grass and full of trees. Occupants prefer to be in tea saloon in order to socialize with each other and to read newspapers, especially at tea time and

after breakfast Also this is a main social activity area for meetings and parties which has been organized occasionally (Figure 4.4).

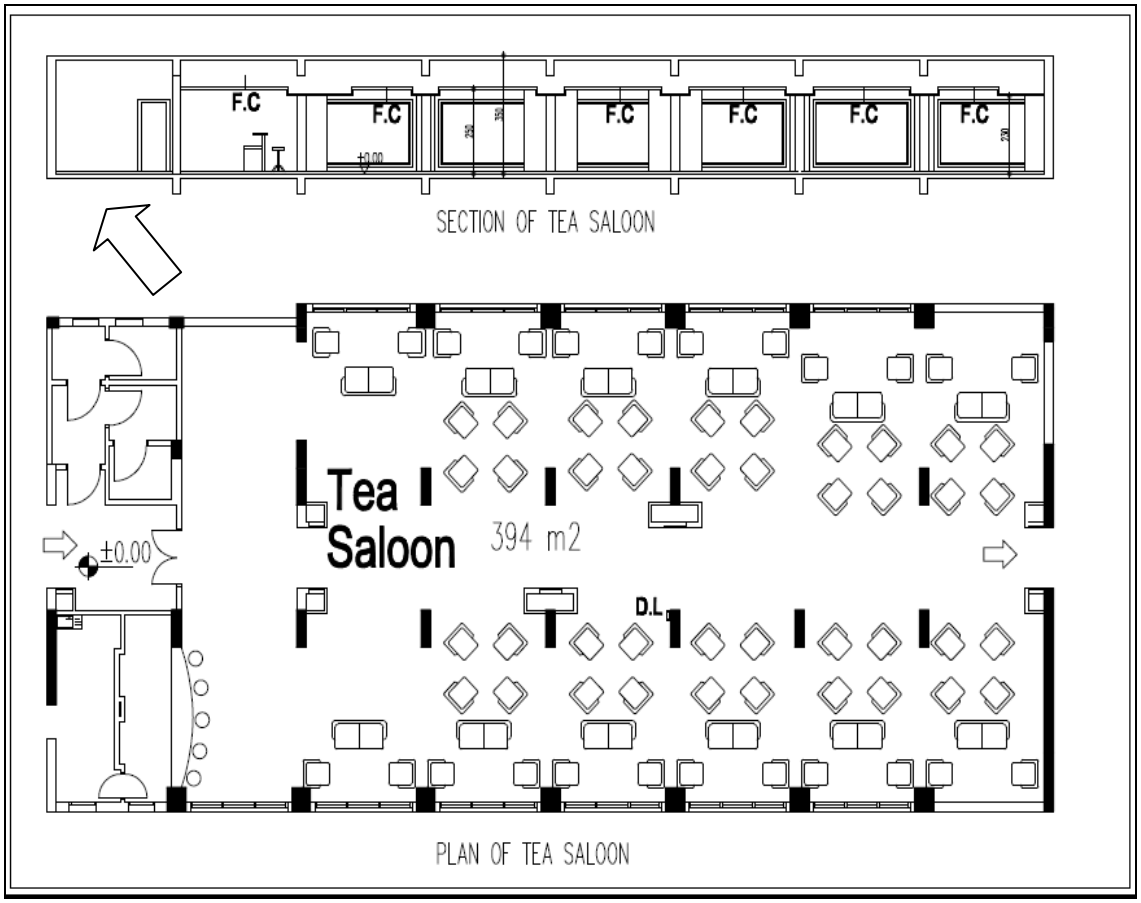

Figure 4.4. Plans and Section of Tea Saloon

As mentioned in previous section, there are three types of suites which are coded as A1, S1 and S2. S2 suites are not accommodated yet. Therefore, the field measurements through accommodated rooms include only A1 and S1 suites. Seven rooms have been used through the evaluation which five of them are A1 and the other two are S1 suites. The shape and size of the typical rooms are standard; there are some exceptional thermal conditions that should be considered separately for each room. Direction to the sun and the situation of the room in the building was taken into consideration in room selection process. Rooms facing to different facade were selected from various floors. There are no accommodated rooms facing to north facade of the building. That's why selected room's facade orientations are east, southeast, south, southwest and west.

In this study, thermal performance of seven occupied rooms was analyzed, and measurements were taken inside. Definitions of these selected rooms are as follows:

Room-1 is coded as 105 in buildings numeral system. It is situated on the first floor and faces to the south-east facade. Sunlight penetrates into the room before afternoon. For this study, the measurement device, data logger, was assembled to the wall with attention to prevent it from direct sunlight. Because, direct influence of sunlight causes misleading temperature records.

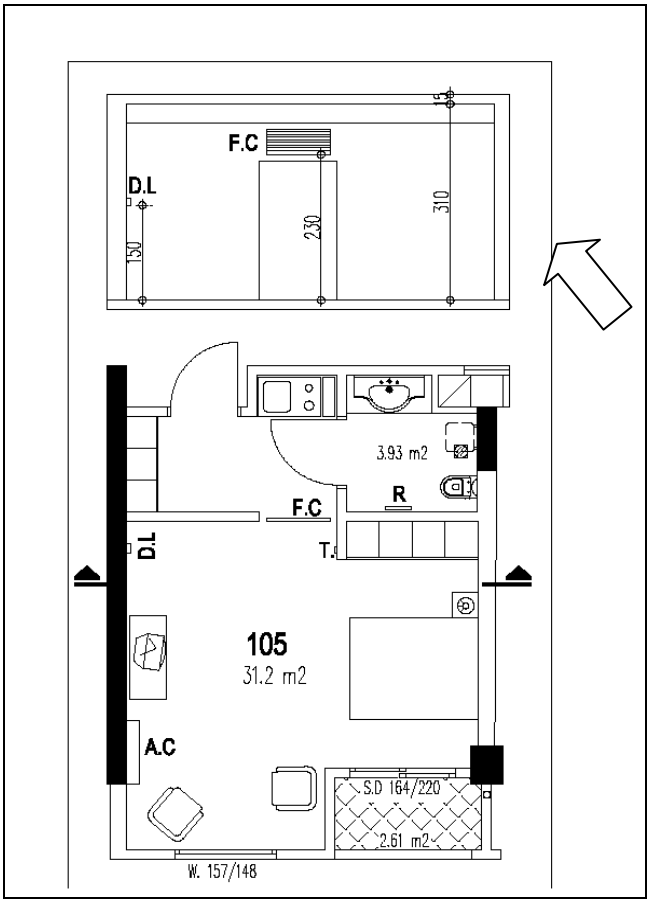

Figure 4.5. Plan and Section of Room

Heating and cooling are supported by fan coil.There is also a water radiator in the bathroom. There is also an additional air conditioner in the room. Replacement of devices is shown in Figure 4.5.

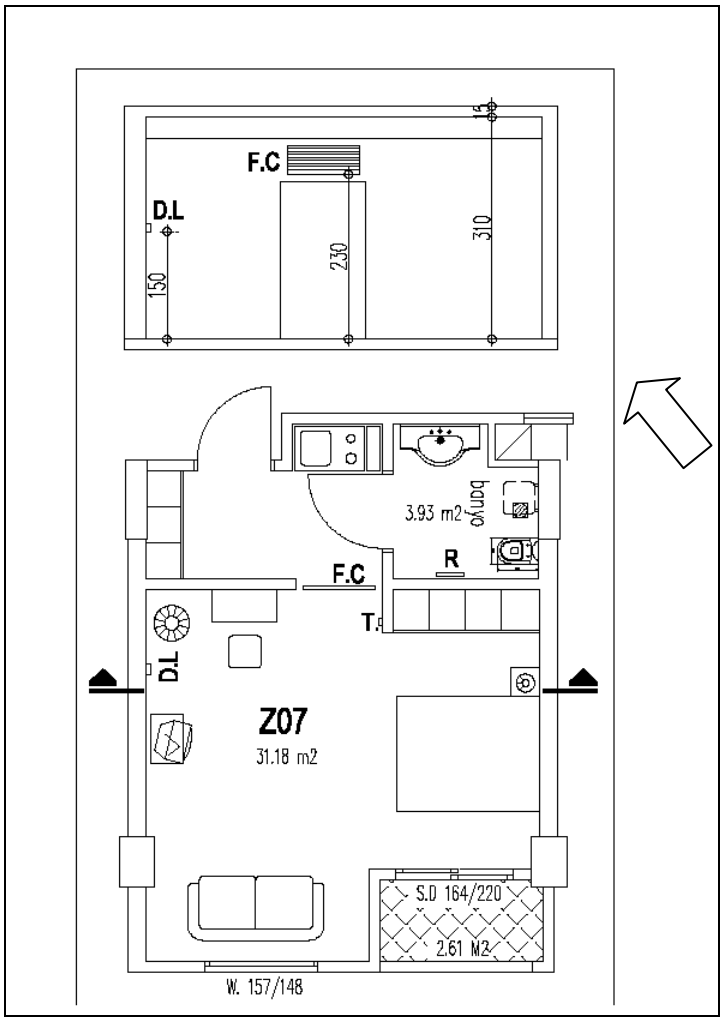

Figure 4.6. Plan and Section of Room 2

Room.2 is designated as Z07. It is also an A1 type room which settles on ground floor. It is facing to the South-east facade. (Figure 4.6). In addition to standard heating mechanisms, such as fan coil and water radiator, there is a portable electrical heater in the room. The data logger was hanged to the side wall, 1.5 m above the ground. This was repeated for all selected rooms. There are already room thermo stated devices in all rooms which allow occupants to adjust temperature settings. At the same time, these devices display indoor air temperature. Room thermostated panel is shown in Figures 4.5 - 4.11 by T. Code.

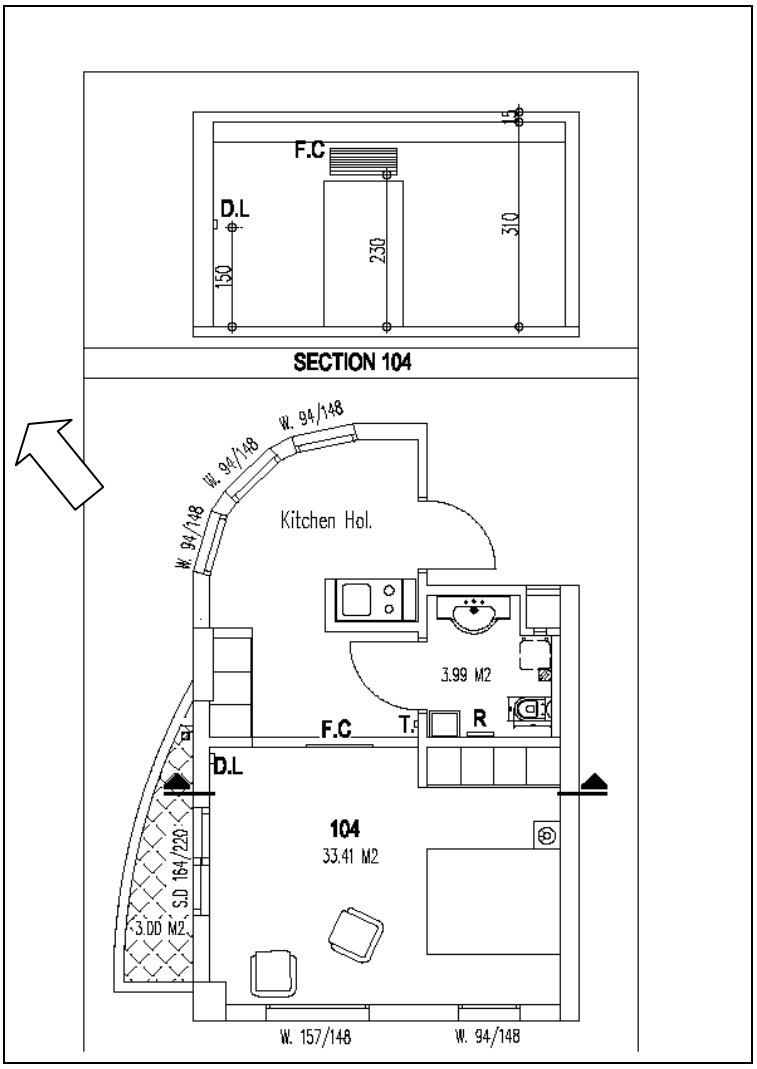

Figure 4.7. Plan and Section of Room 3

Room 3 is coded as 104 in the building. It is situated on the first floor of Block B2. It is a corner suite and settles at the end of the corridor. As it is an A1 type suite, it's very different from standard A1 types, in regard to its extra ordinary plan. It has three facade and various types of windows on each facade as seen in Figure 4.7. The room receives effective sunlight all day from the windows on south-east, south-west and west. Standard heating and cooling devices are equipped in this room as seen in Figure 4.7. Any other additional heating or cooling devices are not present in this room.

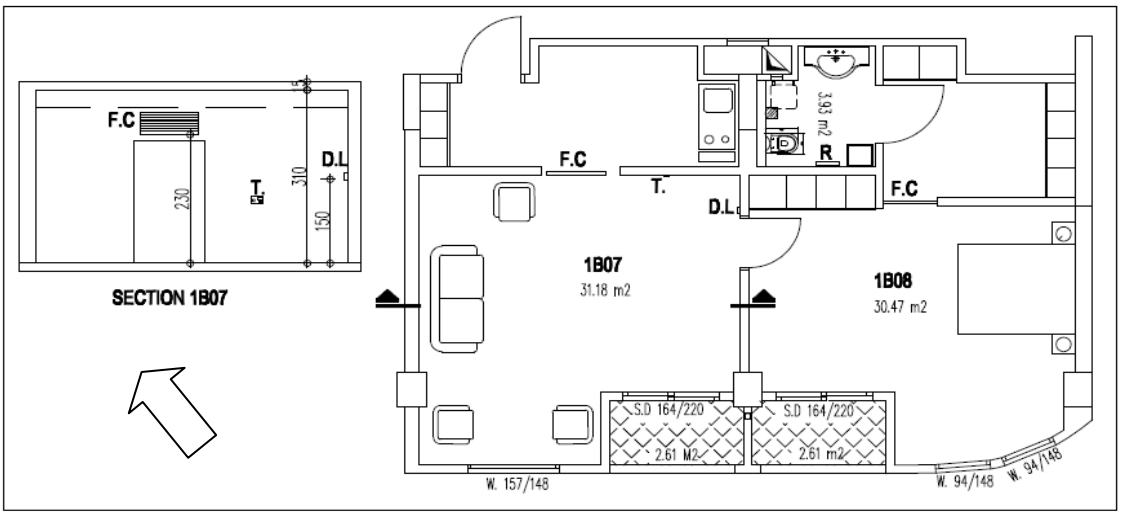

Figure 4.8. Plan and Section of Room 4

Room.4 is an extra ordinary suite which was composed of two A1 type suites together. Two A1 rooms represent similar design principles of S1 type in regard to their arrangement. It is accommodated by a couple. However it is a corner flat which settles at the end of the corridor, it has only one facade. One of its facades is embedded to the ground. This suite settles on the first basement floor of Block B2. It has wide floor area when compared to other S1 suites.

Similar heating and cooling equipments are present in this room as seen in Figure 4.8 below and no additional heating or cooling device were observed.

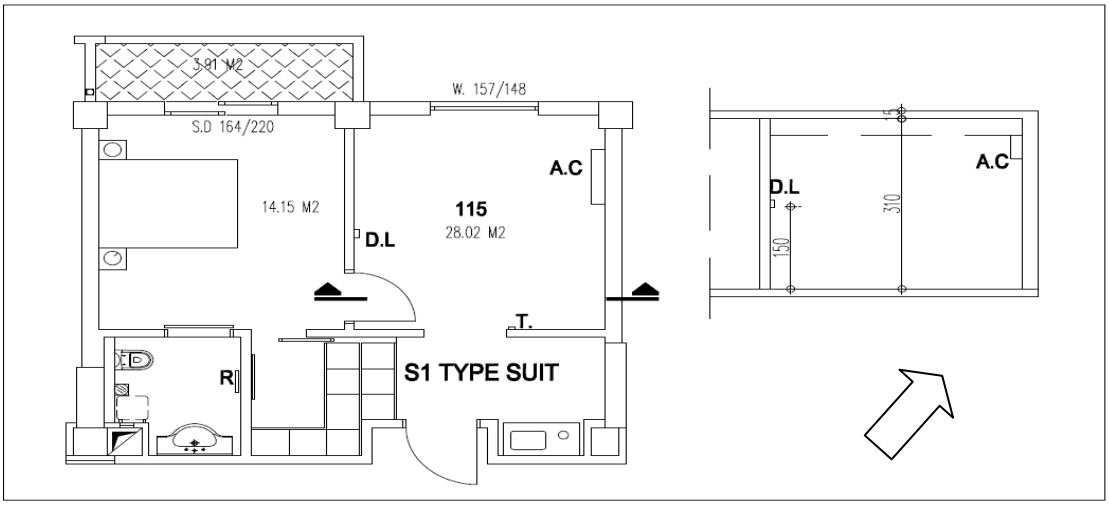

Figure 4.9. Plan and Section of Room 5

Room 5 is designated as 115 in the building. It is settled on east side of the Block B3, on the first floor. It is an S1 type room. Room orientation is to the east. Fan coil is out of use in this room and there is an additional air conditioner. Other standard heating and cooling equipments which are present in the room are shown in the Figure 4.9.

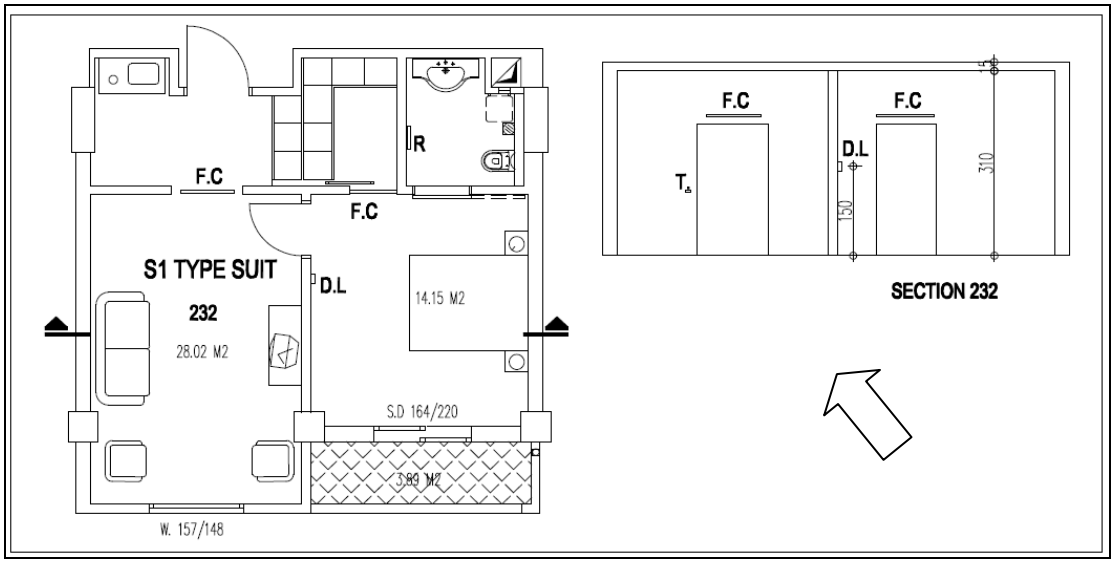

Figure 4.10. Plan and Section of Room 6

Room 6 is being accommodated by a couple. Its code in the building is 232, settled on the second floor of Block B3. It is a typical S1 suite and faces the west facade. It has two rooms and a bath. It has two fan coil and a water radiator. No additional heating or cooling device observed in this room. Other measurement equipments such as data logger and thermo stared control panel are mounted on the wall and are placed in plan as shown in Figure 4.10.

Room 7 settles on the first basement floor of Block B2 and faces to the south-east. It is coded as 1B05. There is no modification and user interference in the room.

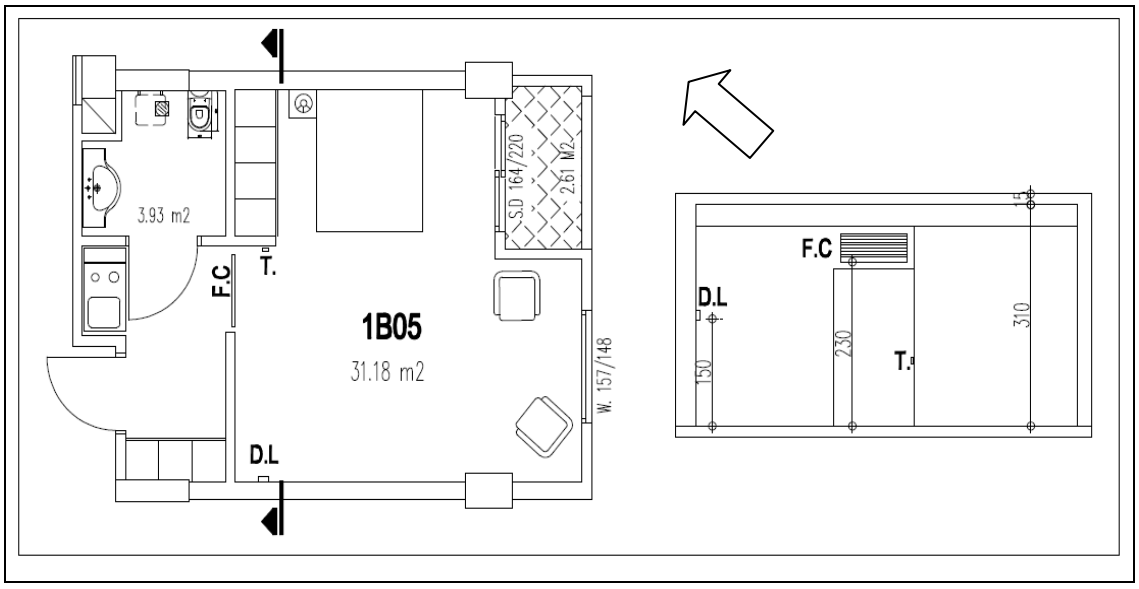

Figure 4.11. Plan and Section of Room 7

4.2. Subjective Data Collection and Analysis

4.2.1. Research Process

In this research, un-structured interview method applied in order to collect subjective data. The main reason to prefer this method is basically to collect excessive data from respondents as much as possible, in a reasonable time. The limited amount of the interviewees has been an advantage which makes this type of interview ideal for this case study. This research as a thermal comfort evaluation requires detailed knowledge about respondents' individual perceptions and sensing. Detailed explanations were preferred in this study, instead of generalizations, in order to define individual thermal perception.

The questions were mostly open-ended questions. But there was an exceptional question which presented multiple choices in order to help occupants with some example cases. Occupants were free to prefer more than one choice among them and also were able to give additional answers and make wide explanations over a selected issue. It was also experienced that some of the questions were not answered by the occupants. Some of the questions that had been in interview guide were preferred to be asked under a more common issue, related with the instant attitude of the respondent. In addition some new topics were explored during the interview period. These questions

took place in the final interview. Some of the questions required knowledge about the subject. These were often specific issues that need detailed research. Brief information was given to the respondents about some concepts such as definition of intelligent buildings and thermal comfort.

Interviews were conducted in seven different spaces with totally nine interviewees. Five of them answered the questions independently and other four people were couples as husband and wife. Couples answered the questions together. So there were seven interview meetings throughout the study. Identification of the interviewees was presented in Material. Meetings were held in their occupied suites

In order to prevent data loss and misunderstandings through a wide scope, speech tape record was used to capture this comprehensive knowledge. Then the recorded speeches were typed. The original records and uninterested texts were present but while analyzing the answers speeches were refined and some classifications were made by researcher. This refined knowledge was expressed in results part of the study.

4.2.2. Interview Questions

In this section the interview questions which were asked to the respondents are presented.The original version was prepared in Turkish and those questions and all interview text in raw format were presented in Appendix C. This unstructured interview was also composed of one multiple choice question and brief information about such concepts for intelligent buildings and thermal comfort. All questions included in the interview are as follows:

> *Intelligence is defined as an ability of adapting for the varying conditions in general. So an intelligent building has to be able to adapt itself to the various human Requirements and various outside and inside environmental conditions. And it should also provide maximum operational efficiency besides minimizing the operation costs.*
>
> *The principal aim is to minimize the operational energy and to satisfy users' comfort conditions.*
>
> *Question 1:* According to this definition can you evaluate or criticize the intelligence of this building?
>
> *Question 2:* With which features do you think the building is intelligent?

Question 3: What are your expectations from an intelligent building?

Question 4: Do you think buildings working with intelligent systems are suitable for this kind of residence which is occupied by alter users.

Question 5: In what other kind of buildings these systems can be implemented?

Human comfort is influenced by psychological factors as well as physiological factors. There is no precise method of stating what thermal environmental condition will affect a comfort feeling in a human being. It is difficult to specify a single physical quantity for evaluating human comfort.
Thermal comfort is defined as that condition of mind which expresses satisfaction with the thermal environment. Acclimatization is an important factor effecting comfort. Thermal comfort Parameters can be determined by six major variables as environmental and personnel;

Environmental factors

- *air temperature*
- *air speed*
- *humidity*
- *mean radiant temperature*

Individual factors

- *activity*
- *clothing insulation*
- *Individual differences and recent thermal history.*

Question 6: According to definition how do you evaluate the thermal comfort in this building?

A. Completely Suitable B.Comfortable C.Acceptable D.Uncomfortable

Question 7: When you are not satisfied from thermal comfort conditions,
What kind of precautions would you take in order to eliminate discomfort?
What would you do in action?

- Using room thermostat for temperature control?
- Change in clothing?
- Contact to building officials?
- Opening doors and windows
- Doing sportive or physical activities; moving, walking, etc., in order to increase metabolic rate.
- Having hot or cold drink
- Using extra heater or air conditioner,

Question 8: Do you use fun coil?

If yes,

- How often do you use?
- Do you need any alternative heater additively?

If no,

- Why?
- What do you use instead?

Question 9: Do you let the sun light penetrate into the room, during the day, in order to benefit from the sun light, to provide thermal comfort or does it cause discomfort?

- Do you want to benefit from sunlight during the day?
- Do you feel the disturbing effect of sunlight?
- Do you need sun control devices and prevent the influence of sunlight?

Question 12: How many hours in a day, do you spend in your room?

Question 13: What are your daily activities in the room?

Question 14: Do you feel differences in thermal comfort conditions between room and common places of the building?

1. What are the common places in the building that you use frequently?
2. Are there any places among these spaces that you feel absence of thermal comfort?
3. Can you describe these spaces according to the reasons of discomfort?

Question 15: What is your opinion about your room direction?

Question 16: have you been considered the room direction as a fact while deciding to occupy this room? Or do you have any idea about the other alternative sides just now? Would you prefer be on any other aspect instead of this?

Question 17: Do you feel health and comfort problems which depend on physical conditions such as cold, perspiration, extreme skin wetness, stuffiness, headache, oral dry, dazzling etc? If they happen, how often?

CHAPTER 5

RESULTS AND DISCUSSION

In this chapter two subsections, namely, results obtained from field measurements and from interview questions; and discussions about these findings according to literature and objectives are presented.

5.1.Results

This section includes presentation of findings from both objective and subjective analyses. Results of measurements, as a part of objective data analysis, are illustrated with tables and graphics. All variables, temperature, relative humidity and intensity, are explained and listed explicitly. In addition results of correlation analysis between variables are presented to show whether any significant relationships exist among certain variables. In the following subsection represented findings from subjective data analysis. All verbal(subjective) data obtained from interview method is presented as the raw data which is in Appendix. Tables constructed to show all answers to interview questions under three sub-headings, evaluating the intelligence in this building, thermal comfort evaluation, room identification.

5.1.1. Results of Measurements

Readings taken from data logger formatted in Excel and classified as temperature data, relative humidity data and intensity data. As weather conditions affect the thermal behaviour of a building the meteorological data is also considered in order to evaluate the thermal environment. The outdoor measurements of these parameters are taken from Davis 6120 Vantage Pro Portable type meteorological station. The intention was to be able to compare the indoor and outdoor variables, if changes in outdoor weather has a direct impact on indoor thermal comfort. The outdoor measurements of these parameters are taken from Davis 6120 Vantage Pro Portable type meteorological

station. 28 day dynamics derived from the measurements, are seen in Figures (from C. 1 to C.10).

5.1.1.1 Temperature Data

Indoor temperatures recorded within 30 minute time intervals for each room are prepeared. As an example of data sheets, measurement values for Room-1 demonstrated in Appendix A. Instant maximum, instant minimum and daily average temperatures, are listed in Appendix B on tables between B1-B11.

Outdoor Temperature: Through measuring period daily outdoor average temperature ranges between 6.2ºC and 17.2ºC, and mean average outdoor temperature of this period is 10.2ºC. Minimum daily outdoor average temperature is measured as 6.2ºC on 25 February and maximum daily outdoor avarage temperature is measured as 17.2ºC on 06 March. Instant temperature is measured as 4.4ºC on 24 February at 06:40, which is the lowest temperature during the measurement period. Ambient temperature reached 19.1ºC on 06 March, at 14:40, which is recorded as the highest instant temperature of measuring period. Briefly, the outdoor temperatures changed between 4.4ºC and 19.1ºC during measurement period. Time data are listed, in order to display instant extreme temperatures. Then it will be possible to compare indoor comfort conditions related with the sudden climate changes. (Table B.1)

Indoor Temperature: In this part of the study, daily average indoor temperatures for each space are listed and expressed. In addition to this, highest and lowest instant temperatures that recorded by data loggers are indicated with the time data.

When the recordings of Room-1 investigated it is seen that temperature values varied between maximum of 28.2ºC ,which is measured on 22 march at 09:10, and minimum of 20.3 ºC that measured on 13 march 22:40. Daily average temperatures were between 23.3ºC and 25.5ºC and mean average temperature has found 24.3ºC through measuring period. (Table B.2)

Daily average temperature of Room-2 changes between 24ºC and 27.9ºC through measuring period and mean average indoor temperature for 28 day has found as 26.9ºC. Daily average temperature decreased 24ºC on 25 February which is the coldest day of measuring period for ambient temperature. On the other hand and daily average temperature reaches to 27.9 ºC on 10 March. Instant temperature measured on 26

February at 04:40 was 23.6ºC. That is the lowest temperature recorded during the measurement period for room-2. Highest instant temperature is recorded on 16 March, at 15:40 as 28.6ºC. The indoor temperature during measurement period differed between 23.6ºC and 28.6ºC. (Table B.3)

Daily average temperatures of room-3 varies between 21.7ºC and 26ºC during the measurement period. Mean average indoor temperature is found as 24.1 ºC for room-3. Daily avarage temperature was 21.7 ºC during three days on 26-27-28 February. Even, the lowest instant temperature is recorded on 28 February, at 09:10 as 18.7 ºC. After this cold period temperature increases. 6 March is the hottest day for room 3, this day maximum indoor avarage temperature was 26 ºC. Highest instant temperature is recoreded in the following day, on 7 March at 16:10 as 26.8 ºC. (Table B.4)

Through measuring period average of the recorded temperature data has found 23 ºC, as mean average indoor temperature for room-4. Daily avarage temperature was 21.5 ºC on 25 February , which was the coldest day for room-4 and also lowest instant temperature is recorded on 25 February, at 11:10 as 15.8 ºC. In addition, the date 23 March, was the hottest day for room-4, with 25 ºC daily avarage temperature and 29.8 ºC instant temperature which is recorded at 23:40 as the highest temperature of measuring period. (Table B.5)

Mean average indoor temperature of room-5 is found 24.1 ºC on 4 March daily average temperature was 21 ºC, which is registeed as the coldest day for room-5. Hottest day of this room was 10 March with 26.5 ºC average temperature. Through measurement period indoor temperature ranges between minimum 17.1ºC and maximum 28.5 ºC. Highest instant temperature, 28.5 ºC is recorded on 17 March, at 20:40 and lowest instant temperature is recorded on 14 March, at 19:10 as 17.1ºC. (Table B.6)

Mean average indoor temperature of room-6 was 24.8 ºC through 28 day. Lowest value of daily average temperatures has seen on 24 February as 23.1ºC while highest daily average temperature was 26.4ºC on 7 March. Highest instant temperature is recorded on 27 February , at 13:10, as 28.4 ºC. Lowest instant temperature is recorded on 24 february at 08:40, as 20.7 ºC. (Table B.7)

As seen from the table B.8 and Appendix C.7, instant temperatures vary between 18.1ºC and 28.9 ºC through measurement period in room-7. However daily average temperatures changes between 22.7ºC and 26.8 ºC, mean average of 28 day stastistics

is found 24.6 ºC for room-7. Minimum daily average temperature, 22.7ºC is belong to date 24 February and maximum daily average temperature 26.8 ºC pertain to date 15 March . That was the hottest day for this room with 28.9 ºC indoor temperature which is recorded at 07:40. The lowest instant temperature is recorded on 25 February at 16:40, as 18.1 ºC (Table B.8).

Mean indoor temperature for restaurant is found 21.7ºC when 28 day dynamics are computed. Daily average temperatures vary between 19.7ºC and 23.4 ºC through 28 day. On 27 February, as the coldest day, daily average temperature was 19.7ºC and on 7 March it was 23.4 ºC as the hottest day for restaurant. Highest value of instant temperature is recorded on 10 March , at 19:40, as 25.9 ºC and lowest instant temperature is recorded as 15.6 ºC on 27 February at 06:40. (Table B.9)

When the average of the all temperature values for lobby evaluated, mean indoor temperature is found 24.0 ºC. Coldest day for restaurant was 27 february with 22.7ºC daily average temperature. Minimum instant temperature is also recorded on the same day at 20:10, as 20.9 ºC.Measurements show indicate that highest Instant temperature is recorded on 17 March at 23:40, as 26.2 ºC. The hottest day of restaurant was 8 March with 24.8 ºC average temperature. (Table B.10).

Mean average indoor temperature computed from 28 day measurements is 23.1 ºC for Tea-Saloon. On the date 27 february which is the coldest day of the measurememt period daily avarage temperature was 21.9ºC. The hottest day was 3 March in which daily average temperature was 24.9 ºC . However, highest instant temperature is recorded on 25 February , at 14:40, as 26.4 ºC. In addition to this, lowest instant temperature is recorded on 24 february at 00:40, as 20.2 ºC (Table B.11).

5.1.1.2 Relative Humidity Data

RH value of 28 days are listed and recordings are formatted in Excel. Daily average RH values are found by listing 30 minute statistics per each day. One example data sheet which belongs to Room-1 is demonstrated in Appendix.A (Table A.2) as Relative Humidity Data for Room-1.

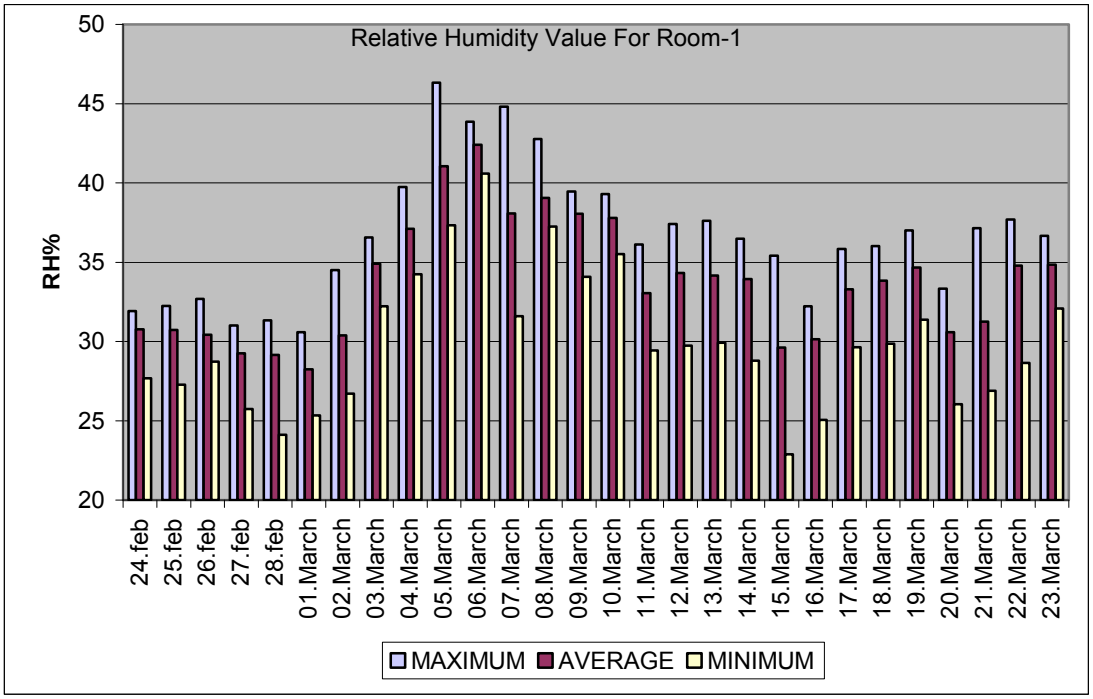

Figure 5.1. Relative Humidity Value for Room-1

When the measurements of relative humidity investigated for room-1, it is seen that the measured value of relative humidity changes between 23 % and 46% through measurement period . The RH value reaches to 46% on 5 March and decrease to 23% on the date 15 March. Daily average RH value as seen in figure 4.1 changes between %28 and %42. Mean average RH value of 28 day is found as 34%. (Figure 5.1)

Measurements of room-2 which are recorded by data logger are presented in appendix (Table B.2). Results indicate that, daily average RH value differ from 26% to 37% as seen in figure 4.2. According to these daily average values mean value of RH has found as 31% for room-2. Nevertheless, instant values that are taken in every 30 minute show that RH value decrease to 24 % on 16 March and maximum value is recorded as 38% for two times through measurement period. (Figure 5.2)

30 minute statistics which acquired from measurements demonstrate that RH value for room-3 changes between 24% and 45%. As seen in Table.3 in Appendix B and Figure 4.3 below, daily average RH value decrease to 31% on 11 March and reaches the maximum value of 42 % on date 6 March. According to these daily average measurements mean average RH value of 28 day has found as 35 % for room-3. (Figure 5

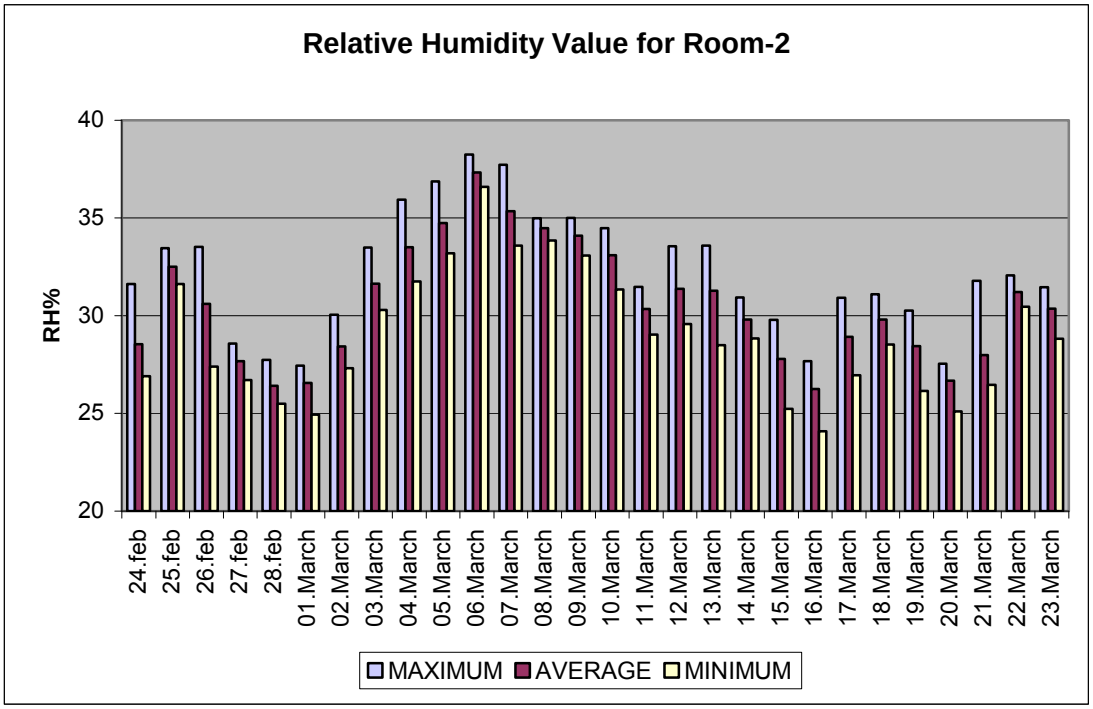

Figure 5.2. Relative Humidity Value for Room-2

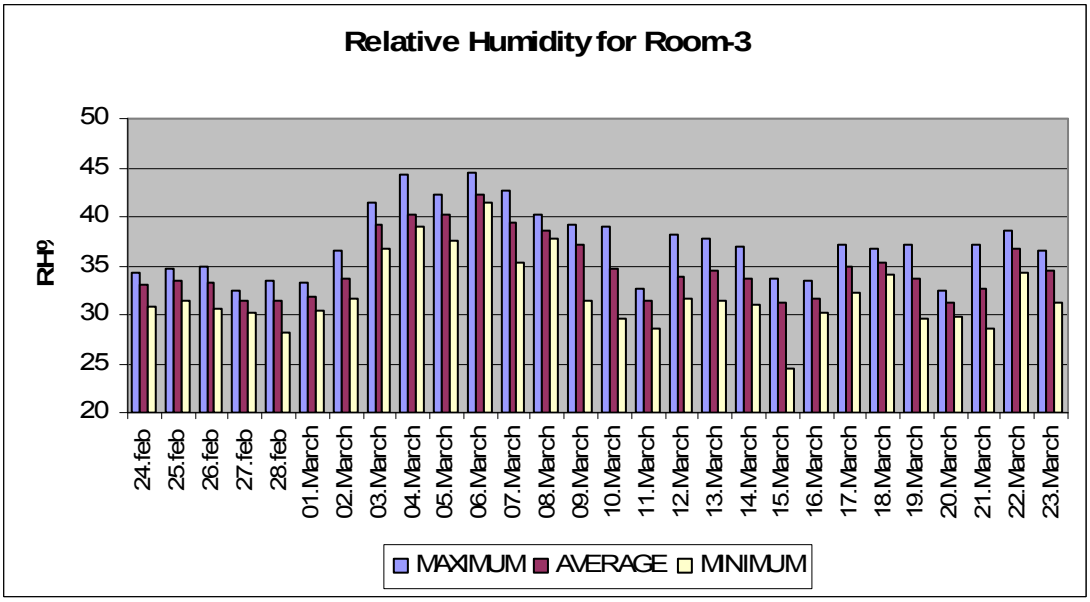

Figure 5.3. Relative Humidity Value for Room-3

As seen in Figure C.4 in Appendix C, daily average values of relative humidity for room-4 varies from 28% to 49%. Due to this daily average values mean average RH value of 28 day is found as 37%. In addition to this, instant RH values are recorded as minimum 23% and maximum 58% during measurement period. (Figure 5.4)

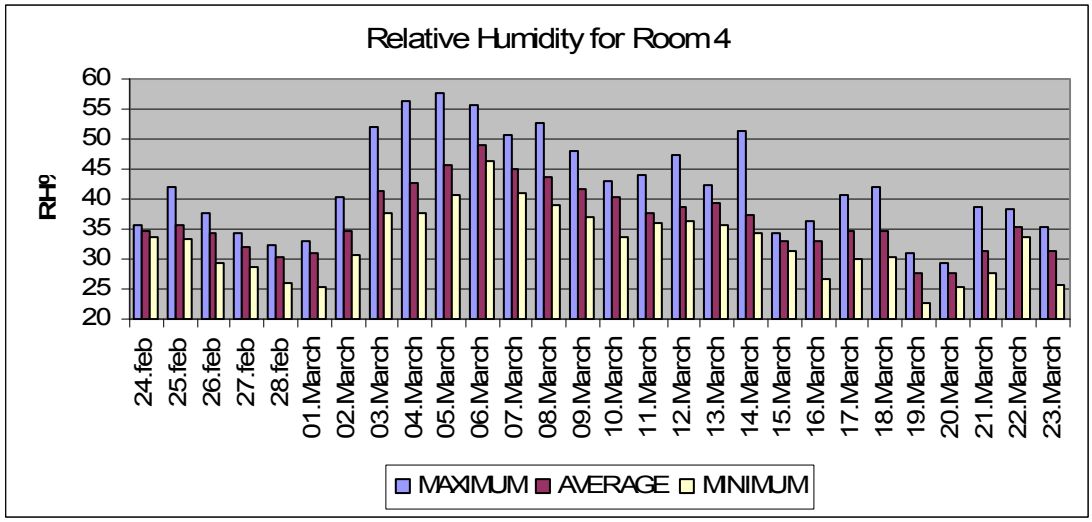

Figure 5.4. Relative Humidity Value for Room-4

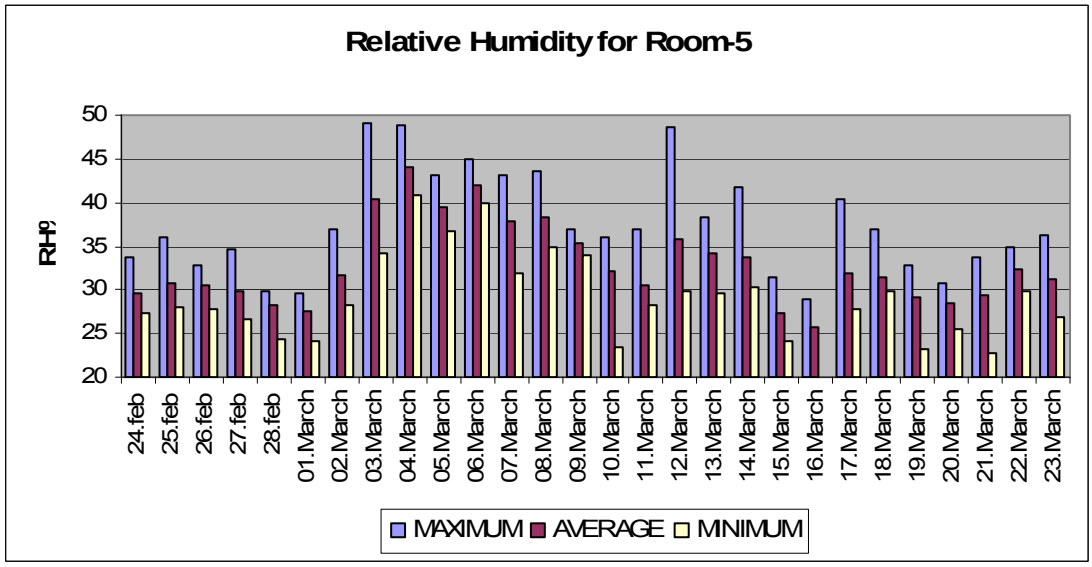

Figure 5.5. Relative Humidity Value for Room-5

Measurements of room-5 show that, daily average RH value varies between 26% to 44% as ssen in figure 5.5. According to these daily average values mean value of RH has found as 33% for Room-5. Since, instant values that are taken in every 30 minute show that RH value decrease to 19% on 16 March and maximum value reaches to 49% for two times on 3 and 4 March through measurement period. (Figure 5.5)

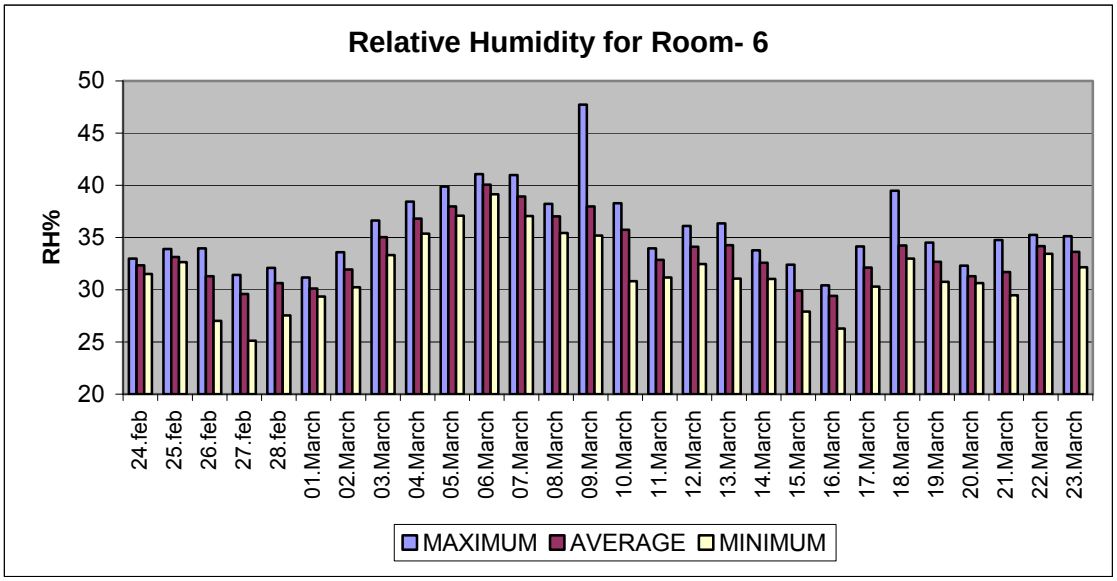

Figure 5.6. Relative Humidity Value for Room-6

As seen in Figure C.6 in appendix C, RH value for room-6 changes between 25% and 48% that reaches to maximum %48 on 6 and 7 March and decrease to 25% on 27 February. Figure 4.3 indicates daily average RH value decrease to 31% on 11 March and reaches the maximum value of 48% for two times on 6-7 March. According to these daily average measurements mean average RH value of 28 day has found as 34% for room-6. (Figure 5.6)

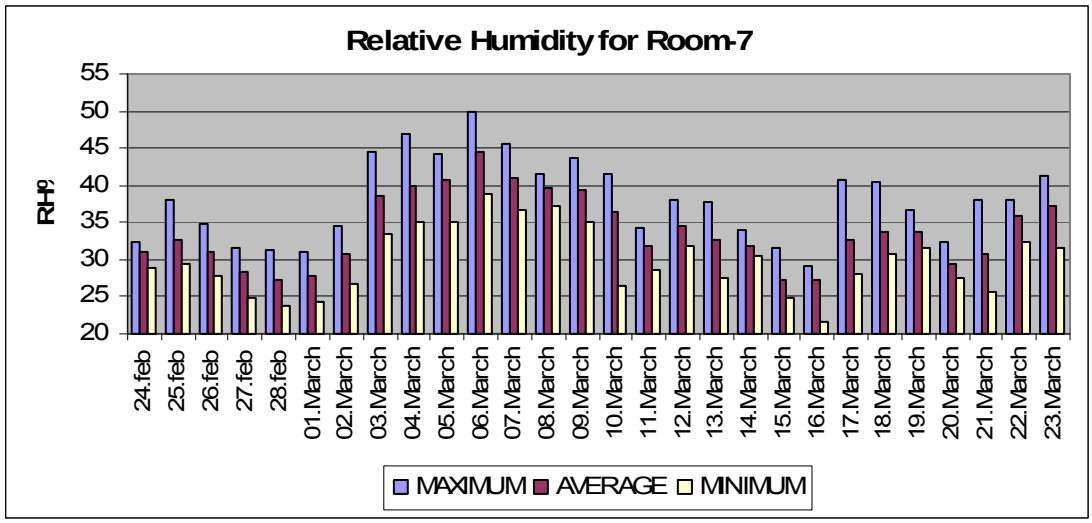

Figure 5.7. Relative Humidity Value for Room-7

Figure.C.7 in appendix, shows the measured RH values for room-7. RH value changes between 22% and 50% that reached to maximum %50 on 6 March and fall to 22% on 16 March. Figure 4.7 demonstrates the maximum, minimum and daily average RH values for each day. Daily average RH value decrease to 27% on 16 March and reaches the maximum value of 50% on 6 March. According to these daily average measurements mean average RH value of 28 day has found as 34% for Room-7. (Figure 5.7)

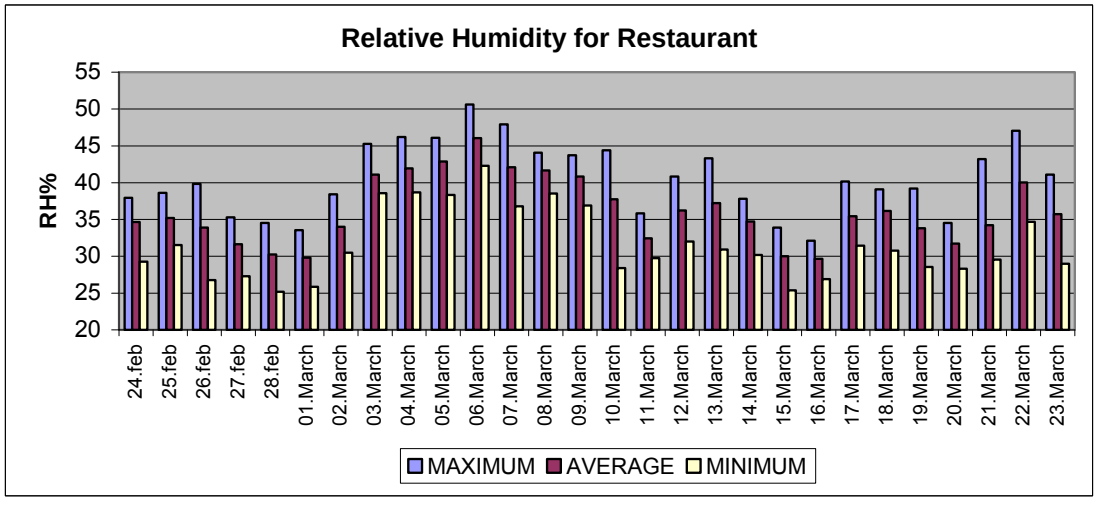

Figure 5.8. Relative Humidity Value for Restaurant

30 minute statistics in figure C.8 show that RH value fall upon 25% on 15 March and 28 February, maximum RH value reaches to 51% on 6 March in restaurant. daily average RH value varies between 30% to 46% as seen in figure 4.8. According to these daily average values mean value of RH has found as 36% for Restaurant. (Figure 5.8)

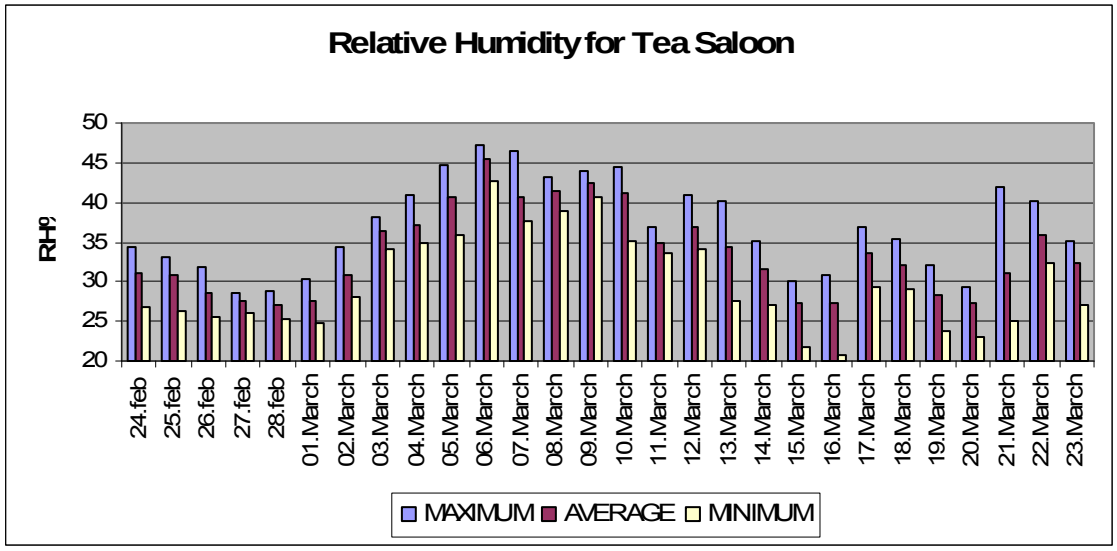

Figure 5.9. Relative Humidity Value for Tea Saloon

Figure C.9 reveals that, RH value of Tea Saloon varies between 21% and 47% that reaches to maximum %47 on 6 and 7 March and decrease to 21% on 16 March. Figure 4.9 indicates daily average RH value and also highest and lowest RH values for each day. Daily average RH value measured as 27% on various days and maximum value of daily average RH was 45% on 6 March as seen in figure 4.9. Due to these daily average measurements mean average RH value of 28 day has found as 34% for Tea Saloon. (Figure 5.9)

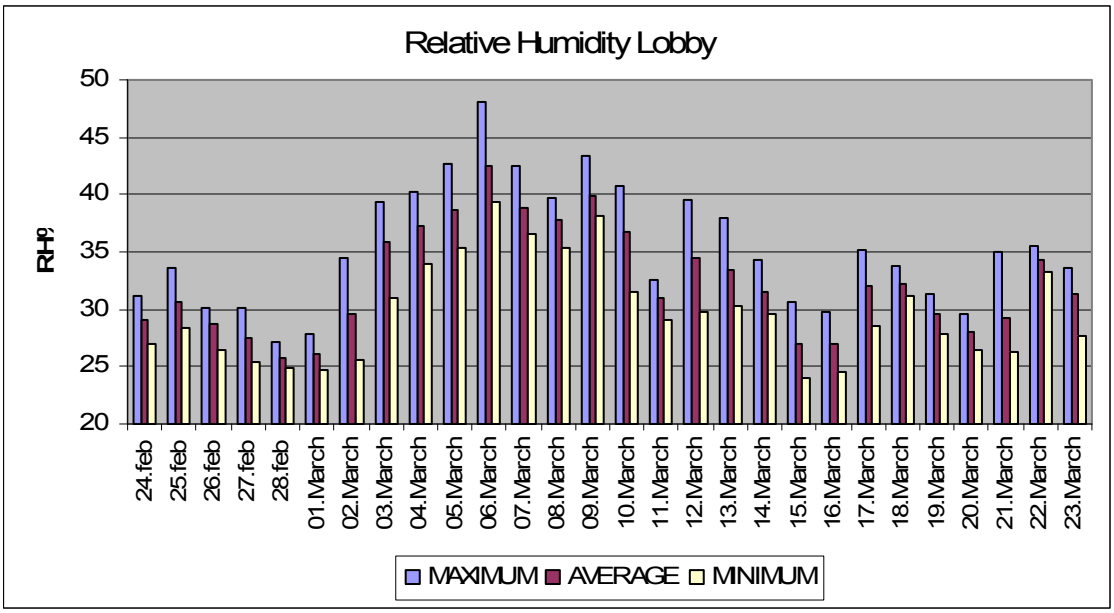

Figure 5.10. Relative Humidity Value for Lobby

Figure C.10 in appendix, display the measured RH values of Lobby. Related to the data derived from 30 minute statistics of data loggers RH value changes between 24% and 48%. Reached to maximum %48 on 6 March and fall upon 24% on 15 and 16 March. Minimum of daily average RH value is measured as 26% on 1 March and also on 28 February. Maximum of daily average RH value was 43% on 6 March as seen in figure 4.10. According to these daily average measurements mean average RH value of 28 day has found as 32% for Lobby. (Figure 5.10)

5.1.1.3. Intensity Data :

Intensity data which are recorded by data loggers in every 30 minute are listed as tables. An example data sheet for intensity values of room-1 is presented in Appendix A that includes tables which are belong to each room. Tables include 30 minute statistics of 28 day. Highest values for each day are signalled in order to emphasize the effect of the time value when the highest radiation occured in the room by the effect of sunlight. Although the 24 hour measurement period includes both artificial light and daylight intensity values, the period between 08:40 and 16:10 selected to distinguish the effect of artificial lighting and daylight.

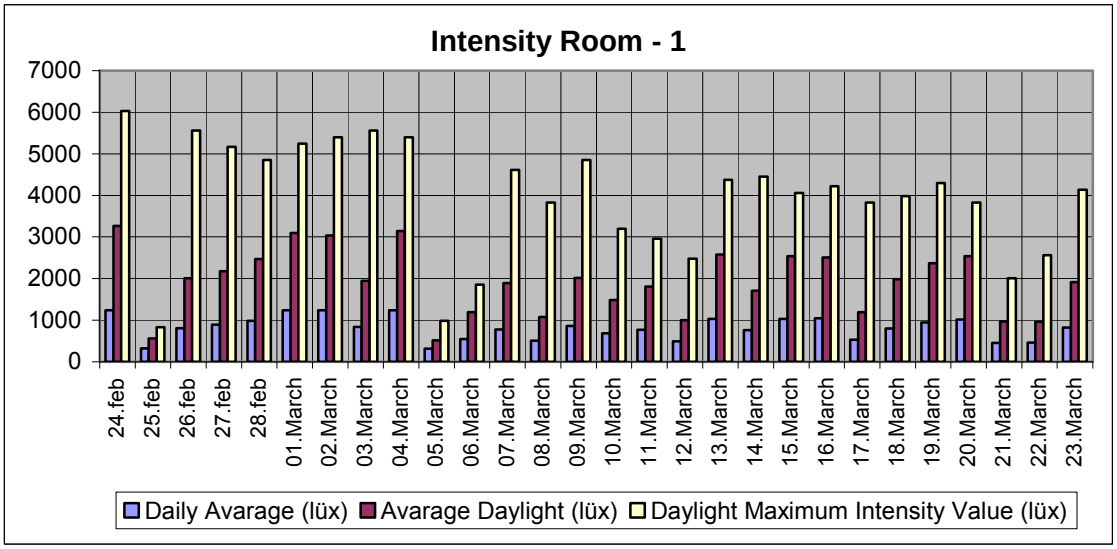

Figure 5.11. Intensity Value for Room 1

Intensity value varies between 315 lux and 1240 lux during measurement period. Avarage of all intensity data for Room1 is found as 810 lux. In addition to this values, daylight is distinguished from all day measurements and according to 28 day statistics mean average daylight is measured as 1928 lux. Daily average of daylight ranges between 3267 lux and 517 lux through 28 day. Highest value is recorded as 6031 lux on 28 February as seen in Figure 5.11.

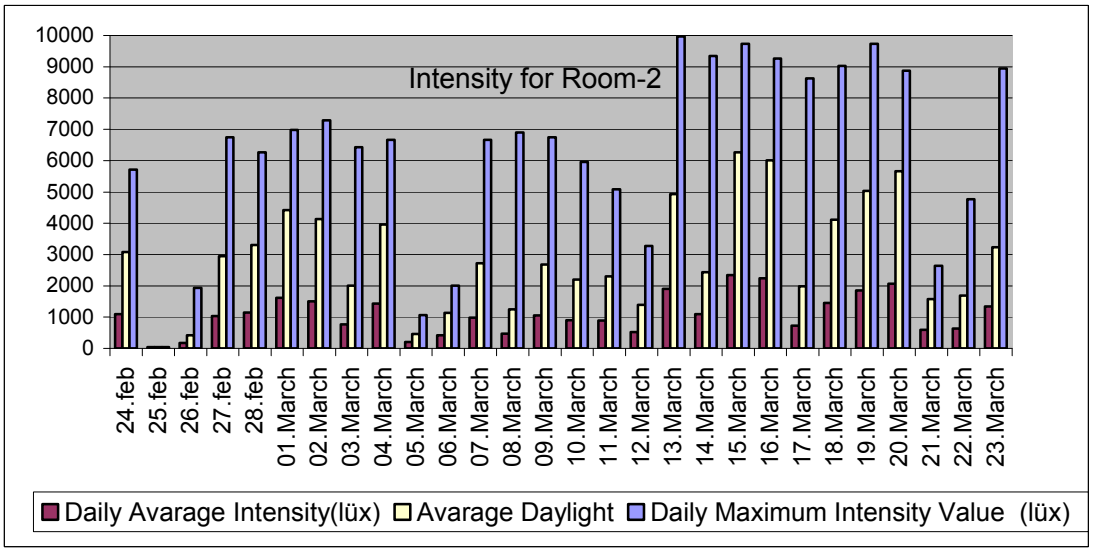

Figure 5.12. Intensity Value for Room 2

- The daily average intensity values changes between 39 lux and 2348 lux during measurement period.The mean average of intensity values are calculated as 1089 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 2907 lux. The average daylight during 28 day varies between minimum value of 39 lux and maximum value of 6268 lux.
- The maximum instant intensity recorded on 13 March as 9973 lux in Room2

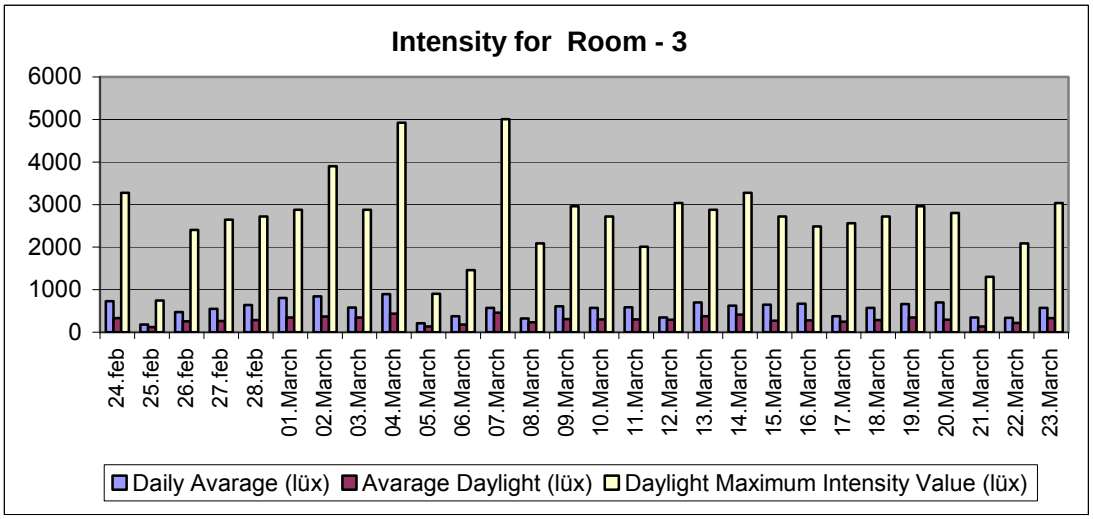

Figure 5.13. Intensity Value for Room 3

- The daily average intensity values changes between 184 lux and 893 lux during measurement period.The mean average of intensity values are calculated as 554 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 1347 lux. The average daylight during 28 day varies between minimum value of 419 lux and maximum value of 2198 lux.
- The maximum instant intensity recorded on 7 March as 5006 lux in Room-3

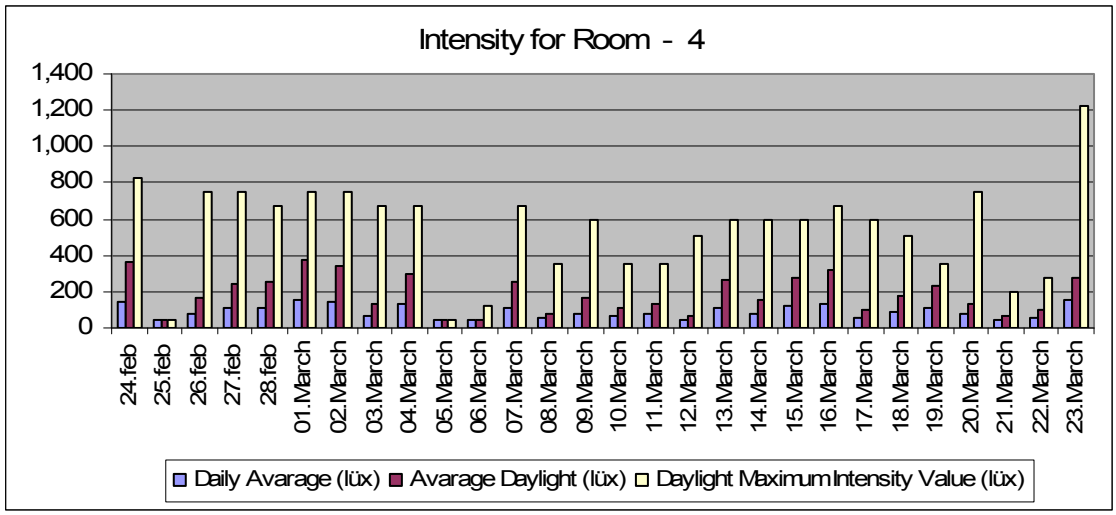

Figure 5.14. Intensity Value for Room 4

- The daily average intensity values changes between 39 lux and 158 lux during measurement period.The mean average of intensity values are calculated as 90 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 186 lux. The average daylight during 28 day varies between minimum value of 39 lux and maximum value of 369 lux.
- The maximum instant intensity recorded on 23 March as 1222 lux in Room-4.

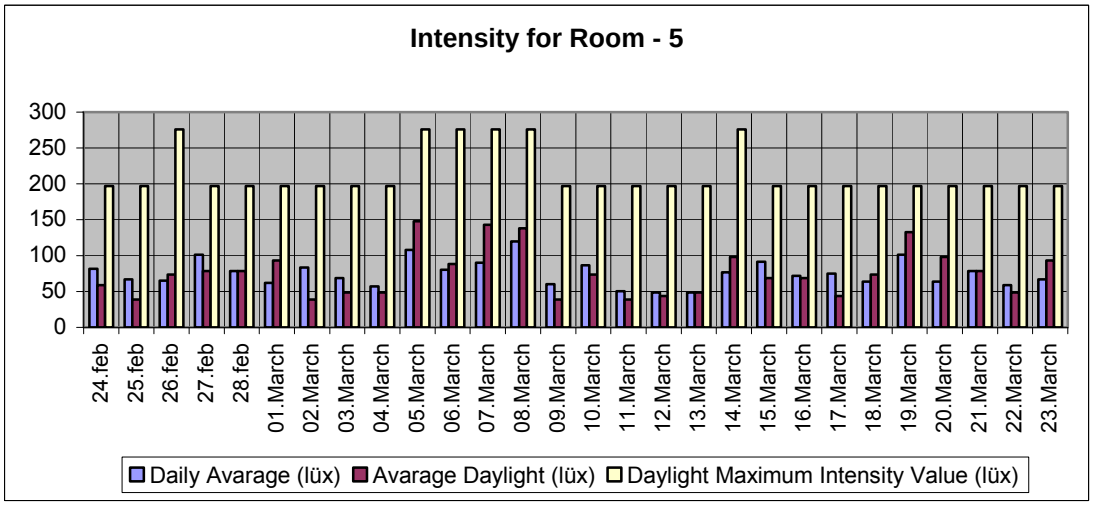

Figure 5.15. Intensity Value for Room 5

- The daily average intensity values changes between 49 lux and 120 lux during measurement period. The mean average of intensity values are calculated as 75 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 76 lux. The average daylight during 28 day varies between minimum value of 39 lux and maximum value of 148 lux.
- The maximum instant intensity recorded as 276 lux in Room-5 as seen in figure 5.15.

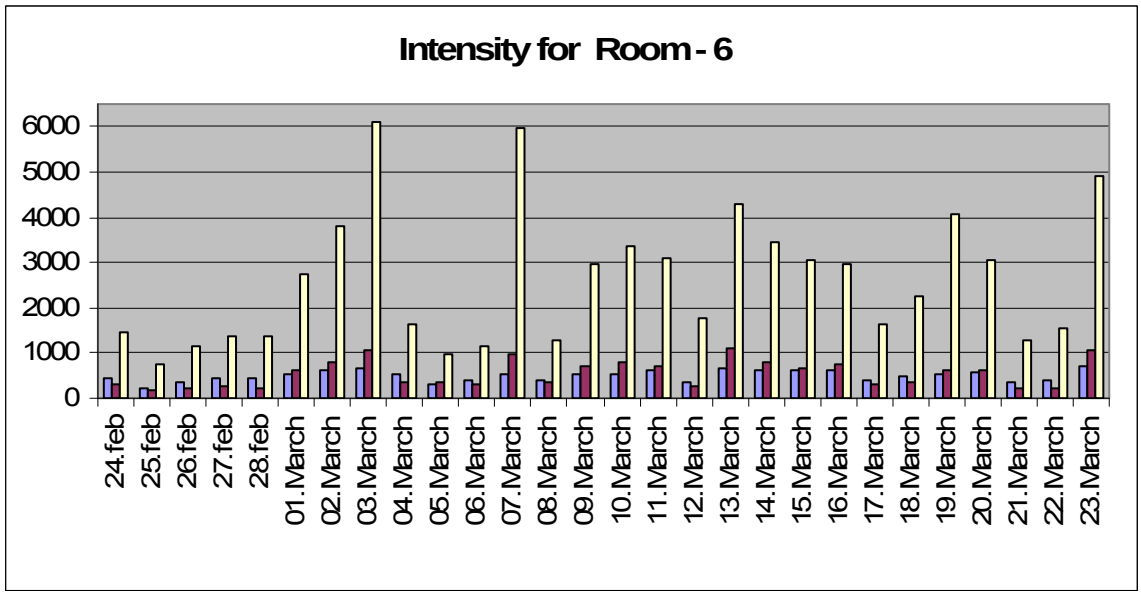

Figure.5.16. Intensity Value for Room 6

- The daily average intensity values changes between 243 lux and 701 lux during measurement period.The mean average of intensity values are calculated as 497 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 543 lux. The average daylight during 28 day varies between minimum value of 564 lux and maximum value of 1100 lux.
- The maximum instant intensity recorded on 3 March as 6110 lux in Room-6

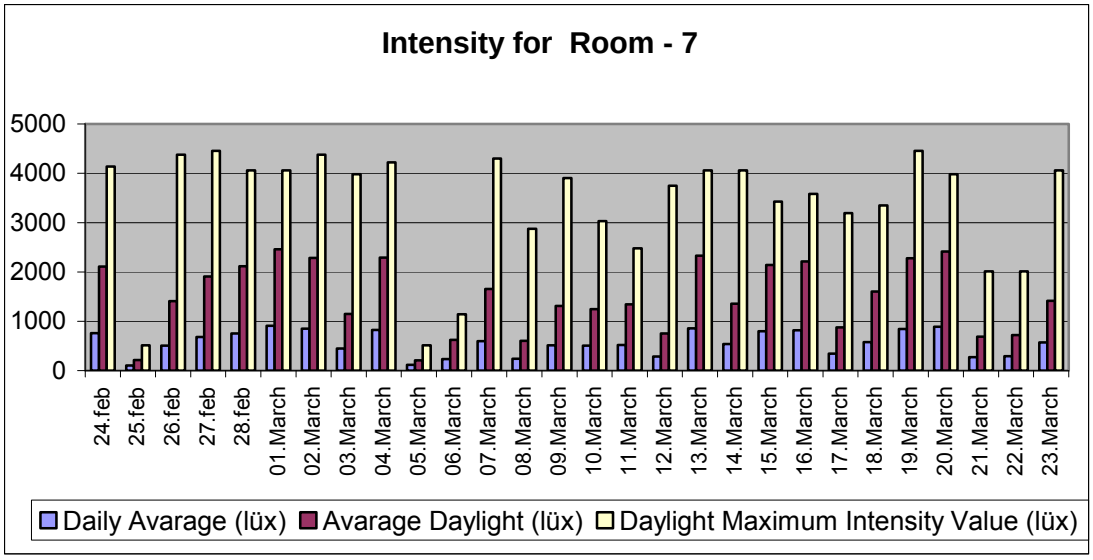

Figure 5.17. Intensity Value for Room 7

- The daily average intensity values changes between 103 lux and 910 lux during measurement period.The mean average of intensity values are calculated as 559 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 1490 lux. The average daylight during 28 day varies between minimum value of 207 lux and maximum value of 2464 lux.
- The maximum instant intensity recorded on 19 March as 4454 lux in Room-7

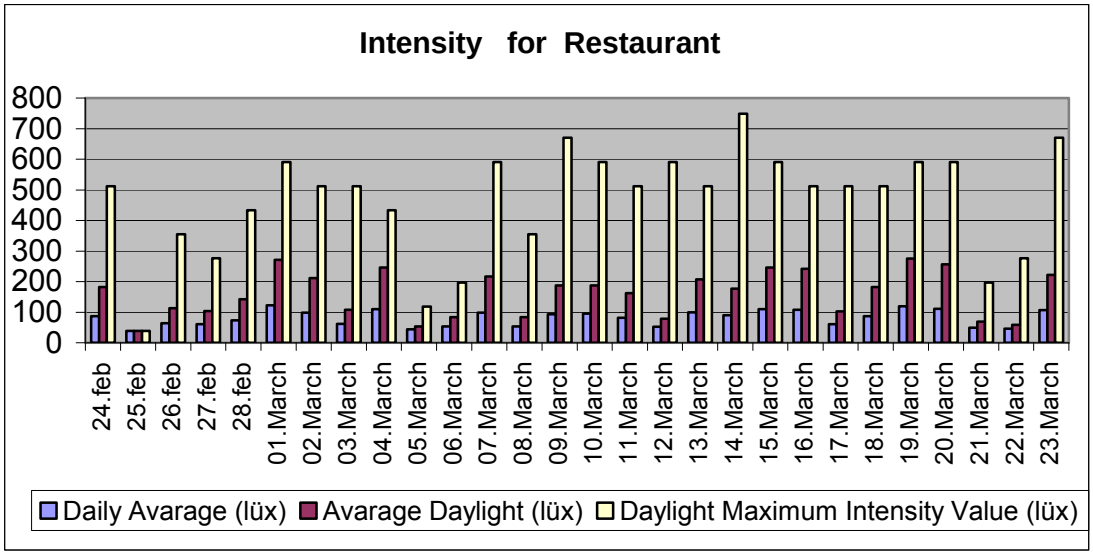

Figure 5.18. Intensity Value for Restaurant

- The daily average intensity values changes between 39 lux and 1231 lux during measurement period.The mean average of intensity values are calculated as 81 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 161 lux. The average daylight during 28 day varies between minimum value of 39 lux and maximum value of 276 lux.
- The maximum instant intensity recorded on 14 March as 749 lux in Restaurant.

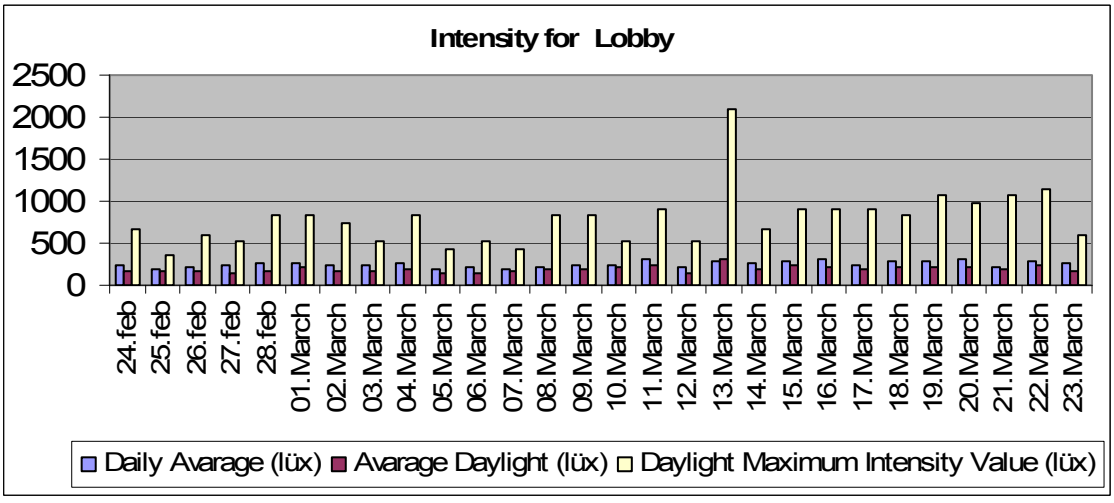

Figure 5.19. Intensity Value for Lobby

- The daily average intensity values changes between 184 lux and 305 lux during measurement period.The mean average of intensity values are calculated as 250 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 192 lux. The avarage daylight during 28 day varies between minimum value of 149 lux and maximum value of 307 lux.
- The maximum instant intensity recorded on 13 March as 2089 lux in Lobby.

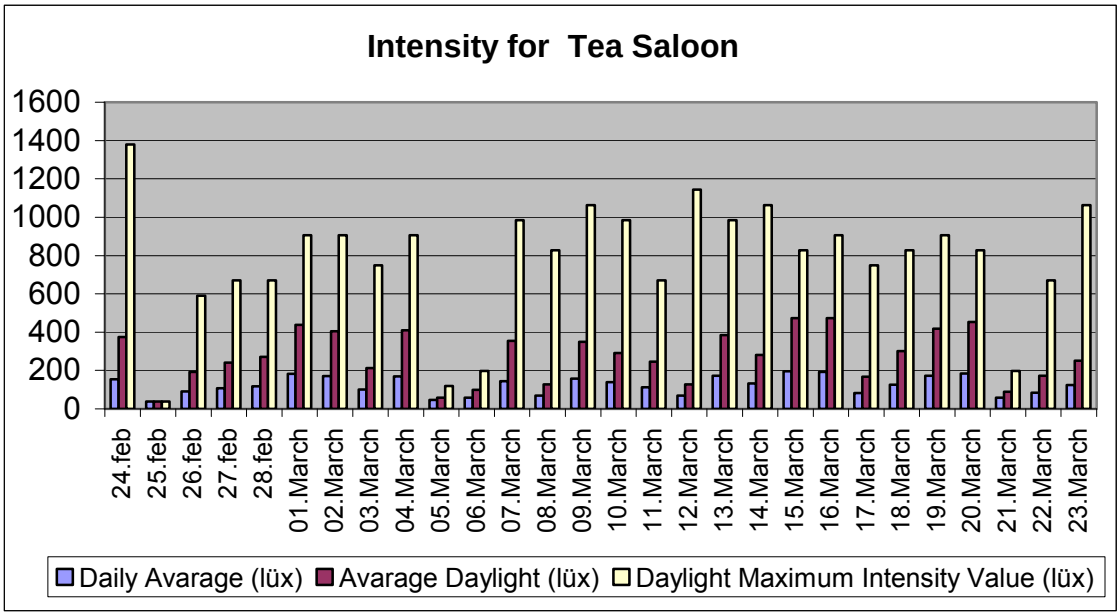

Figure 5.20. Intensity Value for Tea Saloon

- The daily average intensity values changes between 39 lux and 195 lux during measurement period. The mean average of intensity values are calculated as 123 lux according to stastics of 28 day.
- When the daylight is evaluated sperately it is seen that the mean average value of daylight is 275 lux. The average daylight during 28 day varies between minimum value of 39 lux and maximum value of 473 lux.
- The maximum instant intensity recorded on 24 February as 1380 lux in Tea Saloon.

5.1.2. Results of Correlation Analysis between variables

5.1.2.1 Temperture and Relative Humidity

In this part relation between two random variables, temperature and relative humidity, is evaluted. Corelation analysis gives opportunity to evaluate strength and direction between two random variables. Temperature and relative humidity data which is formatted in Excel programme is illustrated by distribution graphics as seen below by the figures from 5.21 to 5.30. Each variables include 1344 data. Temperature data is illustrated in X axis and relative humidity takes place in Y axis.

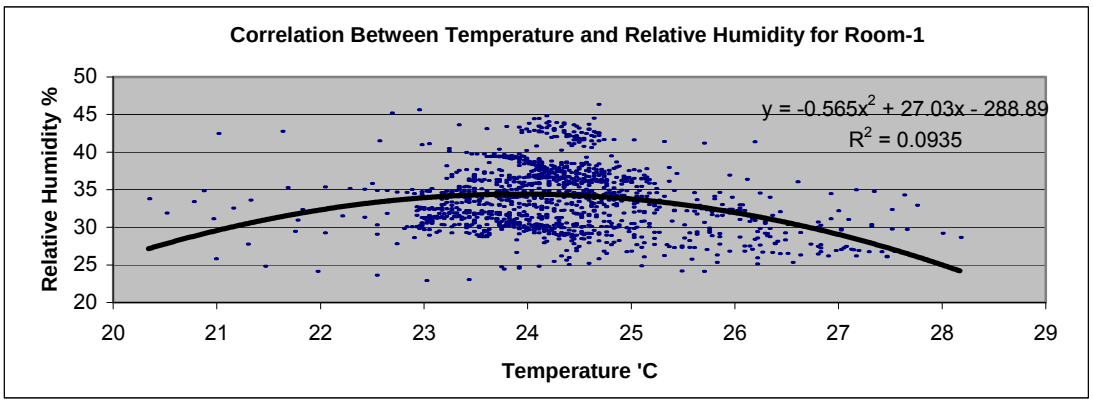

Figure 5.21. Correlation Between Temperature and Relative Humidity for Room -1

RH value of room 1 varies between 23% and 46% during measurement period. Meanwhile temperature changes between 28.2ºC and 20.3ºC. The equation above gives the R^2 value as 0.09 which symbolise the corelation coefficient.

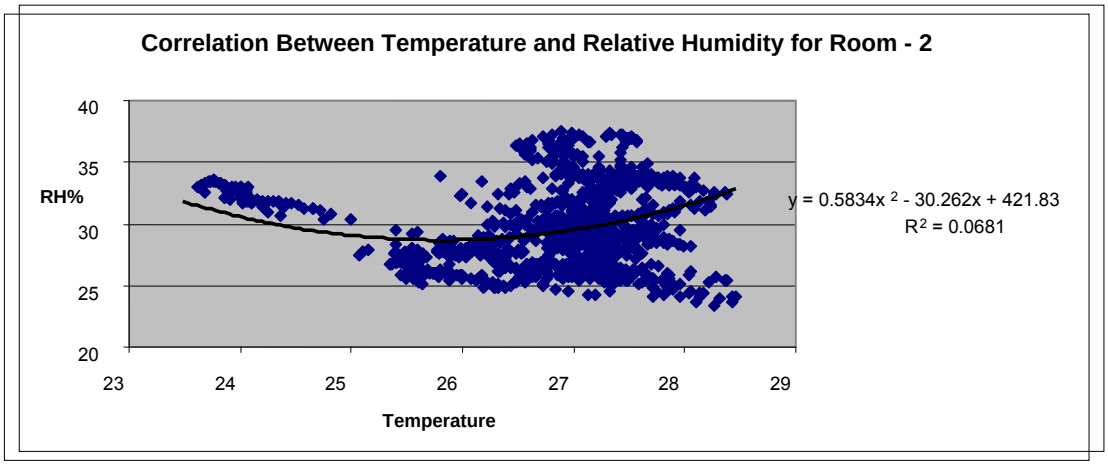

Figure 5.22. Correlation Between Temperature and Relative Humidity for Room -2

As seen in figure 5.22, Corelation coefficient is calculated as $R^2 = 0.06$ for room 2. this result is obtained by the RH value which changes from 24% to 38% and temperature changes between 28.6ºC and 23.6ºC during measurement period.

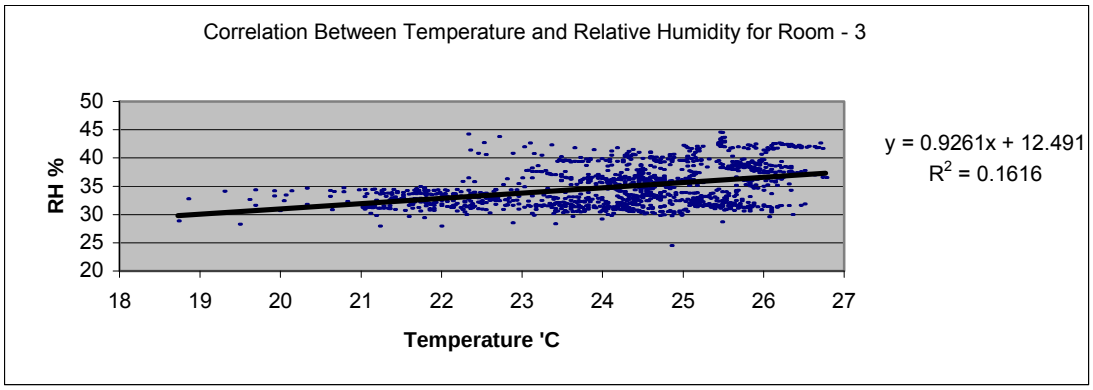

Figure 5.23. Correlation Between Temperature and Relative Humidity for Room -3

Figure 5.23 illustrates the distribution of temperature and relative humidity data. Corelation coefficient is calculated as $R^2 = 0.16$ for room 3. this result is obtained by the RH value which changes from 24% to 45% and temperature changes between 26.8ºC and 18.7ºC during measurement period.

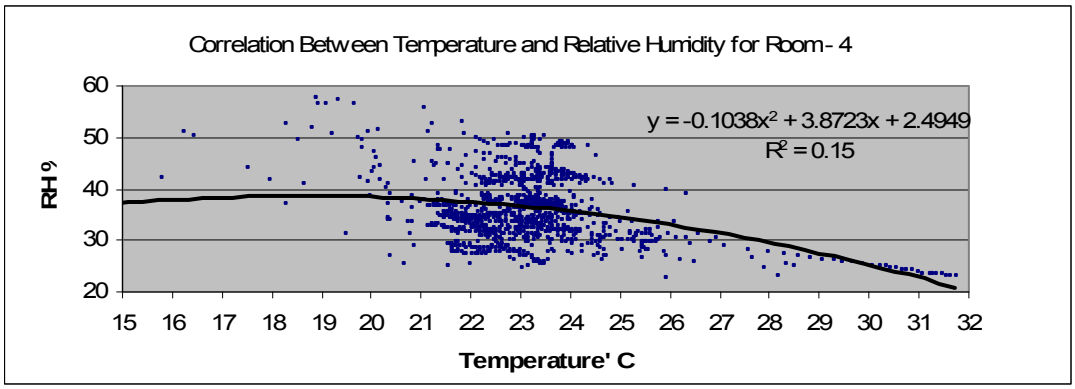

Figure 5.24. Correlation Between Temperature and Relative Humidity for Room -4

As seen in figure 5.24, R^2 value which symbolise the Corelation coefficient is found as 0.15 for room 4. The equation is settled by the RH value which changes from 23% to 58% and temperature changes between 29.8ºC and 15.8ºC during measurement period.

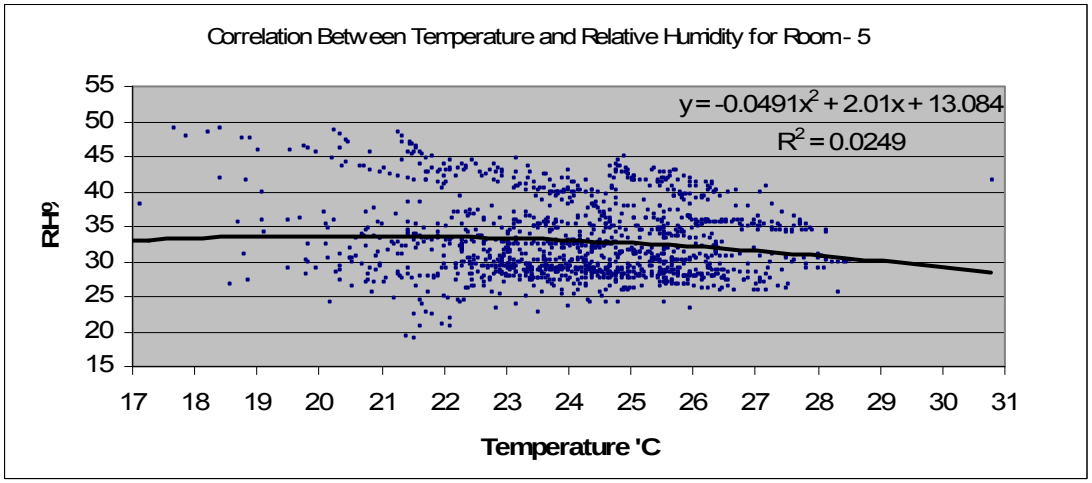

Figure 5.25. Correlation Between Temperature and Relative Humidity for Room -5

As seen in figure 5.25, Corelation coefficient is calculated as $R^2 = 0.02$ for room 5. This result is obtained by the RH value which changes from 19% to 49% and temperature changes between 28.5ºC and 17.1ºC during measurement period.

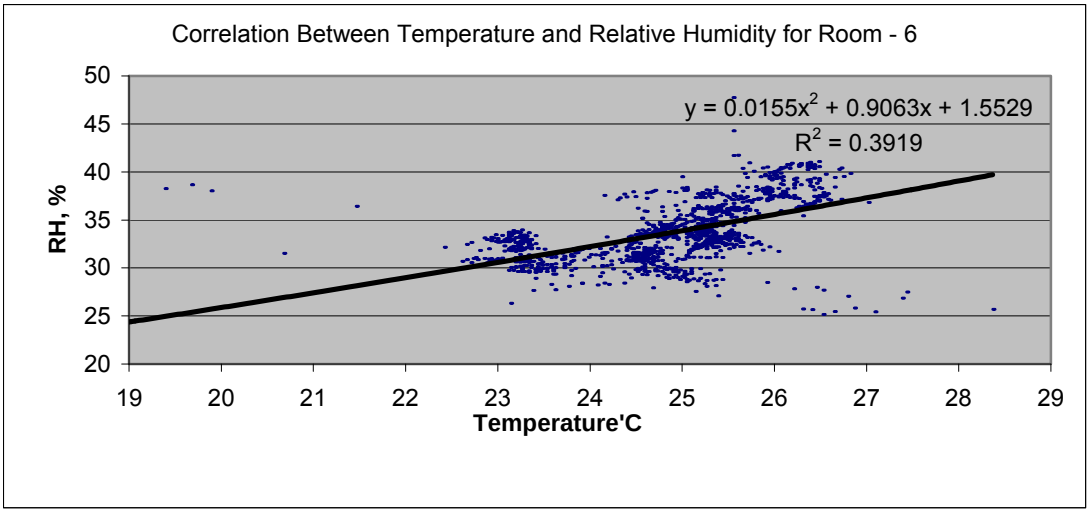

Figure 5.26. Correlation Between Temperature and Relative Humidity for Room -6

Figure 5.26 displays the , Corelation coefficient value, as $R^2 = 0.39$ for room 6. The data includes 1344 RH value which changes from 31% to 48% and temperature changes between 28.4ºC and 20.7ºC during measurement period.

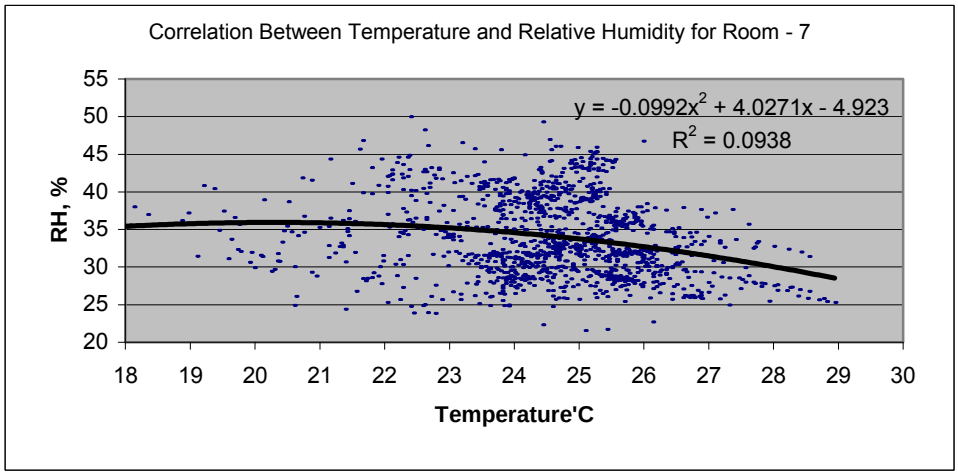

Figure 5.27. Correlation Between Temperature and Relative Humidity for Room -7

As seen in figure 5.27, Corelation coefficient is calculated as $R^2 = 0.09$ for room 7. This result is obtained by the RH value which changes from 27% to 50% and temperature changes between 28.9ºC and 18.1ºC during measurement period.

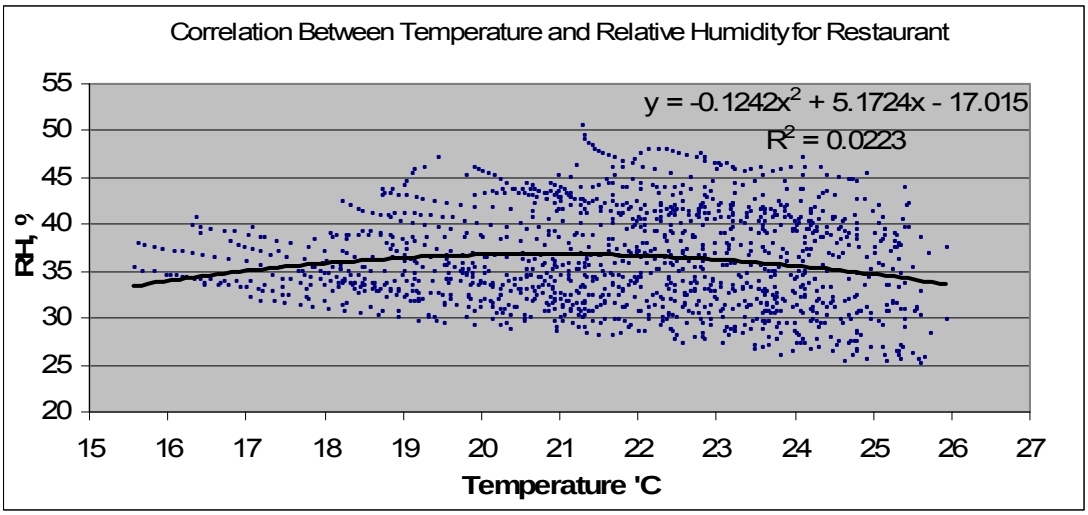

Figure 5.28. Correlation Between Temperature and Relative Humidity for Restaurant

As seen in figure 5.28, Corelation coefficient is calculated as $R^2 = 0.02$ for restaurant. this result is obtained by the RH value which changes from 25% to 51% and temperature changes between 25.9ºC and 15.6ºC during measurement period.

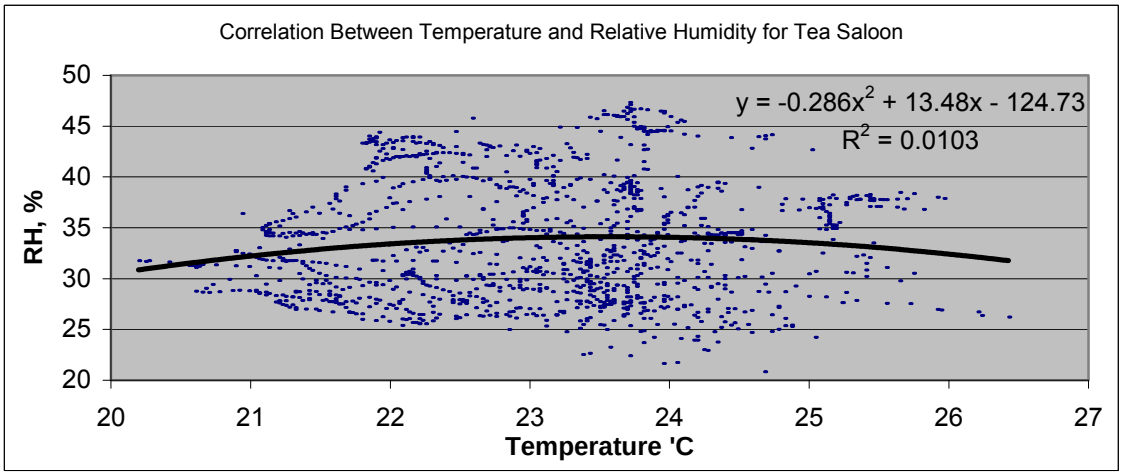

Figure 5.29. Correlation Between Temperature and Relative Humidity for Tea Saloon

As seen in figure 5.29, Corelation coefficient is calculated as $R^2 = 0.01$ for room Tea Saloon. This result is obtained by the RH value which changes from 21% to 47% and temperature changes between 26.4ºC and 20.2ºC during measurement period.

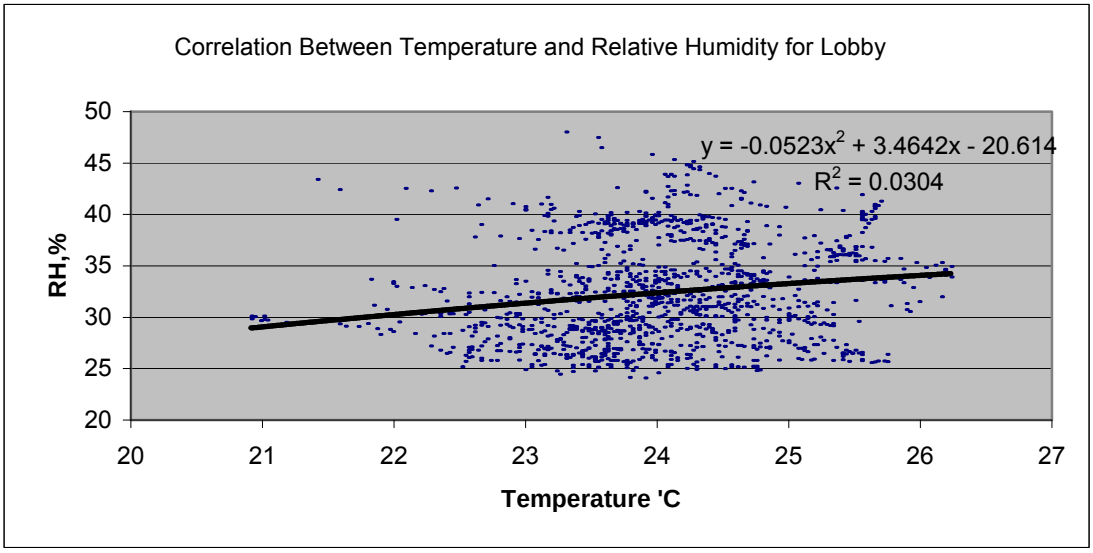

Figure 5.30. Correlation Between Temperature and Relative Humidity for Lobby.

As seen in figure 5.30, Corelation coefficient is calculated as $R^2 = 0.03$ for Lobby. This result is obtained by the RH value which changes from 24% to 48% and temperature changes between 26.2ºC and 20.9ºC during measurement period.

5.1.2.2 Temperture and Intensity

Relation between daylight and temperature is illustrated with graphics below. These graphics are generated with avarage daylight, avarage temperature and maximum temperature data. The daylight data includes the recordings of intensity between 08:40 and 16:10. This part of the study aims to illustrate the effect of the sun factor by using the intensity data which is limited with daylight. Results signifies the changings of intensity related with time in a day. The temperature tables which takes place in appendix range from B.1 to B.11 displays the maximum temperature related with the time when it is recorded. The intend is claryfing the effect of radiation, occured by sunlight, to the room temperature by using maximum temperature value.

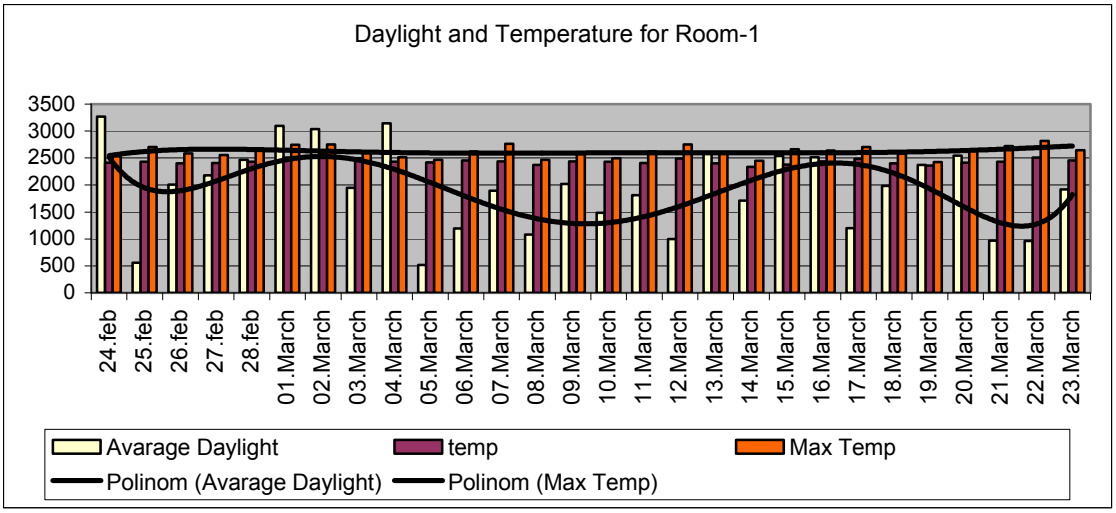

Figure 5.31. Trendline of Temperature and Daylight for Room -1

Trendline-1, which belongs to the avarage value of intensity during day time between 08:40 and 16:10, floats according to fluctuating values of daylight whereas the trendline-2 which illustrates the variation of maximum temperature does not react paralel to the first time.

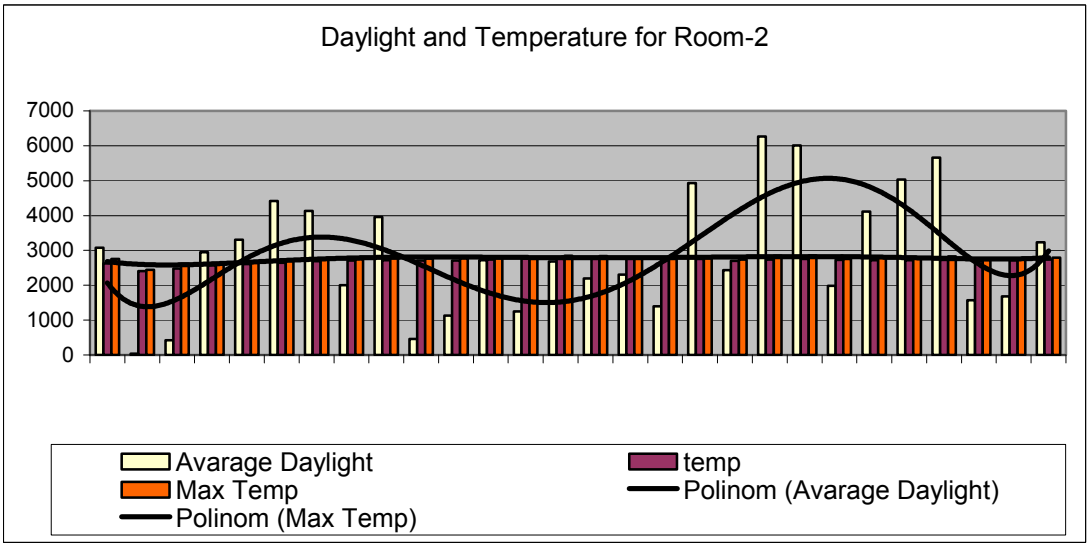

Figure 5.32. Trendline of Temperature and Daylight for Room -2

As seen in figure 5.32 Trendline-1 shows a dynamic attitude related with the fluctuating recordings of intensity but trendline 2 does not show significiant changes and keeps constant.

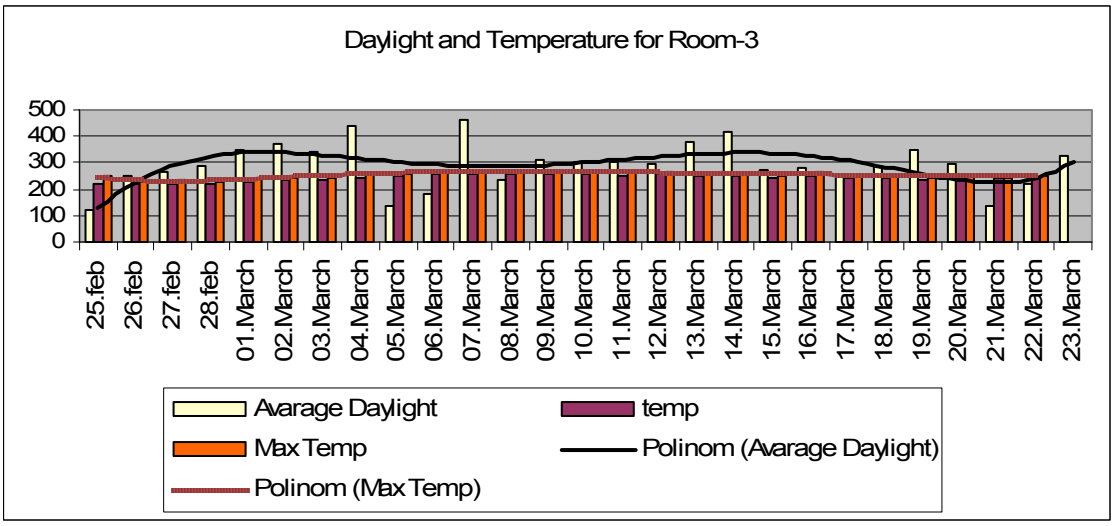

Figure 5.33. Trendline of Temperature and Daylight for Room -3

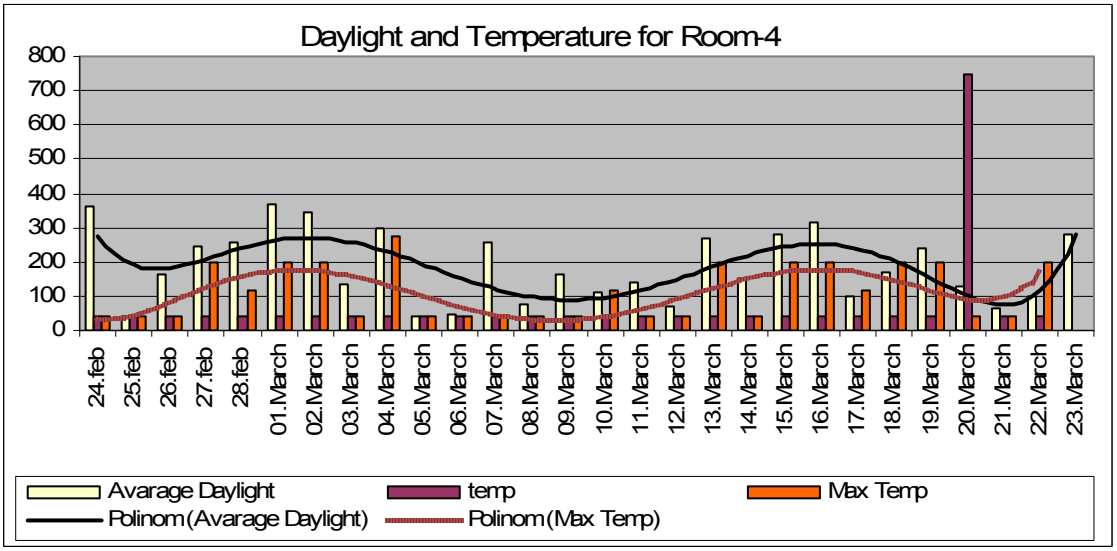

Figure 5.34. Trendline of Temperature and Daylight for Room -4

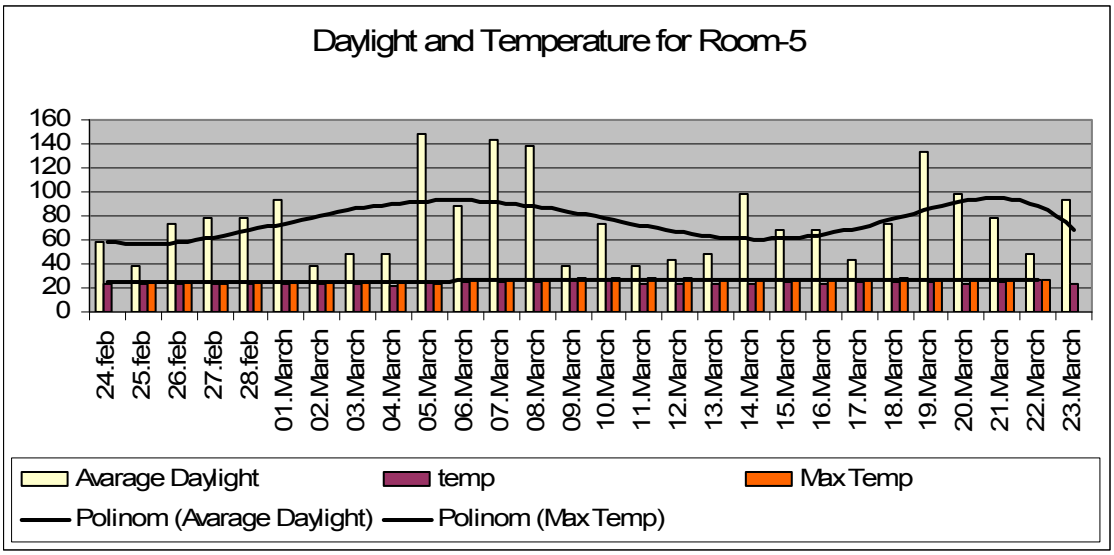

Figure 5.35. Trendline of Temperature and Daylight for Room -5

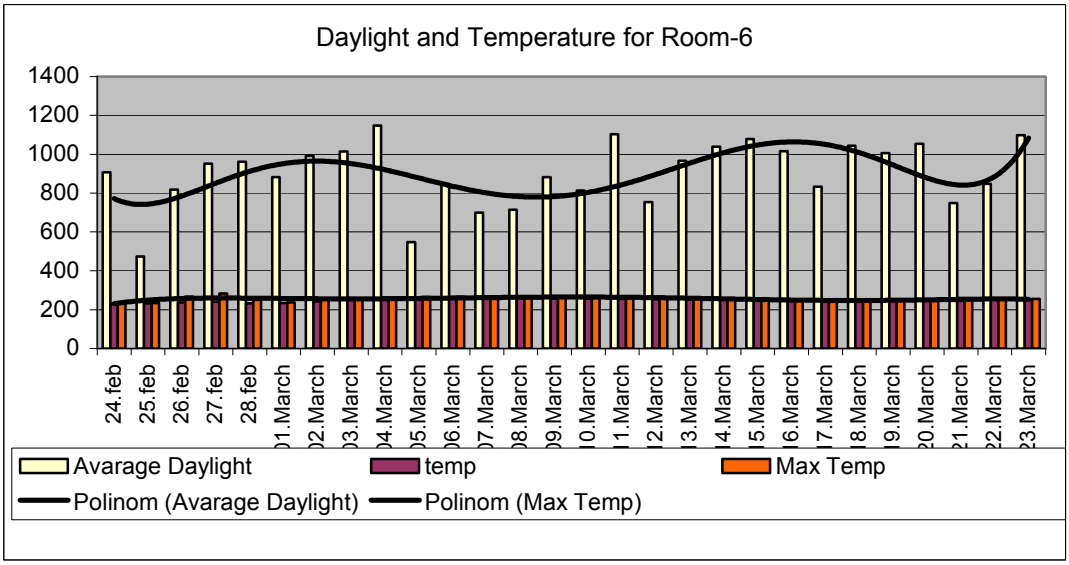

Figure 5.36. Trendline of Temperature and Daylight for Room -6

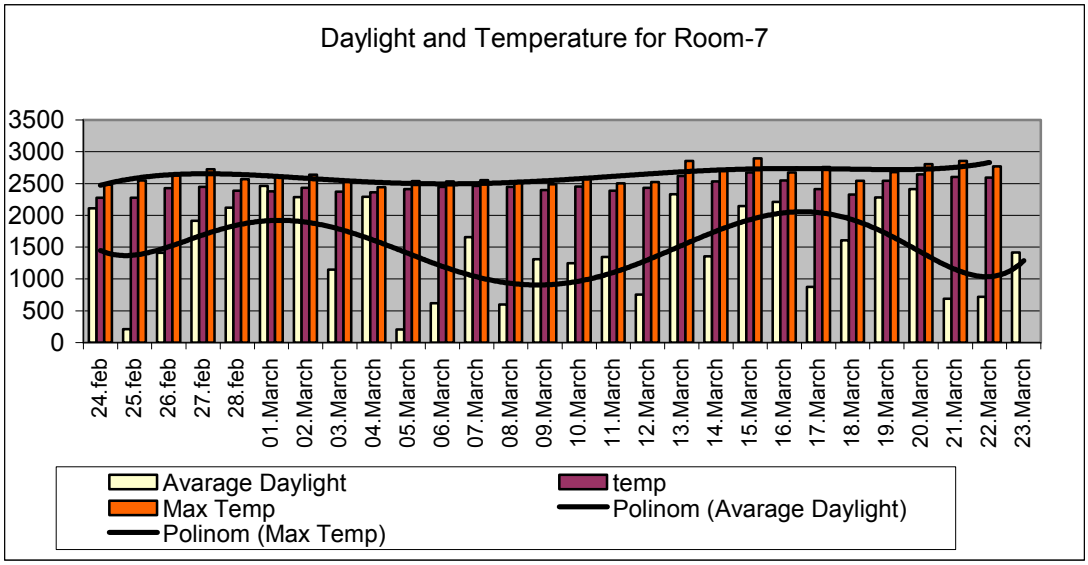

Figure 5.37. Trendline of Temperature and Daylight for Room - 7

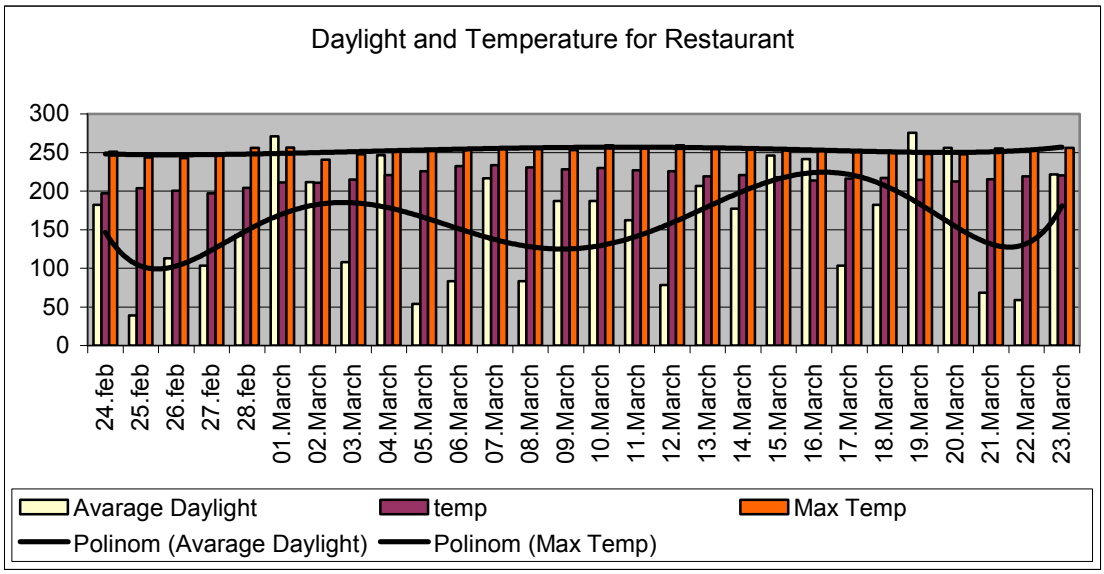

Figure 5.38. Trendline of Temperature and Daylight for Restaurant

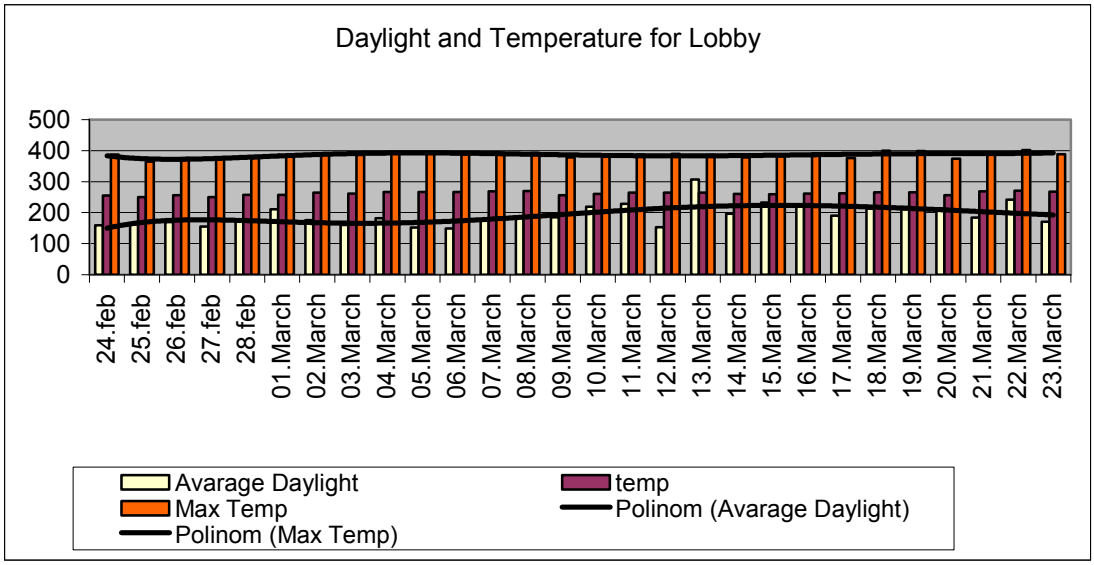

Figure 5.39. Trendline of Temperature and Daylight for Lobby

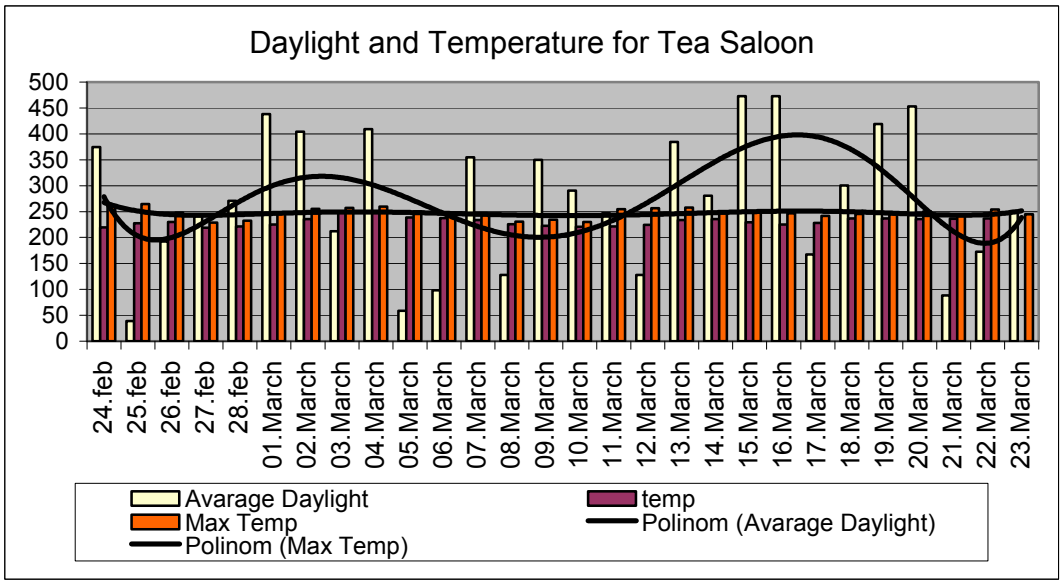

Figure 5.40. Trendline of Temperature and Daylight for Tea Saloon

5.1.3 Results of Interview

5.1.3.1. Evaluating the Intelligence in This Building

Information about Intelligent Buildings is given to the interviewees;
You can see the definition of the Intelligent Building and intelligency below:
'Intelligence is defined as an ability of adapting for the varying conditions in general. So an intelligent building has to be able to adapt itsself to the various human Requirements and various outside and inside environmental conditions. And it should also provide maximum operational efficiency besides minimizing the operation costs.'
The principal aim is to minimize the operational energy and to satisfy users' comfort conditions.
Question:1 According to this definition can you evalute or criticise the intelligence of this building ?
Question:2 In what aspects?
Question:3 What is your expectation from an intelligent building ?
Question:4 Do you think intelligent buildings are suitable for this kind of ResidenceBuildings which serve special care for older people?

Table 5.1. Intelligence of The Building

	Evaluating Intelligence of the Building
[I01]	She claims that solar energy should have been prefered for heating system in this building according to the aim of the Intelligent building ; providing ideal comfort conditions with minimum energy.
[I02]	She claims that this building does not properly suit with the definition of intelligent building. According to her, some of the comfort requirements are inadequate. She has alergic astyma. Low indoor air quality affects her health. She is having trouble in thermal comfort conditions.

(cont.on next page)

Table 5.1 (cont).

[I03]	She evaluates the building performance as successful. According to her, this buildings' total performance is better when compared with other big buildings than other large buildings where she accomodated before. She thinks that building stability againist earthquake and its insulation are the most important items while evaluating the performance of the building. She explains her ideas with these words 'Intelligence in a building is its good structure'. Nevertheless, she adds that she is not able to evaluate the intelligence of the building especially in terms of building automation systems. Because she has inadequate knowledge about these technical facilities. She also focused on the building economy and thinks that all occupants and workers should be sensitive and careful for energy efficiency and minimizing operation costs.
[I04]	He criticises the building performance as unsuccesful due to lack of attention to the building economy. And he supports his opinion that there is no solar energy system in the buildings. He thinks, energy efficiency is one of the most important factor of intelligent buildings. Recent technology offers us lots of alternative natural energy sources to provide energy by economic ways. However in this building, despite of contemporary heating and cooling systems designed for energy efficiency especially these systems belong to an obsolete technology so they waste too much energy.
[I05]	Occupant declares his opinion directly and says that this building at a first glance is not an intelligent building. The aim of the building should be to reach the expected conditions by controlling itself and the environment. But he thinks that this building can not achieve this goal. His expectation from an intelligent building is 'the ability of regulating heating and cooling systems in optimal conditions without human interfere'.
[I06]	She says that she does not have any knowledge about buildings automation systems so she can not evaluate the intelligence of the building. She adds that this building is being used with a very low capacity so it is impossible to achieve the goal; energy efficiency. In this condition, users should pay attention to provide building economy.
[I07]	From the line of thought of intelligence, there are important mistakes especially about heating systems. The land we live is very suitable for using natural and sustainable energy sources. In this building Solar energy should be used instead of LPG. Except heating equipments, there are some other elements of buildings which belong to obsolete technology and consume too much energy like lamps and several electrical equipments. He generally criticises the building by the aspects of energy efficiency.

5.1.3.2. Thermal Comfort Evaluation

Information about Thermal Comfort given to the Interviewees;

Human comfort is influenced by psychological factors as well as physiological factors. There is no precise method of stating what thermal environmental condition will effect a comfort feeling in a human being. It is difficult to specify a single physical quantity for evaluating human comfort.
Thermal comfort is defined as that condition of mind which expresses satisfaction with the thermal environment. Acclimatization is an important factor effecting comfort.Thermal comfort Parameters can be determined by six major variables as environmental and personel;

Environmental factors

- *air temperature*
- *air speed*
- *humidity*
- *mean radiant temperature*

Individual factors

- *activity*
- *clothing insulation*
- *individual differences, and recent thermal history.* ’

First Step:

According to the definition of Thermal comfort, Intervievees asked to evaluate the building with this comfort scale below:

Satisfaction Level:

Completely Suitable

Comfortable

Acceptable

Uncomfortable

Second Step:

Interviewees asked to make comment and detailed explanations related with their personel requirements and opinions about Thermal Comfort in the building.

Table 5.2. Evaluation of Awareness according to Individual Thermal Comfort

Question 6	SATISFACTION LEVEL	OPINIONS ABOUT THERMAL COMFORT IN THE BUILDING
[I01]	COMPLETELY SUITABLE	She thinks she is in an exceptional condition. She usually feels hot. She never finds the weather cold, even in winter. She adds that she never will be complainant from cold indoor air.
[I02]	ACCEPTABLE	She says that she is sensitive to the cold air. In winter, sometimes in the room and often in common places she feels the annoying effect of the cold. By the effect of her health problems and low activity level, she often has individual thermal comfort problems. Therefore she can easily feel lack of environmental comfort.
[I03]	COMPLETELY SUITABLE	She says that she does not have any thermal comfort problem which depends on cold. Thermal comfort of the building is quite appropriate for her.
[I04]	ACCEPTABLE	While evaluating the indoor thermal comfort he emphasize that there are significiant temperature differences in the building. He also considers the insulation of the building according to outdoor and indoor air relation. He thinks that indoor thermal comfort can directly effect from the weather outside. This shows that; there is an insulation problem which effect thermal comfort.

(cont.on next page)

Table 5.2 (cont.).

[I05]	UNCOMFORTABLE	He says that he prefers cold weather indoor, even in winter. He thinks that; in his room, temperature degree is above the temperature that he desired. He thinks that Ideal indoor air temperature should be 21C but his room temperature is always above 24C although he does not use any heater. He tries to decrease the temperature by several ways but he could not achieved. Central heating in the building surrounds his room by wall surfaces and heats the room. He thinks that in an intelligent building he should be able to obtain his individual thermal comfort.
[I06]	ACCEPTABLE	She says that she has thermal comfort problems which arise from her health problems. She thinks that this can be considered as an individual problem. She has astyma so she directly influences from indoor air quality. She estimates that her illness can be relapsed due to humidity of the air inside and the air speed in the room which arise from funcoil. Besides, she thinks that indoor temperature of the building is acceptable.
[I07]	ACCEPTABLE	Firstly, he stresses that thermal comfort concept should be considered as an individual subject and reminds us that perception of thermal comfort changes from person to person. He determines that individually he does not have significiant thermal comfort problem but he adds; he notices that air temperature is not in a constant temperature in all parts of the building, especially women occupants and older people in the building can have cold problems.

Question 7:

It has been asked to the interviewees;
'When they feel lack of Thermal Comfort, What kind of precautions or interferes do they attempt individually to get back Their comfort conditions?'

Some alternatives have been read to them to help to explain their tendency;

- *Wearing thick clothes ,*
- *Using extra heater or air conditioner,*
- *Doing sportive activities to increase Their body temperature,*
- *Having hot drink or cold drink(in summer),*
- *Openning doors and windows*

Table 5.3. Individual Interferences

	Individual Interferences of Occupants in order to Improve Their Thermal Comfort
[I01]	• If she has thermal comfort deficiency this is due to high indoor air temperature. In this case first she turns off the radiator in the bathroom. If she would no be able to obtain her ideal temperature by this way, she would wear thiny clothes. If she could not succeed to provide her thermal comfort with these interferences; lastly she opens doors or windows. • These actions can be available in winter but in autumn these are not adequate to prevent effective cooling that she expected to obtain her individual thermal comfort. She uses an additional air conditioner, for cooling, in her room. Because in autumn central cooling stops in the building and she feels very hot.
[I02]	• When she feels cold she operates the additional electrical heater in her room. • Besides she changes her clothing due to the indoor temperature. • Sometimes she takes a woolen blanket . • She tries to keep her thermal comfort stable by having cold drink in summer.

(cont.on next page)

Table 5.3 (cont.).

	Individual Interferences of Occupants in order to Improve Their Thermal Comfort
[I03]	When the indoor air temperature decreases, Firstly she changes her clothing, wears thick clothes suitable for winter. She says she was used to make walking before but now she cant make sportive activities because of her health problems.
[I04]	He and his wife have cold problems in some common places in the building so they wear thick clothes when they would get out of the room.
[I05]	He opens doors and windows to decrease the room air temperature. In his room, he has an extra air conditioner for cooling. In addition to his sensitiveness to the thermal comfort Requirements, he also has some interferes in order to provide air quality. He has a ventilation system in his room.
[I06]	She opens doors and windows in order to take Oxygen (O_2) and provide indoor air quality. But on the other hand this causes decrease in indoor air temperature and badly effects the thermal comfort. As they feel lack of thermal comfort due to low air temperature, they operate fun-coil and sometimes they contact with the employees and adjust the thermostat settings to obtain thermal satisfaction. She and her husband are not able to make sportive activities because of their health problems.
[I07]	He stated that he can easily satisfy his individual thermal comfort requirements by several ways. When he feels the air temperature is low, especially in common places, he wears thick clothes. When he needs instantaneous increase in air temperature in his room, for example after shower or early in the morning, he operates the fun-coil, but just for a short time. But generally, he doesn't have thermal comfort problems due to low air temperature. He determines that he prefers low air temperature while sleeping. When he needs cool or fresh air he opens windows and he likes fresh air that came with slight wind. He used to make sport he swims every morning. He explains his ability for adapting thermal environment owing to his sportive facilities.

Use of Fan Coil

Question:8: ***Do you use fun coil?*** (Yes / No)

If the answer is Yes,

Question:2: ***How often do you use?***

Question:3: ***Do you need alternative heater? instead?***

If No ,

Question:2: ***Why?***

Question:3: ***What do you use***

Table 5.4. Use of Fun Coil

	USE OF FUN COIL		
	Do You USE Fan Coil	If Yes, 1.How often do you use? 2.Do you need alternative heater? 3.Do you interfere to the system by changing thermostat settings?	If No , 1. Why? 2. What do you use instead?
[I01]	No	1. She does not use Fun Coil because; • She thinks the temperature is high enough in her room. • Her blood temperature is generally high. • Sunlight that penetrate from windows can heat the room. 2. There is a radiator in the bathroom it gives enough heat. When the doors are open it can warms up all around.	
[I02]	No	1. She cant use funcoil because; • When it works she has breathing problems due to her illness 'astyma'. • Fun coil causes an annoying air movement and dries the air. • High air speed decrease the felt air temperature in the room. She feels cold even the room temperature is 24C. • In addition to this it makes too much noise. 2. She uses the radiator in the bathroom and an extra electrical heater.	

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Table 5.4 (cont.).

[I03]	Yes	She uses fun coil rarely. She works it for an hour before having shower in cold days. Sometimes in the mornings she opens while she is leaving the room to go to the restaurant for breakfast. She intends not to be in the room while it is working. Because fun coil makes an annoying air speed when it works and it causes to feel cold even the room air temperature is high. Also it makes too much noise so she does not use fun coil except the days when there is an extreme cold outside. Her room takes effective sunlight through the day and radiator in the bathroom works all the time she thinks that these are adequate to heat the room. She interfered to the system by decreasing the fun speed .
[I04]	Yes	They dont use funcoil unless there is an extreme cold. One of the reason that he avoid operating is providing building economy. The other reason is that it makes too much noise.In their suit they have two rooms; a bedroom and a living room.They always run the funcoil in the room which they dont reside.They intend not to be in the room while it is being operating because it makes too much noise. Radiator in the bathroom Works all the time and it provides a warm environment.
[I05]	No	He does not use fun coil becouse it makes too much noise. That's why he cancelled the valves and pipes of the funcoil that came to his room room. So it is always in off circuit. Either, he doesnt need any alternative heater becouse he thinks that his room temperature is above the expected indoor air temperature.
[I06]	Yes	They use fun coil in cold days and in morning hours. Further more, they used to operate it before having bath. But they try not to use funcoil if it is not needed. She says the air speed which comes from fun coil threats her health. She thinks funcoil blows out cold air. In order to reach expected thermal comfort, she sometimes interferes to the system by making adjustment with thermostat settings.
[I07]	Yes	He operates fun coil for a short time and only in cold days. Besides, he operates it for 10-15 minutes before having bath. He intends not to be in the room while it is being working because it makes too much noise. He thinks thermostat settings of the fun coil does not work properly. He says it is operation does not alter although he converts its settings. He adjusts the thermostat settings when he wants instantaneous change. He increases the fun speed to obtain sudden heating but he keeps the temperature constant at 24°C.

Question:9 *Do you let the sun light penetrate into the room, during the day, in order to benefit from the solar energy, to provide thermal comfort or Does it cause discomfort?*

- *Do you feel the disturbing effect of sunlight?*
- *Do you need sun control devices and prevent the influence of sunlight?*

Table 5.5. Sun Control

	Effects of Sunlight to Visual Comfort and Effects of Solar Energy to the Thermal Comfort by means of Radiant Temperature.
[I01]	As it has been observed she keeps the curtains open and let the sunlight get into the room however she says that she prefered this room willing to be exposed to less sunlight. She claims that solar effect does not cause discomfort except summer time.
[I02]	She is alergic to the sunlight. So she avoids taking direct sunlight. She prefers drawing the curtains during the day and takes the sunlight behind the veils.
[I03]	Her room is settled in the end of the block, having the advantage of being corner suit, it has two facades; West and South –West. Owing to sunlight that penetrates through windows, indoor air temperature increases during the day. She says she does not have discomfort due to sunlight. It is observed that she keeps the curtains open however effective sunlight difuse into the room. Due to the solar energy that penetrates into the room, heat gain occurs during day.
[I04]	• Their suit has settled in South west. They used to keep curtains open all the day. Main reason of this behaviour is the *view factor*. However they noticed that heat gain occurs during the day owing to the sunlight that penetrates through windows, they say they didn't feel discomfort due to solar heating. • It has been observed that radiant asymetry occurs in the room due to the influence of sunlight. The Occupants avoid sitting by the window especially in the afternoons. Nevertheless they dont attempt to make sun control or prevent the sun that influence into the room.

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Table 5.5 (cont.).

[I05]	He says his room has settled in east facade so does not take effective sunlight during the day but only morning times and it doesn't cause discomfort. That's why he does not need sun control.
[I06]	• Solar heating occurs in the room due to radiation effect of sunlight. Their room is settled on west facade. Direct solar radiation causes high temperatures especially in the afternoon she says she observed that indoor air temperature reaches at 30-31C degrees in these hours. • Rarely discomfort occurs due to solar radiation. In these cases she attemps sun control by drawing the curtains.
[I07]	• His room is settled in South West part of the building. He clarifies that particularly he has paid attention to the sun factor and he prefered the room which takes sunlight. The room takes effective sunlight for a long time through the afternoon. Solar radiation causes heat gain during the day. But he does not complain for solar radiation. • He deals with not only thermal aspects of sun but also visual effects of the sunshine. He has glaring problems while reading book. He explains his visual discomfort with blue eye sensitiveness. In this case he needs sun control.

5.1.3.3 Room Identification

In this part of the interview dwelling frequency of the room and other common places has been investigated in order to understand the tendencies and choices of people by making observations.

Question: 10: ***How many hours in a day, do you spend in your room?***

Question: 11: ***What are your daily activities in the room?***

Table 5.6 Use of the Room

	How many hours in a day, Do you spend in your room?	**What are your daily activities in the room?**
[I01]	In a day she spends most of the time in her room. She can be out of the room for breakfast, lunch & dinner. Sometimes she may join to the tea time in the tea saloon	In the room she spends her time by knitting and reading newspaper.
[I02]	Inevitablely she has to spend all the day in her room because of her difficulty of walking. But on breakfast, lunch and dinner times she can to Restaurant by the help of the duties.	She spends her time with several educational studies such as learning Foreign Language(German), listening language cassettes. She also spends her time with hobies like art and listening music. She makes physical exercises with step board.
[I03]	She used to spend time in her room during the day. She goes to restaurant regularly three times in a day totally she spends nearly three hours in restaurant everyday. In the evening hours She rarely visit other Occupants and she also spends time in tea salon on tea times.	Her daily activities in the room; watching TV and reading newspaper.
[I04]	The time that has spend in the room is not certainly defined by these occupants. They mentioned that they dont sit in the room through the day. The time that they have spend out of the room is not only in other common places of the building and also can be out of the building.	Their routin activities that they do in the room; are watching TV and reading newspaper.
[I05]	He claims that he does not spend much time in the room.	Activities that he does in the room; watching TV, reading newspaper, busing with computer and internet.

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Table 5.6 (cont.).

[I06]	She tells that she and her husband used to spend most of their time in the room. They go out in meal times everyday and rarely they go to the tea saloon after breakfast and afternoon.	Their daily activities in the room; watching TV and reading newspaper.
[I07]	He claims that he spend most of time out of the room and even he is generally out of the building. Except sleeping hours he stays in the room for three hours in a day.	In these hours he prefers reading book.

Room Orientation ; In this part; interviewees asked in order to evaluate their awareness while they were choosing their room. Answers are searched for these questions;

- Have they paid attention to the settlement or direction of the room?
- Were they aware of the importance of the sun factor?
- Are they pleasent from their choice?

Table 5.7. Awareness Evaluation about Room Orientation

	Room Direction	Reasoning	Pleasentless
[I01]	Southeast	While choosing her room she prefered a room which does not take sun especially in the afternoon hours. She believes that if she wold be exposed to sunlight through the afternoon she could have serious thermal comfort problems.	She is glad from her room because sunlight penetrates into the room only until 13:00 then goes to the south west side. This prevents unwilling heating in the room.

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Table 5.7 (cont.).

[I02]	Southeast	She prefered this room because the sunlight can penetrate into the room in the morning hours and starts to heat the room.	She is pleased from her room because she takes sunlight till through the morning and afternoon.
[I03]	West-SouthWest	While deciding to choose her room she prefered a room which takes effective sunlight . the main reason of this choice is not related with thermal comfort expectations, it depends on visual effect of daylight and view factor.	She claims that she is pleased to be living in a room which has two facades and sunlight influence into the room through the day.
[I04]	SouthWest	Visual parameters such as view and sunlight effected their choice while deciding to stay in this room.	They mentioned that they dont have any disturbtion from their room in terms of visual comfort. Besides, they added that they like the view of the room.
[I05]	East	He tells that he has been compelled to change his room before. His first room was located on the north facade of the block that's why he had thermal comfort problems due to cold. However he does not like high temperatures he moved to this room which is settled on the east side of the block and which is influenced from sun less than others.	As he mentioned he prefered this room hoping to keep away from the disturbing effect of the sun. But he says he is not pleased from the room because of the inpreventable heating.
[I06]	West	She tells that they prefered west because especially her husband wants to see sunlight through the day.	As they mentioned they are glad from the direction of the room as they can see the sun until evening.

(cont.on next page)

Table 5.7 (cont.).

[I07]		He tells that his father was used to advice them to live in places which takes sun. In this respect he paid attention to the sun factor while choosing the room that he will live.	He says his room takes enough sun light. He does not have problem with his room direction and its visual effects however sometimes he has glaring problems especially while reading book.

Common Places Thermal Comfort Evaluation

In this part interview, occupants asked in order to evaluate the thermal comfort in common places. Questions below used to help them to determine thermal comfort conditions.

12. Do you feel differences in thermal comfort conditions between room and common places of the building?

13. What are the common places in the building that you use frequently?

14. Can you evaluate the thermal comfort in these places? Do you feel discomfort in these places due to temperature differences or cross ventilation?

Table 5.8. Common Places Thermal Comfort Evaluation

	Common Places Often used by Occupants	Thermal Comfort Evaluation for Common places of the Building
[I01]	Restaurant & Tea Saloon	• She claims that ***corridors*** are colder in comparision with rooms. Windows and doors sometimes keep open and this causes air current and decrease in air temperature in corridors. • Also, she adds that sometimes in the ***morning***, at the breakfast time, people feel cold in ***restaurant***. She suggests that workers should operate the heating system earlier in this place.

(cont.on next page)

Table 5.8 (cont.).

[I02]	Restaurant & Tea Saloon	She determines that she has problem with cold air in common places of the building; especially in corridors, restaurant and tea saloon in winter. She says that while she is staying in the room, she can feel the effect of cold air in ***corridors***, when the door of her room has openned by someone. She explains that in other common places a disturbing air current occurs due to the cross ventilation she says, this event can be observed mostly in ***tea saloon***. For ***restaurant*** ; she mentions to the inadequate heating in early hours of morning.
[I03]	Restaurant & Tea Saloon	She says that ***corridors*** sometimes can be colder than the rooms but she thinks that people should regard this normal. She thinks that cross ventilation causes decrease in air temperature, in areas that are for general use. In order to keep building's temperature constant everywhere, both workers and the occupants should pay attention to keep doors and windows close to prevent cross ventilation. She tells that however the ***restaurant*** has a huge area, there is no different thermal zones in this place. Air temperature is same in everypart of the restaurant. Rarely,in early hours of morning, restaurant can be cold but it is easy to obtain expected temperature in a short time by interfering to the thermostat settings.
[I04]	Restaurant & Tea Saloon	They mention that they feel thermal differences in ***corridors*** while going to the ***restaurants and sport center***. As they stated they have to wear on additional clothings while passing from these sirculation areas. Especially they focused on ***sports hal***l which has been settled under ground level these places are not being used frequently so their heating system can be closed when they are out of service. They added that the ***corridors*** in this level are not being heated with any system, that's why they can get cold as they have to pass these corridors. According to them; in the ***Restaurant*** they feel discomfort due to inadequate heating but now thermal comfort problems has been solved.

(cont.on next page)

Table 5.8 (cont.).

[I05]	Restaurant & Tea Saloon	He determines that corridors are cold. In restaurant he feels discomfort due to unstable air tempearature which is sometimes hot and sometimes cold. Also, in tea saloon there is a non-homgenous air temperature. However personally he is not complainant from cross ventilation in tea saloon he mentions that an air current occurs in this place which can effect environmental thermal comfort.
[I06]	Restaurant & Tea Saloon	She says that there is not an important difference in air temperature between room and other places. She thinks that there can be different thermal zones in the building that's because the building yet does not serve with full capacity. A big part of the building is out of use and the common places are enormous large when considered with the number of people who live in the building. From this point of view; environmental comfort of this building is reasonable however there are some different thermal zones.
[I07]	Restaurant & Tea Saloon	He clarifies that he does not like hot weather that's why he does not have problem with cold in restaurant. But he adds that as he observed especially women and older occupants get cold in restaurant and they wear thick clothes in this place. However, rarely he feels cold in tea saloon and in entrance hall (lobi) , when doors are openned from both sides and cross ventilation occurs. He focuses on the importance of user awareness. He thinks that people should pay attention to keep doors closed because in such a big building it is hard to provide thermal comfort. He also claims that there are thermal differences between different levels of the building.

5.2.Discussion

After revealing the results of measurements done in a 28 day period, all of the variables are categorized and evaluated both separately and by comparison. Each place was evaluated and interpreted independently. Evaluations and interpretations include temperature data, RH data, intensity data, relations of each data among others. Outdoor temperature and outdoor humidity values are also considered, the relation of indoor and outdoor variables are controlled. Through these study air speed did not measured, although the literature (Fanger, ASHRAE) defines the impact of air speed on thermal comfort. As mentioned in chapter 3, field studies conducted in special living areas of people and it was not possible to make the measurements without disturbing people. Permissions taken from the administers only for the field measurements which can be done by data loggers.

The time-dependent behavior of room-1 and outdoor is shown in Figure 5.41 between the 23.February 2009 and 23 March 2009. As the building was being heated by a central heating system and controlled by central automation, temperature of each space was settled as 24ºC as expected temperature. Measurements indicated that average indoor air temperature of Room 1 changes between 23.3ºC and 25.5ºC during this period. As understood from the measurements system successfully fulfilled the requirement of indoor air temperature. As seen from the Figure 5.41, indoor air temperature displayed a constant attitude while outdoor temperature were changing. However, exceptional degrees were recorded as 28.2ºC maximum and 20.3ºC minimum, which can be out of acceptable limits. Acceptable limits were determined between 22ºC and 26ºC, which meant (+2ºC) and (-2ºC) around expected 24ºC.

Relative Humidity values should range between %30 and %60 according to ASHRAE. “In the winter, heating cold outdoor air can decrease indoor relative humidity levels to below 30%, leading to discomfort such as dry skin and excessive thirst.” (ASHRAE, 2003). According to 28-day-data mean average RH value of Room 1 was 34%, which changed daily, from 28% to 42%. Figure 5.41 shows the dates in which RH value decreased under recommended values. On February 27th-28th, March 1st and March 15th, RH values were under 30%.

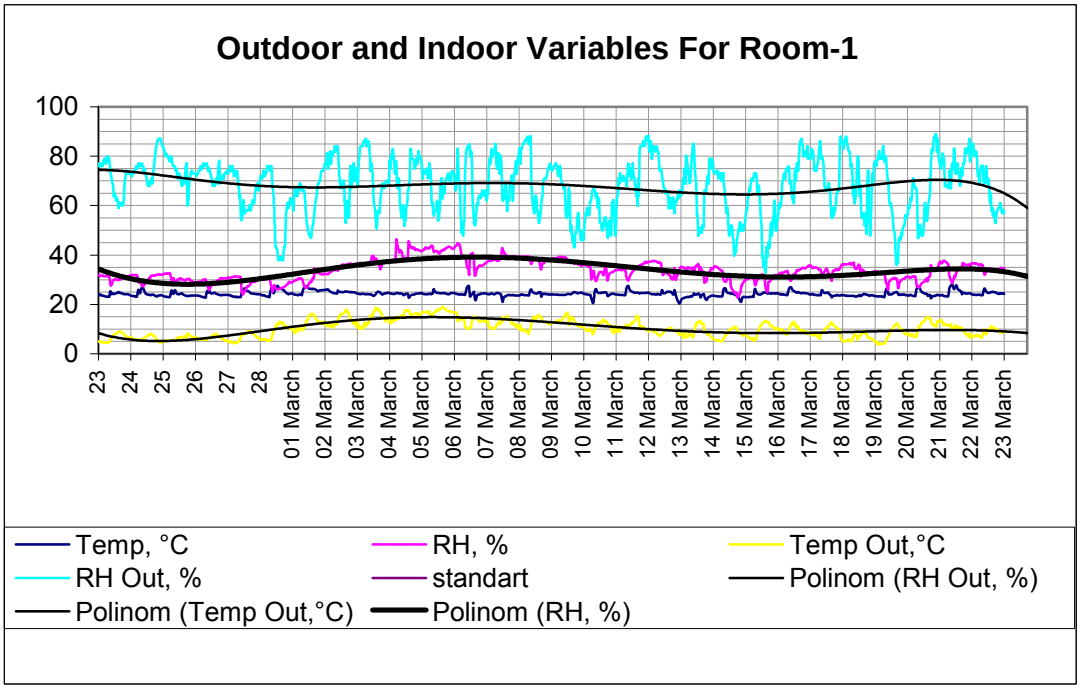

Figure 5.41. Outdoor and Indoor variables For Room-1

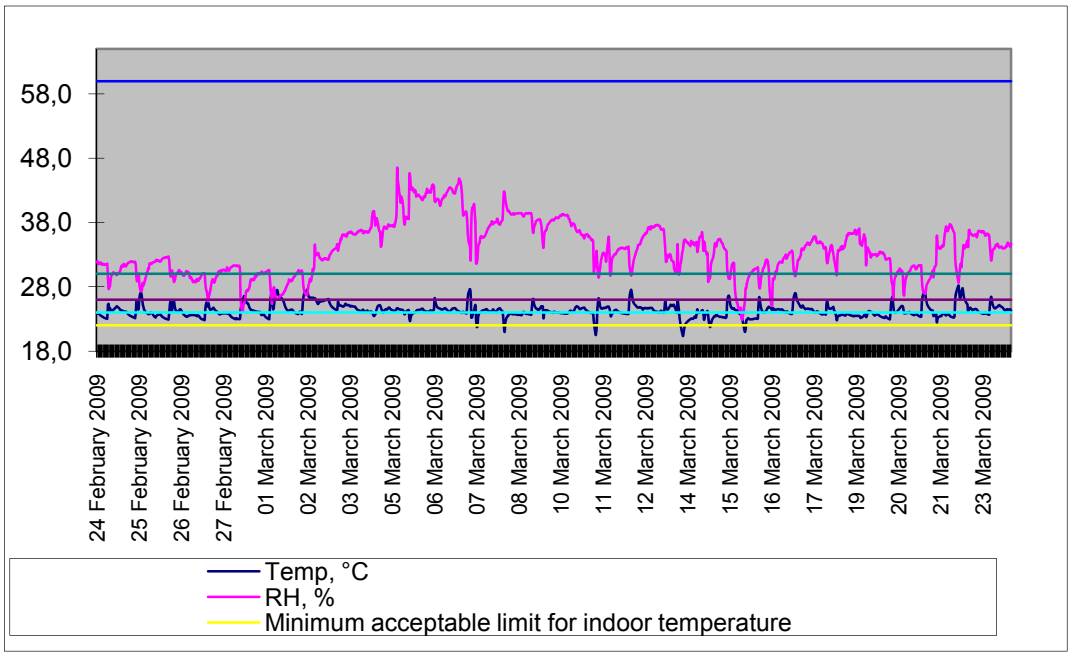

Figure 5.42. Acceptable limits and Actual Measured Values of Indoor Temperature and RH for Room-1

In Figure 5.42 below acceptable limits and actual measured values are illustrated for indoor temperature and RH. As a result, there was no direct relation between indoor and outdoor temperatures.

Apart from these, several noteworthy findings were achieved. The first was about the effect of outdoor conditions to the indoor temperature. Results of measurements which are demonstrated in Figures 5.41-5.42 and in Figures C.1-C.9 , and in Tables B1-B11. Although in literature it is mentioned that indoor temperature depends on outdoor temperature, In this study according to findings it has seen that outdoor temperature did not have direct impact on indoor conditions, due to effectiveness of both insulation and the properly working active system.

The second one was about effect of sun factor. As in Results the relation between daylight and temperature was displayed by Figures 5.31-5.40, it was aimed to observe if there were any relations between temperature and daylight. Figures showed the average daylight was measured between 09:10 and 16:10. Indoor air temperatures, except temperatures in restaurant, were not affected by daily temperature changes. While the highest temperature was sometimes obtained at midnight, the lowest temperatures were attained during day time. It was expected that the high temperatures will occur due to solar radiation in day time; however it was observed that there was no increase in this period. This showed that central heating system stabilize the indoor temperature despite the effect of solar radiation to the heating.The columns indicated the maximum temperature and intensity in Figures; so there was no similarity between trendline of the maximum temperature and average daylight level. Indoor air temperature which is normally dependent on sun factor can be regulated by heating devices in this building.

The third aspect was significant in terms of evaluating the results according to standards. During the measurement period, the heating mechanism in the building was working in order to supply thermal comfort. Although several uncomfortable situations that interviewees mentioned, according to the results of measurements, the building fulfilled the requirements of thermal comfort according to ASHRAE Standart 55- 2003--Thermal Environmental Conditions for Human occupuancy--. Indoor air temperature is recommended as 24ºC for residence rooms.

One major aspect was observed about user satisfaction. Although measurements depicted that thermal comfort levels were in satisfying range according to certain standards, occupants satisfaction about their thermal environment varied and they expressed conflicting ideas on this issue. As cited in Literature, it may be impossible to design such a physical environment where everyone becomes satisfied and comfortable. It is necessary to include users' ideas and their interferences in evaluating process. It is

known that metabolic rate and clothing factor have direct impact on their thermal perception. In relation to these, in this study, it was requested from interviewees to rate the degree of thermal comfort levels in four categories; completely suitable, comfortable, acceptable, or uncomfortable. Two interviewees out of 7 were rated as completely suitable, while one rated as uncomfortable. That interviewee complained that the building was being overheated. And he could not decrease the indoor air temperature although he tried. On the other hand, interviewees who rated as acceptable, complained that they were unsatisfied due to the cold indoor environment. Such inconsistencies from interview findings may be due to gender differences, metabolic rate and health problems. These may affect their perceptions of their thermal environment.

Interviewees common argument about their unsatisfaction was on common spaces, like lobby, restaurant and tea saloon. Restaurant and corridors were evaluated as the coldest spaces in the building. The cool air among circulation areas may be because of cross ventilation due to opened windows and doors by occupants. Measurements taken from restaurant depicts the low air temperatures, almost 21.8 ˚C. So measurements has close matches with interviewee opinions. However, it should be considered that, restaurant is not a place which should be heated for the purpose of maintaining a constant temperature level. According to ASHRAE, such spaces should have an independent heating system apart from building central heating system, and it should operate only during mealtime. In this building, the building manager mentioned that the control mechanism of heating system in the restaurant was not connected to the central remote control. So, the heating period was analysed and the lowest temperature was observed at the very early morning hours, while the highest levels were achieved at 9.00 a.m., 1.00 p.m. and 9.00 p.m. These temperature fluctuations were perceived by all occupants. In tea saloon, similar problems were observed. As sliding doors were frequently open, cross ventilation happened and this prevented the heating of the interior.The average temperature was 23.1ºC. It was considered that the complaints were dependent on air velocity but not low temperatures. Since during the most commonly used period, this space was heated satisfactorily and high temperature levels were attained.

Temperature levels were in satisfying range as mentioned in ASHRAE, almost 24ºC. According to measurements indoor air temperature was acceptable. Although lobby was an entrance hall, the relatively high temperatures were due to the entry

vestibule. Interviewees except Interviewee 7, agreed on the satisfying thermal conditions of this space.

The final significant aspect was about individual thermal control and interferences. Evaluating occupants' opinions and measurements, it was considered that occupants could attain satisfying temperature levels in their own rooms. The discomfort situations occur in common spaces due to cool air. However, individuals could control the air conditions successfully. For example, Interviewee in Room 1 thought that the indoor air temperature was very high, and she controlled her thermal condition by wearing very thin clothes. Meanwhile, the average indoor temperature was measured as 24.3ºC. Interviewee in Room 2 mentioned that she complained about cool air in her room; so she preferred to wear thick and woolen clothes. Meanwhile, the average indoor temperature was measured as 26.9ºC, which conflicted that the room air was not cold. It had the highest temperature level among all measured rooms. Another interviewee in Room 3, used to ventilate the room by opening the windows. This action occured by totally the occupant's control decreased indoor air temperature due to natural ventilation. Afterwards, the room's thermal condition was resatisfied by turning on the fancoil unit. However, interviewee in Room 5 did not used to the fancoil unit, and used to open the windows to decrease the indoor air temperature by intention.

Evaluation of Intelligiency of the Building:

As mentioned in literature intelligiency of the building can be evaluated by several items such as building economy, Satisfaction for environmental comfort, conveniency of automated systems, fire and security potections, and also network of comminication technologies.

However measuremental evaluations in this study are restricted with thermal comfort parameters, observations and user opinions evaluated in order to discuss about the intelligiency of the building. In interview study, definition of the intelligient building given to the interviewees before the questions about intelligiency of the building. According to this information people declared their opinions. As seen from the interview results occupants more often focuses on the energy problem when they are asked about intelligiency of the building. Users argue that for heating, solar energy should be prefered instead of LPG. Three of them were in agreement that whether the energy that they use or the heating devices are not economic and belongs to an old technology. The building generally criticised by the aspects of energy efficiency.

Another issue for evaluating the intelligiency of the building was comfort. As seen from interview answers, occupants have conflicting ideas about thermal comfort. The automation system includes heating and cooling functions. Measurements and user opinions show that expected temperatures achieved in rooms which are in the direction of building automate system. On the other hand it is observed that people which have breathing problems, are aware of the lack of humidity. As seen from the measurements the building is not functioned to obtain the balance of three parameters of thermal comfort; humidity, air speed and temperature. That's why some occupants evaluate the automation system insufficient, in terms of regulating the parameters in optimal conditions.

Other conditions of the building can be evaluated due to walkthrough observations. Sun control is also an important facility for intelligient buildings which can be maintained provided by automated sun control devices. This systems serves to obtain visual comfort while preventing excessive heating and minimizing operating costs in cooling period. There is no automated sun control device in the building. Even though the interview conducted in winter time, the occupants were not complaint about the disturbing effect of the sunlight. Sun control can be obtained by drawing curtains, when needed.

As mentioned in chapter two; device communication in intelligent buildings is one of the most important facility. These buildinds should have ability to coordinate actions between multiple systems. Through the evaluations in this building it is observed that technic employees of the building who are respondent from automated systems are not adequate to operate the system efficiently. That'a why, yet the system does not work properly to fulfil the requirements by coordinated actions. The only function of the system is regulating the heating and cooling of the building.

CHAPTER 6

CONCLUSION

Through this study a building evaluation has been conducted in terms of thermal comfort. An intelligent residential building was used as a research field. In order to support knowledge to the advanced literature studies, these study has revealed to the some issues that should be scrutinized through building evaluation period. As informed from Literature, thermal comfort analyses should be appraised both by environmental and personal factors.

As recommended in Literature, this building's thermal comfort evaluation done by both measurements in order to gather quantitative data which will be used to evaluate the building under recommended standards, and also by occupants ideas to reach a qualitative knowledge in a wide spread. Objective measurements which conducted during 28 day displayed that the building had uniform indoor temperature. However there had been climatic changes outside, the indoor air temperature was not affect from these variations. Even, it was observed that indoor temperature was not related with daylight and solar radiation which occurred during day time. From this point of view, the building's thermal stability could be evaluated as successful. Temperature limits generally kept between the acceptable limitations that were requested with authorities. In spite of these relative humidity values were found under acceptable limits. When the occupants were listened, it was observed that they generally complain about the heater (fan coil unit) because of the air movement which occurs in the room while fan coil was operating. The general idea was that fan coil dried the air and threats the thermal comfort. This explained the low values of RH. It was also observed that indoor RH values increased in a ten day period when outdoor temperature increased. The building was very successful to keep indoor temperature constant. The main reason of this success was the thermostat settings which were adapted to a constant temperature degree. As the outdoor temperature decreased, system worked to prevent cooling.

The another important issue which should be considered while evaluating thermal comfort was that; the heating system caused discomfort by decreasing the RH

value of the room. When the outdoor temperatures increased system worked less than normal, so RH values reached to the highest values of measurement period.

The interview study demonstrated that occupants of the buildings were generally having conflicting ideas and demands. These findings verified the argument of Fanger which declared that no 'thermal environment can satisfy everyone'. People can have various thermal perceptions due to gender factor and other individual factors. Now, it is possible to say that elder people are sensitive to the environmental conditions related with their health problems.

Through the evaluation of buildings intelligence the case building was found to be insufficient as an intelligent building, from the occupants' point of view. However, the building includes high tech automated systems, there are deficiencies in usage of systems effectively. Even though the building has built only two years ago and it works with a very low capacity, it is expected that it will fulfill the requirements better overtime.

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APPENDIX A

MEASUREMENT DATA

In this section examples of the data sheets are presented. Readings taken from data logger formatted in excel and classified as temperature data, relative humidity data and intensity data. Addition to intensity data daylight data table is arranged with the intensity values between 08:40 and 16:00. All of the measurements were taken 48 times in each day during the 28 day evaluation period through 24.February 2009 and 23 March 2009. For each room 1344 data arrived for each variable. Avarage, maximum and minimum values are demonstrated at the end of each day.The daily time-dependent measurements of the room 1 during 28 day is shown below as an example data sheet.

Table A.1. 28 day Statistics Of Temperature Data of Room – 1

Room 1	24.feb	25.feb	26.feb	27.feb	28.feb	01.March	02.March	03.March	04.March	05.March	06.March	07.March	08.March	09.March	10.March	11.March	12.March	13.March	14.March	15.March	16.March	17.March	18.March	19.March	20.March	21.March	22.March	23.March
00:10	23,8	23,5	23,3	23,6	23,8	24,0	24,2	25,9	24,4	24,5	24,4	24,5	24,2	23,6	24,1	24,3	24,1	24,6	22,0	23,5	22,9	24,3	24,0	23,7	23,4	23,6	23,6	24,1
00:40	23,8	23,5	23,3	23,5	23,8	23,7	24,1	26,0	24,3	24,4	24,3	24,3	24,2	23,8	24,1	24,2	24,0	24,5	22,3	23,4	22,9	24,2	24,1	23,7	23,3	23,6	23,7	24,0
01:10	23,9	23,4	23,2	23,5	23,7	23,6	24,1	26,0	24,3	24,3	24,2	24,3	24,1	24,0	24,0	24,1	24,0	24,3	22,4	23,4	23,0	24,2	24,2	23,6	23,3	23,7	23,9	24,0
01:40	23,8	23,4	23,1	23,4	23,7	23,7	24,0	26,0	24,2	24,3	24,2	24,2	24,1	24,1	24,0	24,1	23,9	24,2	22,5	23,3	23,0	24,1	24,1	23,6	23,2	23,8	23,8	23,9
02:10	23,6	23,3	23,1	23,5	23,5	23,8	23,9	26,1	24,2	24,3	24,1	24,2	24,1	24,0	24,0	24,0	23,9	24,2	22,6	23,3	23,0	24,0	24,0	23,5	23,2	23,9	23,6	23,9
02:40	23,5	23,3	23,0	23,5	23,4	23,7	23,9	25,7	24,2	24,3	24,1	24,1	24,3	23,9	24,0	24,0	23,9	24,1	22,7	23,3	23,0	24,1	24,0	23,5	23,2	23,7	23,5	23,9
03:10	23,5	23,2	23,0	23,4	23,3	23,5	23,8	25,4	24,4	24,2	24,1	24,1	24,5	23,8	24,0	23,9	23,9	24,1	22,8	23,3	23,0	24,2	23,9	23,5	23,3	23,6	23,4	23,8
03:40	23,4	23,2	23,0	23,3	23,2	23,4	23,8	25,2	24,4	24,3	24,1	24,0	24,4	23,8	24,0	23,9	23,8	24,1	22,9	23,3	23,1	24,1	23,8	23,4	23,4	23,5	23,3	23,8
04:10	23,3	23,1	22,9	23,1	23,1	23,3	23,8	25,0	24,3	24,6	24,1	23,9	24,2	23,8	24,0	23,9	23,8	24,1	23,0	23,2	23,1	24,0	23,8	23,4	23,3	23,4	23,3	23,8
04:40	23,3	24,3	22,9	23,0	23,1	23,2	24,0	24,9	24,2	24,7	24,2	24,1	24,1	23,8	23,9	23,9	23,8	24,1	23,1	23,3	23,0	23,9	23,7	23,5	23,2	23,4	23,3	24,0
05:10	23,2	25,8	24,0	23,0	23,0	23,2	24,1	24,8	24,1	24,6	24,3	24,1	24,1	23,8	23,9	22,5	23,8	24,0	23,0	23,2	23,0	23,8	23,7	23,5	23,1	23,4	23,3	23,9
05:40	23,2	25,8	25,2	22,9	23,0	23,1	24,1	24,7	24,1	24,6	24,2	24,0	24,1	23,7	23,9	21,8	23,8	24,0	23,0	23,2	23,1	23,8	23,7	23,5	23,0	23,4	23,2	23,9
06:10	23,1	25,0	25,7	22,9	23,0	23,0	23,9	24,6	24,1	24,5	24,2	24,0	24,4	23,7	23,9	21,0	23,8	24,2	23,0	23,2	25,3	23,8	23,9	23,5	23,0	25,6	23,4	23,8
06:40	23,1	24,5	24,8	22,9	23,1	23,0	23,8	24,6	24,3	24,5	24,2	23,9	24,5	23,7	23,9	20,5	23,8	24,3	23,2	23,5	26,4	23,8	23,8	23,5	22,9	26,4	26,0	23,7
07:10	23,0	26,0	24,3	22,8	23,0	24,8	25,0	24,5	24,2	24,4	24,3	23,9	24,6	23,7	23,9	21,3	25,9	24,1	23,4	25,7	25,8	24,5	23,7	23,5	24,1	26,8	26,9	23,7
07:40	23,0	26,7	25,2	24,4	23,0	26,1	26,2	24,5	24,1	24,5	24,4	23,9	24,6	24,8	23,8	24,2	26,8	24,1	23,3	26,3	25,1	25,9	23,7	23,5	25,6	27,0	27,3	23,7
08:10	25,2	27,1	25,7	25,2	23,0	26,8	26,8	24,4	24,1	24,4	26,2	25,4	24,7	25,9	23,8	25,5	27,3	24,0	23,2	26,6	24,6	26,5	25,5	23,5	26,2	27,2	27,7	25,2
08:40	25,3	27,0	25,8	25,6	23,0	25,8	27,1	24,4	24,1	24,4	25,7	26,6	24,5	26,1	23,8	26,2	27,5	24,0	23,8	26,5	24,3	26,8	25,8	23,4	26,4	27,0	28,0	26,0
09:10	24,1	26,2	25,0	24,9	23,0	25,0	27,1	25,6	24,1	24,3	25,3	27,2	24,4	25,4	23,8	25,7	26,8	24,8	24,5	25,6	24,1	27,0	25,1	23,2	25,1	26,1	28,2	26,4
09:40	24,7	25,5	24,5	25,6	24,4	24,5	27,3	25,3	24,1	23,9	25,0	27,3	24,2	25,1	23,8	25,1	26,0	25,8	24,1	25,0	24,0	26,8	24,8	23,3	24,2	25,6	27,0	25,7
10:10	24,3	24,9	24,2	25,3	25,1	25,1	27,4	25,2	24,1	23,7	24,8	27,6	24,1	24,8	23,9	24,8	25,6	24,9	24,0	24,8	24,0	26,1	24,6	23,3	24,1	25,2	26,2	25,3
10:40	24,2	24,5	24,1	24,7	25,5	26,2	27,5	25,1	23,8	23,9	24,7	27,0	23,0	24,7	24,0	24,6	25,4	24,5	24,0	24,7	24,0	25,8	24,6	23,3	24,0	25,0	26,4	24,9
11:10	24,2	24,3	24,1	24,5	25,7	26,8	26,8	25,1	23,6	24,1	24,7	23,2	21,6	24,6	24,1	24,6	25,3	24,5	24,0	24,6	24,1	25,6	24,6	23,4	24,0	24,8	27,1	24,8
11:40	24,3	24,1	24,1	24,4	26,2	27,2	26,5	25,0	23,4	24,2	24,6	23,2	21,0	24,5	24,2	24,6	25,2	24,5	24,1	24,6	24,2	25,4	24,6	23,5	24,1	24,7	27,5	24,7
12:10	24,4	24,0	24,3	24,5	26,5	27,5	26,3	25,0	23,6	24,3	24,6	23,7	22,6	24,4	24,3	24,7	25,0	24,7	24,1	24,7	24,4	25,2	24,7	23,7	24,2	24,6	27,8	24,7
12:40	24,5	24,0	24,4	24,5	26,2	27,5	26,3	24,9	23,7	24,4	24,5	24,0	23,0	24,4	24,2	24,7	24,9	24,8	24,3	24,4	24,6	25,0	24,8	23,8	24,3	24,4	26,9	24,8
13:10	24,6	23,9	24,5	24,6	25,8	26,9	26,3	24,9	24,1	24,4	24,5	24,4	23,2	24,5	24,1	24,7	24,8	25,0	24,3	24,4	24,8	24,8	24,8	23,3	24,4	24,3	26,3	24,8
13:40	24,8	23,8	24,5	24,8	25,6	26,6	26,3	25,0	24,6	22,9	24,5	24,8	23,4	24,7	24,1	24,8	24,8	25,2	23,8	24,3	24,9	24,8	24,3	23,4	24,6	24,3	26,0	24,9
14:10	24,8	23,7	24,2	24,6	25,5	26,5	26,2	25,1	24,9	22,7	24,5	25,1	23,5	24,8	24,1	24,7	24,8	25,1	22,9	24,4	24,8	24,8	24,2	23,8	24,7	24,3	25,8	25,0
14:40	25,0	23,8	24,1	24,4	25,5	26,4	26,3	25,4	25,0	23,3	24,5	22,9	23,7	25,0	24,3	24,8	24,8	25,0	23,4	24,2	24,8	25,1	23,9	24,1	24,9	23,5	25,6	25,1
15:10	24,9	24,0	23,9	24,3	25,4	26,4	26,3	25,2	25,1	23,6	24,6	21,7	23,8	24,8	24,6	24,9	24,8	25,1	23,7	24,1	24,7	24,9	23,5	24,2	25,0	23,5	25,4	25,1
15:40	24,8	24,0	23,7	24,2	25,0	26,3	26,2	25,2	25,1	23,8	24,7	21,8	23,8	24,9	24,8	24,9	24,8	25,2	24,0	23,9	24,6	24,7	22,8	24,2	25,0	23,7	25,2	25,0
16:10	24,7	24,0	23,6	24,2	24,8	26,1	26,2	25,1	25,1	23,9	24,6	23,2	23,8	23,1	24,9	24,9	24,7	25,1	24,1	23,9	24,4	24,6	23,2	24,2	24,9	23,8	24,1	24,9
16:40	24,6	23,9	23,5	24,1	24,6	25,9	26,1	25,2	24,8	23,9	24,6	23,8	23,8	23,9	25,0	24,6	24,6	24,8	24,2	23,8	24,7	24,5	23,4	24,1	24,5	23,8	24,6	24,9
17:10	24,4	23,7	23,4	23,9	24,4	25,7	25,9	25,1	24,5	24,0	24,4	24,0	23,8	24,2	24,9	24,1	24,5	24,6	23,5	23,7	24,6	24,6	23,5	24,1	23,9	22,5	24,6	24,8
17:40	24,3	23,5	23,4	23,8	24,4	25,4	25,6	25,1	24,2	24,0	24,3	24,0	23,8	24,4	24,8	23,4	24,6	24,2	22,5	23,4	24,5	24,6	23,5	24,0	23,9	23,0	24,8	24,7
18:10	24,3	23,4	23,3	23,7	24,4	25,1	25,4	24,9	24,0	24,1	24,2	24,0	23,7	24,1	24,7	23,7	24,7	24,0	22,0	23,0	24,4	24,6	23,5	23,8	23,9	23,3	24,7	24,6
18:40	24,3	23,3	23,4	23,7	24,3	24,8	25,3	24,9	24,1	24,2	24,2	24,2	23,8	24,3	24,6	23,9	24,7	25,8	21,7	22,5	24,4	24,6	23,6	23,7	24,0	23,3	24,5	24,4
19:10	24,1	23,2	23,4	23,8	24,3	24,6	25,6	25,0	24,3	24,4	24,1	24,3	23,8	24,3	24,5	23,9	24,7	25,4	22,2	22,0	24,4	24,6	23,7	23,6	23,9	23,4	24,4	24,3
19:40	24,2	23,4	23,5	23,9	24,2	24,4	25,6	25,0	24,4	24,4	24,1	24,3	23,7	24,2	24,6	24,1	24,7	24,3	22,6	21,5	24,5	24,5	23,8	23,5	24,0	23,4	24,3	24,3
20:10	24,2	23,5	23,6	23,9	24,2	24,3	25,7	24,9	24,5	24,4	24,3	24,4	23,7	24,2	24,7	24,3	24,6	23,3	22,9	21,0	24,5	24,5	23,7	23,6	24,0	23,4	24,4	24,4
20:40	24,2	23,6	23,6	23,9	24,2	24,1	25,7	24,9	24,5	24,4	24,5	24,4	23,7	24,1	24,7	24,4	24,7	22,4	23,1	21,3	24,5	24,5	23,6	23,7	24,1	23,5	24,5	24,5
21:10	24,1	23,6	23,6	23,9	24,1	24,2	25,8	24,9	24,5	24,4	24,6	24,4	23,7	24,1	24,7	24,4	24,7	21,7	23,3	22,7	24,5	24,6	23,6	23,8	24,1	23,7	24,5	24,4
21:40	24,1	23,7	23,6	23,9	24,1	24,3	25,8	24,9	24,6	24,5	24,6	24,5	23,7	24,1	24,8	24,4	24,7	21,2	23,4	22,9	24,5	24,5	23,5	23,7	23,9	23,8	24,6	24,4
22:10	24,0	23,7	23,6	23,9	24,1	24,4	25,8	24,8	24,7	24,5	24,7	24,5	23,6	24,0	24,8	24,3	24,7	20,8	23,5	23,0	24,4	24,3	23,5	23,6	23,8	23,9	24,5	24,5
22:40	23,8	23,7	23,6	23,9	24,1	24,4	25,8	24,6	24,8	24,5	24,7	24,5	23,6	24,0	24,6	24,2	24,7	20,3	23,4	23,1	24,5	24,2	23,7	23,6	23,8	23,8	24,4	24,5
23:10	23,7	23,6	23,6	23,9	24,1	24,5	25,9	24,5	24,7	24,6	24,7	24,3	23,6	24,0	24,4	24,1	24,7	20,9	23,6	23,0	24,5	24,1	23,9	23,5	23,7	23,7	24,2	24,5
23:40	23,6	23,4	23,6	23,9	24,1	24,4	25,9	24,4	24,6	24,5	24,6	24,2	23,6	24,1	24,4	24,1	24,7	21,7	23,6	22,9	24,5	24,1	23,8	23,4	23,6	23,6	24,1	24,3
Avarage	24,1	24,2	23,9	24,0	24,2	24,9	25,5	25,1	24,3	24,2	24,5	24,3	23,8	24,3	24,3	24,1	24,8	24,1	23,3	23,7	24,2	24,7	24,0	23,6	24,0	24,2	25,1	24,5
Maximum	25,3	27,1	25,8	25,6	26,5	27,5	27,5	26,1	25,1	24,7	26,2	27,6	24,7	26,1	25,0	26,2	27,5	25,8	24,5	26,6	26,4	27,0	25,8	24,2	26,4	27,2	28,2	26,4
Minimum	23,0	23,1	22,9	22,8	23,0	23,0	23,8	24,4	23,4	22,7	24,1	21,7	21,0	23,1	23,8	20,5	23,8	20,3	21,7	21,0	22,9	23,8	22,8	23,2	22,9	22,5	23,2	23,7

Table. A.2. 28 day Statistics Of Temperature Relative Humidity of Room – 1

ROOM 1 (24 hr)	24.02	25.02	26.02	27.02	28.02	01.03	02.03	03.03	04.03	05.03	06.03	07.03	08.03	09.03	10.03	11.03	12.03	13.03	14.03	15.03	16.03	17.03	18.03	19.03	20.03	21.03	22.03	23.03
00:10	31,9	31,8	32,3	28,8	30,7	30,0	29,3	32,4	36,7	37,5	42,0	43,4	37,3	39,4	38,4	36,1	34,0	37,2	35,3	35,2	30,1	32,3	35,8	36,3	33,3	31,3	37,4	36,7
01:10	31,8	31,9	32,4	28,7	30,7	30,1	29,5	32,4	36,7	37,5	42,0	43,7	37,5	39,2	38,6	36,1	34,0	37,3	35,1	35,4	30,2	32,4	35,2	36,3	33,2	31,3	36,9	36,7
02:10	31,9	32,0	32,5	29,1	30,5	30,3	29,5	32,2	36,6	37,4	42,0	43,9	37,7	39,0	38,7	35,8	34,0	37,3	35,1	35,3	30,2	32,6	34,8	36,2	33,3	31,1	36,6	36,6
03:10	31,5	31,9	32,5	29,2	30,8	30,2	29,8	32,3	36,7	37,4	42,5	44,0	37,7	38,9	38,8	35,8	34,1	37,3	34,9	35,4	30,4	32,6	34,8	36,3	33,3	30,8	36,9	36,6
04:10	31,7	31,9	32,6	29,0	30,9	30,1	29,9	32,2	36,8	37,6	42,7	44,8	38,2	39,1	38,7	35,7	34,0	37,5	34,9	35,3	30,6	33,0	34,9	36,2	33,0	30,8	37,2	36,4
05:10	31,7	31,9	32,5	28,9	31,0	30,0	30,0	32,6	36,8	37,3	43,2	44,4	37,9	39,3	38,7	35,5	34,0	37,6	34,7	35,0	30,5	32,4	34,8	36,3	33,0	31,0	37,7	36,5
06:10	31,8	31,9	32,6	29,3	31,1	30,1	30,2	33,0	36,7	37,9	42,7	44,4	37,7	39,4	38,7	35,3	33,9	37,6	34,6	34,9	30,8	32,6	35,0	36,3	32,6	31,1	37,7	36,6
07:10	31,7	31,8	32,6	29,3	31,2	30,2	30,2	33,1	36,4	38,3	42,8	43,8	37,9	39,4	38,9	35,2	33,9	37,6	34,4	34,7	30,8	32,8	35,0	36,3	32,2	31,3	37,5	36,6
08:10	31,4	31,9	32,6	29,5	31,3	30,3	30,6	33,2	36,3	39,3	42,8	42,6	38,0	39,4	38,9	35,3	33,9	37,6	34,3	34,4	30,8	33,0	34,8	36,4	32,3	31,3	37,3	36,3
09:10	31,6	31,3	32,7	29,7	31,3	30,3	30,5	33,5	36,6	46,3	42,9	40,8	38,0	39,4	39,1	35,0	34,0	37,5	35,1	34,1	30,8	33,2	34,8	36,6	32,3	31,2	37,0	36,0
10:10	31,5	29,2	32,1	29,9	31,3	30,3	30,3	33,6	36,5	44,5	42,6	39,1	38,0	39,4	39,0	30,3	34,1	37,4	34,7	33,9	30,9	33,3	34,7	36,8	32,3	31,4	36,7	36,0
11:10	31,5	28,9	30,5	30,0	31,3	30,5	30,4	33,7	36,5	43,7	43,1	39,2	38,2	39,5	39,2	31,0	34,0	37,4	34,8	33,8	31,0	33,4	34,4	36,2	32,4	31,3	36,5	36,0
12:10	31,4	29,4	29,6	30,1	31,3	30,6	30,4	33,8	36,6	42,6	43,5	39,4	38,6	39,4	39,2	31,1	34,0	37,0	34,9	33,7	29,4	33,5	33,9	36,1	32,4	29,1	36,2	36,3
13:10	31,5	30,0	30,0	30,0	31,2	30,6	30,5	33,9	36,4	42,2	43,9	39,5	38,2	39,4	39,3	31,9	34,2	36,9	34,6	33,4	27,9	33,6	34,0	36,4	32,4	27,8	32,5	36,1
14:10	31,4	28,7	30,5	30,1	31,3	29,4	29,8	33,9	36,5	41,1	43,8	39,7	37,8	39,4	39,2	33,6	31,9	36,9	34,5	30,7	27,8	33,4	34,2	36,7	31,4	27,2	31,1	36,1
07:40	31,5	27,7	30,1	28,7	31,2	27,5	28,4	34,0	36,5	42,0	43,6	39,4	37,8	38,7	39,1	31,7	30,7	36,9	34,7	29,9	28,7	31,6	34,0	36,7	29,4	27,0	30,4	35,9
08:10	31,6	27,4	29,4	27,7	31,2	26,7	27,5	34,2	36,7	41,6	41,4	38,0	37,6	36,9	39,1	30,3	30,1	37,0	34,8	29,3	29,6	30,4	32,2	37,0	28,6	26,9	29,7	34,6
08:40	29,3	27,3	28,8	27,3	31,2	25,3	27,1	34,6	36,9	41,2	41,2	36,0	37,9	36,4	39,1	29,4	29,7	36,8	34,9	29,2	30,1	29,9	31,7	34,8	28,2	26,9	29,2	33,0
09:10	27,7	27,6	29,0	26,7	30,9	26,8	27,0	33,6	37,1	40,2	41,4	34,9	38,1	37,1	39,1	29,9	30,3	35,2	33,4	29,2	30,4	29,6	32,1	34,6	26,0	27,5	28,6	32,1
09:40	27,9	28,6	29,4	25,7	26,0	27,5	26,7	34,1	37,2	38,2	41,6	34,8	38,2	37,5	39,2	30,8	31,0	33,8	33,9	30,0	30,9	30,0	32,7	34,7	28,1	28,2	29,8	32,7
10:10	28,2	28,2	29,9	26,2	24,9	27,9	26,7	34,6	38,7	37,7	41,7	34,3	38,5	37,8	39,0	31,6	31,8	31,9	34,6	30,8	31,0	30,8	33,3	34,4	29,3	28,5	30,9	33,6
10:40	29,1	28,4	30,1	26,8	24,2	27,1	26,8	34,9	39,5	38,6	41,7	32,2	41,1	38,2	38,6	32,3	32,3	32,0	35,5	31,4	31,3	31,5	33,6	35,1	29,6	28,7	31,6	33,8
11:10	29,8	28,8	30,2	27,2	24,1	26,5	27,7	35,4	39,7	38,9	41,5	38,1	42,8	38,3	38,5	32,8	32,7	32,9	35,8	31,6	31,7	32,1	34,2	35,4	29,7	28,9	31,0	33,9
11:40	29,9	29,3	30,0	27,8	25,1	26,2	28,3	35,4	39,7	38,8	41,1	40,1	42,5	38,3	38,1	33,2	33,0	32,6	35,8	31,7	32,1	32,2	34,5	36,1	30,0	29,1	32,4	34,0
12:10	30,1	29,7	30,5	28,5	25,3	26,1	28,8	35,9	38,6	38,6	40,6	40,4	41,5	38,4	37,9	33,3	33,4	32,7	35,9	31,6	32,2	32,3	34,4	35,7	30,3	29,2	32,9	34,3
12:40	30,2	30,2	30,6	29,0	25,9	26,1	29,2	36,1	37,5	38,7	40,8	40,2	41,0	38,4	37,4	33,3	33,7	33,0	36,5	28,4	32,1	32,7	33,6	35,5	30,4	29,5	34,4	34,5
13:10	30,1	30,3	30,1	29,2	26,3	26,2	28,9	36,1	38,6	38,5	41,3	40,8	40,4	38,5	37,8	33,0	33,9	33,1	35,3	26,9	31,6	32,8	33,1	31,4	30,4	29,9	34,0	34,5
13:40	30,1	30,8	30,3	29,0	27,3	26,3	29,1	36,0	38,6	45,6	41,6	39,5	39,9	38,4	37,8	32,7	34,5	32,8	33,6	26,2	30,8	33,8	32,2	33,3	30,8	30,1	34,0	34,7
14:10	30,1	30,8	30,3	28,7	27,3	26,5	29,9	36,0	38,1	45,2	41,8	37,8	39,7	38,0	37,8	31,9	34,5	32,2	35,0	25,6	28,0	33,9	31,7	34,1	30,8	30,5	34,1	34,5
14:40	29,9	31,6	30,0	28,8	27,5	26,5	30,7	36,1	37,6	43,6	41,8	31,6	39,8	37,5	37,7	33,1	34,5	32,0	34,7	25,5	26,5	33,9	31,1	33,9	30,3	29,5	34,6	34,1
15:10	29,8	31,6	29,8	29,3	27,4	26,6	30,5	35,8	36,9	43,1	42,2	31,7	39,7	35,9	37,5	34,3	34,6	31,9	33,6	24,8	25,8	33,7	30,6	33,7	30,5	30,7	34,9	34,1
15:40	30,1	31,5	29,7	29,5	27,7	26,7	31,1	35,9	36,7	43,4	42,2	32,4	39,4	34,8	37,1	34,9	34,9	31,9	33,5	24,6	25,2	34,0	29,9	33,3	30,5	31,1	35,1	34,1
16:10	30,1	31,7	29,7	29,7	28,0	26,8	34,5	36,3	36,5	43,3	42,1	34,0	39,3	34,1	36,8	35,7	35,3	30,8	33,0	24,7	25,0	34,1	32,6	33,3	29,9	31,2	34,2	34,2
16:40	30,1	31,6	30,0	29,8	28,7	26,8	33,0	36,3	34,2	42,9	42,5	34,7	39,2	35,8	36,6	33,0	35,6	30,5	33,2	24,4	29,2	34,4	33,7	32,5	26,9	31,5	36,7	34,2
17:10	30,3	31,8	30,1	30,2	29,1	27,0	33,0	36,5	34,5	42,7	42,7	34,8	39,3	36,5	36,5	29,8	35,7	30,3	28,8	24,7	29,2	34,5	33,6	33,1	26,6	35,8	36,9	34,0
17:40	30,4	31,8	30,4	30,4	29,0	27,3	32,9	36,4	35,5	43,0	42,8	35,6	39,3	36,7	36,6	29,9	36,0	30,1	29,1	23,0	29,1	34,6	33,6	32,9	28,3	34,7	36,3	34,0
18:10	30,9	31,9	30,4	30,4	29,2	27,3	33,1	36,4	36,7	42,9	43,1	35,8	39,4	36,8	36,7	31,7	36,0	31,0	29,2	22,9	29,6	34,8	33,8	33,0	29,1	34,0	36,2	34,0
18:40	31,3	31,9	30,2	30,5	29,1	27,7	33,2	36,6	37,0	42,0	43,2	35,8	39,2	37,2	36,8	32,3	36,1	34,6	29,5	23,6	30,3	34,8	34,2	33,0	29,5	34,0	36,2	34,0
19:10	31,3	31,9	30,3	30,3	29,0	27,9	32,9	36,5	37,3	42,3	43,4	35,6	39,3	37,6	36,5	32,7	36,4	30,8	31,5	24,2	30,2	34,7	33,8	33,0	29,8	34,0	36,1	34,0
19:40	31,1	32,2	30,1	30,6	29,1	28,2	32,6	36,3	37,2	42,1	43,4	35,7	39,4	37,7	36,2	32,8	36,3	29,9	31,8	24,8	30,5	34,5	34,3	33,0	30,0	33,9	35,9	34,2
20:10	31,5	32,2	29,6	30,5	29,6	28,4	32,4	36,2	37,1	42,3	43,3	35,7	39,4	37,9	36,1	33,0	36,4	30,0	32,2	25,8	31,3	34,7	33,9	33,1	30,2	34,2	36,0	34,4
20:40	31,2	32,1	29,4	30,6	29,5	28,5	32,3	36,2	37,0	42,2	43,2	35,8	39,4	38,0	36,0	33,1	36,9	31,3	32,5	27,8	31,5	34,9	34,2	33,0	30,3	34,1	36,0	34,3
21:10	31,4	32,1	29,5	30,7	29,9	29,1	32,2	36,2	37,0	42,1	43,0	35,9	39,4	38,2	36,0	33,1	37,2	31,8	32,9	27,8	31,7	35,1	34,1	32,8	30,4	34,4	36,0	34,8
21:40	31,2	32,0	29,2	30,6	29,8	28,9	32,2	36,1	37,4	41,9	42,7	36,1	39,4	38,3	35,8	33,3	37,3	32,5	33,8	28,6	31,8	35,3	34,4	32,9	30,5	34,3	36,2	34,7
22:10	31,3	32,0	29,0	30,5	30,1	29,0	32,2	36,1	37,7	41,8	42,5	36,4	39,4	38,4	35,5	33,5	37,1	33,4	34,7	29,0	31,9	35,4	35,1	33,0	30,9	34,4	35,8	34,5
22:40	31,5	31,9	28,7	30,5	30,0	28,9	32,4	36,3	37,6	41,6	42,5	36,7	39,4	38,4	36,0	33,7	36,9	33,8	34,7	29,3	31,8	35,7	35,4	33,2	31,1	35,5	35,7	34,5
23:10	31,6	32,0	28,9	30,4	30,0	28,9	32,4	36,4	37,4	41,5	42,5	37,0	39,4	38,4	36,1	33,8	37,4	34,8	34,3	29,7	31,8	35,8	36,0	33,4	31,2	36,3	36,3	34,2
23:40	31,7	32,2	28,9	31,0	30,1	29,0	32,3	36,5	37,5	41,6	43,0	37,2	39,4	38,3	36,1	33,8	37,2	35,3	34,8	29,8	31,8	35,8	35,9	33,4	31,2	37,2	36,7	34,7
Avarage	30,8	30,7	30,4	29,3	29,2	28,2	30,4	34,9	37,1	41,1	42,4	38,1	39,0	38,1	37,8	33,1	34,3	34,2	33,9	29,6	30,1	33,3	33,8	34,7	30,6	31,2	34,8	34,8
Maximum	31,9	32,2	32,7	31,0	31,3	30,6	34,5	36,6	39,7	46,3	43,9	44,8	42,8	39,5	39,3	36,1	37,4	37,6	36,5	35,4	32,2	35,8	36,0	37,0	33,3	37,2	37,7	36,7
Minimum	27,7	27,3	28,7	25,7	24,1	25,3	26,7	32,2	34,2	37,3	40,6	31,6	37,3	34,1	35,5	29,4	29,7	29,9	28,8	22,9	25,0	29,6	29,9	31,4	26,0	26,9	28,6	32,1

Table. A.3. 28 day Statistics Of Intensity Data of Room – 1

ROOM 1 (24 hr)	24.02	25.02	26.02	27.02	28.02	01.03	02.03	03.03	04.03	05.03	06.03	07.03	08.03	09.03	10.03	11.03	12.03	13.03	14.03	15.03	16.03	17.03	18.03	19.03	20.03	21.03	22.03	23.03
00:10	118	118	118	276	276	118	118	276	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118
01:10	355	118	118	355	355	118	118	276	118	118	118	118	118	355	118	118	118	118	118	118	118	118	276	118	118	118	276	118
02:10	276	118	118	118	355	118	118	276	118	118	118	118	118	355	118	118	118	118	118	118	118	118	276	118	118	276	276	118
03:10	118	118	118	355	118	355	118	355	118	118	118	118	118	355	118	118	118	118	118	118	118	118	118	118	118	276	118	118
04:10	118	118	118	355	118	355	118	118	118	118	118	118	355	118	118	118	118	118	118	118	118	118	118	118	118	276	118	118
05:10	118	118	118	355	118	118	118	118	118	118	118	118	355	118	118	118	118	118	118	118	118	276	118	118	118	118	118	118
06:10	118	118	118	118	118	118	118	118	355	118	118	118	355	118	118	118	118	118	118	118	118	118	118	118	276	118	118	118
07:10	118	118	118	118	118	118	118	118	118	355	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118
08:10	118	118	118	118	118	39	355	118	118	355	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	276
09:10	118	355	118	118	118	118	355	118	118	118	355	355	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	276
10:10	118	355	355	118	118	118	355	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118
11:10	118	118	355	118	118	118	118	118	118	118	118	118	355	118	118	118	118	118	118	118	355	118	276	118	118	276	118	118
12:10	118	118	118	118	118	118	118	118	355	118	118	118	355	118	118	118	118	355	118	118	355	118	118	118	118	276	276	118
13:10	118	276	118	118	118	118	118	118	118	118	118	118	355	118	118	118	118	118	355	118	434	118	197	197	197	197	355	118
14:10	118	355	118	118	197	434	355	197	276	118	355	118	355	276	276	276	512	118	197	276	355	197	355	355	355	276	276	197
07:40	276	355	197	197	355	591	591	434	434	118	434	118	434	355	276	434	512	197	118	434	434	434	512	434	434	434	512	197
08:10	512	276	276	355	434	749	749	591	591	197	670	355	512	670	355	512	434	355	118	512	591	670	670	670	591	749	434	276
08:40	749	434	512	591	670	749	434	907	749	276	670	434	512	591	434	749	591	670	434	749	749	907	828	828	749	749	670	355
09:10	1064	512	985	591	1143	985	1064	1064	1064	355	907	197	197	1064	512	1143	512	828	828	985	985	1301	985	985	985	907	1222	749
09:40	1458	591	1143	1143	1301	1301	1380	1537	1380	434	1064	197	276	1380	591	1537	828	828	1222	1222	1222	1537	1301	355	1222	670	907	1064
10:10	1853	749	1616	1064	1616	1537	1458	1222	1695	512	1222	276	512	1853	1537	2010	1222	1774	1458	1458	1458	1695	1380	670	1458	1222	197	985
10:40	2405	512	2326	1853	2010	1774	1695	2168	2168	670	1537	276	1301	985	2010	1301	1064	2326	1774	1853	1853	2326	2168	1774	1774	985	1301	1301
11:10	1853	591	1774	2405	2405	2326	2405	1932	3351	985	985	197	1064	1222	1932	1458	1616	3114	1143	2168	2168	1932	2483	1064	2247	985	1143	1616
11:40	3272	749	3666	2799	2799	2562	2720	1537	3193	591	1695	276	355	670	1932	2405	1143	3193	1458	2326	2326	1222	2483	3272	2562	907	1222	1222
12:10	4533	828	2878	3351	3429	3429	3666	907	3351	828	1143	276	512	1695	985	1616	591	2956	2878	3035	2641	355	3193	1143	3035	749	1064	2405
12:40	4533	512	4691	3666	4060	4297	3981	1301	1932	907	1143	1064	907	1380	355	2247	907	3429	985	3351	3114	276	1537	1853	3272	670	907	3272
13:10	5479	512	5558	4533	4218	4691	5164	2483	4849	434	828	4060	670	4139	670	1380	828	3902	749	3587	3351	670	2956	3824	3587	1143	1222	2956
13:40	6031	355	1853	5164	2010	5085	3429	5558	5322	512	1301	4533	3824	1853	1064	2799	1222	3351	828	4060	4218	1774	3035	4218	3824	2010	2562	3981
14:10	5952	512	1222	3666	4849	5243	5400	2405	5400	355	1143	4612	1932	1458	2089	2641	985	1616	4454	3902	4139	3824	3981	4297	3824	1380	1222	4139
14:40	5400	591	1380	985	4691	5243	5164	3035	4927	276	1616	4139	1853	4849	1932	2956	1064	4375	4139	3351	3666	670	1537	4060	3666	1064	670	2405
15:10	4297	512	985	985	2720	4454	4612	1537	4375	276	1853	3351	1616	3981	3193	2168	2483	3666	3587	3429	3351	197	749	4139	3429	985	355	1774
15:40	1143	512	907	828	985	3351	3587	1222	3666	512	1380	3666	907	2720	2405	1143	355	2956	670	2878	2720	197	1774	3035	2956	512	355	1222
16:10	2247	512	670	1222	591	2483	2405	2326	2878	355	591	2799	828	2483	2089	1458	591	2326	749	2247	2247	276	1380	2405	2089	591	355	1222
16:40	1064	118	276	591	276	2405	1932	985	1932	355	434	749	355	1932	1853	985	434	1774	1853	1774	1616	197	512	591	1143	197	276	1774
17:10	591	118	197	434	118	1143	1064	1301	434	591	276	591	670	1301	1380	1301	197	1143	1380	1143	985	355	276	1695	1380	118	197	1380
17:40	118	118	118	197	355	276	197	512	197	197	118	434	118	276	512	670	355	512	591	276	434	276	197	434	355	118	355	670
18:10	276	39	118	118	355	118	118	118	118	118	118	118	118	118	118	118	276	118	118	118	118	276	118	118	118	118	118	118
18:40	276	118	118	276	276	118	276	276	355	355	118	276	355	276	118	276	276	276	276	276	276	276	276	118	276	118	118	118
19:10	118	118	276	355	276	118	355	355	355	355	118	276	118	118	355	118	276	355	276	276	276	276	276	39	118	118	118	118
19:40	276	355	276	276	276	118	355	276	355	276	355	276	118	118	355	355	276	276	276	276	276	276	118	118	276	118	276	276
20:10	276	276	276	276	276	118	276	276	276	276	276	276	118	118	355	276	276	118	276	276	276	276	118	276	276	118	276	276
20:40	276	355	276	276	276	118	355	276	276	276	355	276	118	118	276	276	276	118	276	276	276	276	118	276	276	276	276	276
21:10	276	276	355	276	118	276	355	276	276	276	355	276	118	118	355	276	276	118	355	276	276	276	118	276	118	276	276	118
21:40	276	355	355	355	355	355	355	355	355	276	355	276	118	118	355	118	355	118	355	355	276	118	118	118	118	276	276	276
22:10	118	355	276	276	355	355	355	118	276	276	355	276	118	118	118	118	355	118	118	276	276	118	276	118	118	276	276	276
22:40	118	276	355	276	355	276	355	118	355	276	276	118	118	118	118	118	355	118	118	118	276	118	276	118	118	118	118	276
23:10	118	118	355	355	355	276	276	118	118	276	355	118	118	118	118	118	355	276	355	118	276	118	118	118	118	118	118	118
23:40	118	118	355	276	355	118	276	118	118	118	118	118	118	355	118	118	276	355	118	118	276	118	118	118	118	118	118	118
Avarage	1239,9	320,1	809,7	893,5	982,2	1240,0	1240,0	837,6	1240,1	315,3	550,2	776,8	509,1	860,6	683,2	773,5	494,3	1034,6	758,7	1029,7	1046,2	533,8	803,0	950,9	1018,2	458,1	461,5	822,8
Maximum	6031,0	828,0	5558,0	5164,0	4849,0	5243,0	5400,0	5558,0	5400,0	985,0	1853,0	4612,0	3824,0	4849,0	3193,0	2956,0	2483,0	4375,0	4454,0	4060,0	4218,0	3824,0	3981,0	4297,0	3824,0	2010,0	2562,0	4139,0
Minimum	118,0	39,0	118,0	118,0	118,0	39,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	118,0	39,0	118,0	118,0	118,0	118,0

Table A. 4. Daylight Intensity Data of Room -1

ROOM 1 (DAYLIGHT)	24.02	25.02	26.02	27.02	28.02	01.03	02.03	03.03	04.03	05.03	06.03	07.03	08.03	09.03	10.03	11.03	12.03	13.03	14.03	15.03	16.03	17.03	18.03	19.03	20.03	21.03	22.03	23.03
08:40	749	434	512	591	670	749	434	907	749	276	670	434	512	591	434	749	591	670	434	749	749	907	828	828	749	749	670	355
09:10	1064	512	985	591	1143	985	1064	1064	1064	355	907	197	197	1064	512	1143	512	828	828	985	985	1301	985	985	985	907	1222	749
09:40	1458	591	1143	1143	1301	1301	1380	1537	1380	434	1064	197	276	1380	591	1537	828	828	1222	1222	1222	1537	1301	355	1222	670	907	1064
10:10	1853	749	1616	1064	1616	1537	1458	1222	1695	512	1222	276	512	1853	1537	2010	1222	1774	1458	1458	1458	1695	1380	670	1458	1222	197	985
10:40	2405	512	2326	1853	2010	1774	1695	2168	2168	670	1537	276	1301	985	2010	1301	1064	2326	1774	1853	1853	2326	2168	1774	1774	985	1301	1301
11:10	1853	591	1774	2405	2405	2326	2405	1932	3351	985	985	197	1064	1222	1932	1458	1616	3114	1143	2168	2168	1932	2483	1064	2247	985	1143	1616
11:40	3272	749	3666	2799	2799	2562	2720	1537	3193	591	1695	276	355	670	1932	2405	1143	3193	1458	2326	2326	1222	2483	3272	2562	907	1222	1222
12:10	4533	828	2878	3351	3429	3429	3666	907	3351	828	1143	276	512	1695	985	1616	591	2956	2878	3035	2641	355	3193	1143	3035	749	1064	2405
12:40	4533	512	4691	3666	4060	4297	3981	1301	1932	907	1143	1064	907	1380	355	2247	907	3429	985	3351	3114	276	1537	1853	3272	670	907	3272
13:10	5479	512	5558	4533	4218	4691	5164	2483	4849	434	828	4060	670	4139	670	1380	828	3902	749	3587	3351	670	2956	3824	3587	1143	1222	2956
13:40	6031	355	1853	5164	2010	5085	3429	5558	5322	512	1301	4533	3824	1853	1064	2799	1222	3351	828	4060	4218	1774	3035	4218	3824	2010	2562	3981
14:10	5952	512	1222	3666	4849	5243	5400	2405	5400	355	1143	4612	1932	1458	2089	2641	985	1616	4454	3902	4139	3824	3981	4297	3824	1380	1222	4139
14:40	5400	591	1380	985	4691	5243	5164	3035	4927	276	1616	4139	1853	4849	1932	2956	1064	4375	4139	3351	3666	670	1537	4060	3666	1064	670	2405
15:10	4297	512	985	985	2720	4454	4612	1537	4375	276	1853	3351	1616	3981	3193	2168	2483	3666	3587	3429	3351	197	749	4139	3429	985	355	1774
15:40	1143	512	907	828	985	3351	3587	1222	3666	512	1380	3666	907	2720	2405	1143	355	2956	670	2878	2720	197	1774	3035	2956	512	355	1222
16:10	2247	512	670	1222	591	2483	2405	2326	2878	355	591	2799	828	2483	2089	1458	591	2326	749	2247	2247	276	1380	2405	2089	591	355	1222
Avarage	3266,8	561,5	2010,4	2177,9	2468,6	3094,4	3035,3	1946,3	3143,8	517,4	1192,4	1897,1	1079,1	2020,2	1483,1	1813,2	1000,1	2581,9	1709,8	2537,6	2513,0	1197,4	1985,6	2370,1	2542,4	970,6	960,9	1916,8
Maximum	6031,0	828,0	5558,0	5164,0	4849,0	5243,0	5400,0	5558,0	5400,0	985,0	1853,0	4612,0	3824,0	4849,0	3193,0	2956,0	2483,0	4375,0	4454,0	4060,0	4218,0	3824,0	3981,0	4297,0	3824,0	2010,0	2562,0	4139,0
Minimum	749,0	355,0	512,0	591,0	591,0	749,0	434,0	907,0	749,0	276,0	591,0	197,0	197,0	591,0	355,0	749,0	355,0	670,0	434,0	749,0	749,0	197,0	749,0	355,0	749,0	512,0	197,0	355,0

APPENDIX B

EXTREME AND DAILY AVERAGE TEMPERATURE

In this section instant maximum, instant minimum and daily average temperatures , are listed on tables between B1-B10. These values are strained from the data sheets. This tables are prepeared in order to visualise displays the maximum temperature related with the time when it is recorded.

Table B.1. Instant Extreme and Daily Avarage Outdoor Temperatures

	OUTDOOR				
	Max		Min		Average
Date	t°C	time	t °C	time	t °C
24 February 2009	9.1	16:10	4.4	06:40	6.6
25 February 2009	8	14:40	4.6	22:40	6.2
26 February 2009	8.2	17:40	4.9	00:10	6.3
27 February 2009	8	15:10	5.1	23:10	6.4
28 February 2009	9.2	14:40	4.3	04:40	6.6
01 March 2009	13	14:10	5.2	06:10	9.2
02 March 2009	16.2	14:40	8.3	01:40	12.4
03 March 2009	17.9	15:10	10.6	06:10	13.7
04 March 2009	18.6	14:10	10.1	03:40	14.2
05 March 2009	17.6	12:40	12.3	00:40	15.5
06 March 2009	19.1	14:40	15.5	05:40	17.2
07 March 2009	16.9	00:40	10.1	10:40	13.4
08 March 2009	15.4	14:40	10	23:40	12.2
09 March 2009	15.8	14:10	8	06:40	12.2
10 March 2009	16.7	11:40	10.9	23:00	13.2
11 March 2009	13.8	14:10	7.9	06:40	10.9
12 March 2009	15.4	15:10	8.9	00:10	11.4
13 March 2009	10.6	16:40	7.2	07:40	9.0
14 March 2009	13.4	13:40	6.1	23:10	9.0
15 March 2009	11	16:10	5	05:10	7.8
16 March 2009	13.3	15:40	5.2	05:40	9.7
17 March 2009	13	11:40	7.7	06:10	9.8
18 March 2009	12.8	15:10	5.4	22:40	9.2
19 March 2009	9.2	15:40	4.8	23:40	6.6
20 March 2009	12.3	16:10	3.9	02:40	7.8
21 March 2009	14.8	14:40	6.7	06:10	11.1
22 March 2009	13.8	00:10	6.6	21:40	10.4
23 March 2009	11.1	14:10	6.4	06:40	8.7

Table B.2. Instant Extreme and Daily Avarage Temperatures of Room -1

Room-1	INDOOR Max		Min		Average
Date	°C	time	°C	time	°C
24 February 2009	25	14:40	23	07:10	24.1
25 February 2009	27.1	08:10	23.1	04:10	24.2
26 February 2009	25.8	08:40	22.9	04:40	24
27 February 2009	25.6	08:40	22.8	07:10	24
28 February 2009	26.5	12:40	23	05:40	24.2
01 March 2009	27.5	12:40	23	06:10	24.9
02 March 2009	27.5	10:40	23.8	04:10	25.5
03 March 2009	26.1	02:10	24.4	08:10	25.1
04 March 2009	25.1	15:10	23.4	11:40	24.3
05 March 2009	24.7	04:40	22.7	14:10	24.2
06 March 2009	26.2	08:10	24.1	04:10	24.5
07 March 2009	27.6	10:10	21.7	15:10	24.3
08 March 2009	24.7	08:10	21	11:40	23.8
09 March 2009	26.1	08:40	23.1	16:10	24.3
10 March 2009	25	16:40	23.8	07:40	24.3
11 March 2009	26.2	08:40	20.5	06:40	24.1
12 March 2009	27.5	08:40	23.8	06:40	24.8
13 March 2009	25.8	18:40	20.3	22:40	24.1
14 March 2009	24.5	09:10	21.7	18:40	23.3
15 March 2009	26.6	08:10	21	20:10	23.7
16 March 2009	26.4	06:40	22.9	00:40	24.2
17 March 2009	27	09:10	23.8	06:40	24.7
18 March 2009	25.8	08:10	22.8	15:40	24
19 March 2009	24.2	15:40	23.2	09:10	23.6
20 March 2009	26.4	08:40	22.9	06:40	24
21 March 2009	27.2	08:10	22.5	07:10	24.2
22 March 2009	28.2	09:10	23.2	05:40	25.1
23 March 2009	26.4	09:10	23.7	07:10	24.5

Table B.3. Instant Extreme and Daily Avarage Temperatures of Room -2

Room-2	INDOOR Max		Min		Average
Date	°C	time	°C	time	°C
24 February 2009	27.6	14:40	24.5	23:40	26.2
25 February 2009	24.4	00:10	23.8	23:40	24.0
26 February 2009	26.2	19:40	23.6	04.40	24.8
27 February 2009	26.4	14.10	25.2	18:10	25.7
28 February 2009	26.9	14.40	25.5	04:10	26.1
01 March 2009	27.5	15:40	25.6	09:10	26.4
02 March 2009	27.8	15:40	26.3	09:40	26.9
03 March 2009	27.5	17:40	26.5	12:10	27.1
04 March 2009	28.0	16:10	25.9	10.10	27.2
05 March 2009	27.7	07:10	26.5	10:10	27.1
06 March 2009	27.7	23.10	26.6	13:10	27.1
07 March 2009	27.8	15:40	26.7	12:40	27.4
08 March 2009	28.0	20:10	27.0	09:10	27.6
09 March 2009	28.5	15.40	27.0	11:10	27.8
10 March 2009	28.4	17.10	27.0	1110	27.9
11 March 2009	27.9	16.10	27.2	12:40	27.6
12 March 2009	27.9	15.10	26.8	10:10	27.4
13 March 2009	28.2	17.10	27.0	08.10	27.5
14 March 2009	27.4	16.40	26.4	09:10	27.0
15 March 2009	28.5	15:10	26.3	09:40	27.3
16 March 2009	28.6	15.40	27.0	08:10	27.6
17 March 2009	27.6	00.10	27.0	13:10	27.3
18 March 2009	28.0	14.40	26.4	09:40	27.2
19 March 2009	28.0	15.40	26.7	12:10	27.2
20 March 2009	28.3	15.40	26.5	08:40	27.2
21 March 2009	27.3	15.10	26.7	08:40	27.0
22 March 2009	27.5	14.10	26.9	07:10	27.2
23 March 2009	27.9	15:10	26.9	08:40	27.3

Table B.4. Instant Extreme and Daily Avarage Temperatures of Room -3

Room-3	INDOOR Max		Min		Average
Date	°C	time	°C	time	°C
24 February 2009	24.4	19:10	18.8	09:10	22.1
25 February 2009	24.7	18:40	19.7	09:10	22.3
26 February 2009	22.5	00:10	19.9	09:10	21.7
27 February 2009	23.5	16.40	19.3	09:10	21.7
28 February 2009	22.8	14.40	18.7	09:10	21.7
01 March 2009	24.5	20.10	19.7	08:40	22.4
02 March 2009	24.5	16.40	21.3	09:10	23.3
03 March 2009	24.5	14.40	22.3	09:10	23.7
04 March 2009	25.6	16.40	22.3	09:10	24.2
05 March 2009	25.8	22:40	23.5	09:10	24.9
06 March 2009	26.7	22:10	25.4	02:40	26.0
07 March 2009	26.8	16.10	22.5	08:40	25.8
08 March 2009	26.3	22.10	25.0	09:40	25.8
09 March 2009	26.4	23.10	24.3	09:10	25.7
10 March 2009	26.3	09:40	23.6	15:10	25.8
11 March 2009	26.5	16:40	22.8	09:10	25.3
12 March 2009	26.2	21:40	24.7	23:10	25.4
13 March 2009	25.9	17:10	21.0	09:10	24.9
14 March 2009	25.9	16:40	22.7	08:40	24.8
15 March 2009	25.1	16.10	21.2	09:10	24.4
16 March 2009	26.2	17:10	22.2	08:40	24.8
17 March 2009	25.1	14.40	22.9	08:40	24.4
18 March 2009	25.2	14:40	22.3	09:10	24.3
19 March 2009	24.5	21:40	21.0	10:10	23.8
20 March 2009	25.0	16:40	21.1	08:40	23.8
21 March 2009	24.6	19:10	22.9	09:40	24.0
22 March 2009	24.8	21.40	22.8	10:10	24.5
23 March 2009	25.1	17:10	22.3	09:10	24.2

Table B.5. Instant Extreme and Daily Avarage Temperatures of Room -4

	INDOOR				
Room- 4	**Max**		**Min**		**Average**
Date	°C	time	°C	time	°C
24 February 2009	22.6	14:40	21.4	09:40	21.9
25 February 2009	23.5	23:40	15.8	11:10	21.5
26 February 2009	24.3	22:10	21.2	07:40	22.4
27 February 2009	24.6	23.10	19.5	09:40	22.5
28 February 2009	24.6	12.10	20.8	09:40	22.4
01 March 2009	24.6	23.10	20.4	15.10	22.3
02 March 2009	24.1	09:40	20.3	17:10	22.2
03 March 2009	22.8	14:40	18.8	09:10	22.2
04 March 2009	23.6	23:40	18.9	10:10	22.4
05 March 2009	23.4	00:10	18.9	14.40	22.3
06 March 2009	24.5	08:40	21.0	13.10	23.3
07 March 2009	24.3	23.40	18.5	09:40	23.4
08 March 2009	26.3	22:40	18.2	09:40	23.4
09 March 2009	24.6	00:10	18.6	15:10	22.9
10 March 2009	24.1	16:40	22.5	17:40	23.5
11 March 2009	23.7	00:10	17.5	09:40	23.0
12 March 2009	23.4	00.10	20.0	19:10	22.9
13 March 2009	23.8	16:10	20.6	09:40	23.2
14 March 2009	24.9	23:40	16.2	09:40	23.1
15 March 2009	25.7	00:10	21.7	13.10	23.6
16 March 2009	25.3	23.40	20.7	20:10	23.2
17 March 2009	26.1	00:10	22.1	13:40	23.8
18 March 2009	25.7	10:40	19.7	08:40	23.9
19 March 2009	26.5	13.10	21.5	14.10	24.4
20 March 2009	24.7	10:40	21.6	08:10	22.8
21 March 2009	23.2	23.40	21.5	06:40	22.4
22 March 2009	24.1	08:10	22.4	23.40	23.3
23 March 2009	29.8	23:40	22.1	06.40	25.0

Table B.6. Instant Extreme and Daily Avarage Temperatures of Room -5

Room - 5	INDOOR Max		Min		Average
Date	°C	time	°C	time	°C
24 February 2009	25.7	23:40	20.8	09:10	23.7
25 February 2009	25.7	00:40	18.7	16:40	22.8
26 February 2009	23.7	17:40	22.0	11:10	22.8
27 February 2009	25.6	23:40	18.8	11:10	23.2
28 February 2009	25.6	00:10	18.8	09:40	23.3
01 March 2009	25.0	00:10	18.6	10:40	22.8
02 March 2009	24.7	06:10	22.1	20:10	23.2
03 March 2009	25.1	06:40	18.2	23:40	22.7
04 March 2009	24.0	22:10	17.7	00:40	21.5
05 March 2009	25.9	20:40	23.1	01:40	24.7
06 March 2009	26.4	23:40	24.7	12:10	25.3
07 March 2009	27.1	16:40	23.3	07:10	25.4
08 March 2009	27.7	23:10	23.1	13:10	25.5
09 March 2009	27.8	23:40	24.5	13:10	25.9
10 March 2009	28.1	23:40	23.5	14:10	26.5
11 March 2009	27.8	00:10	20.1	18:10	23.9
12 March 2009	26.2	01:40	20.2	22:10	23.9
13 March 2009	27.0	00:40	20.1	10:10	23.6
14 March 2009	25.8	01:40	17.1	19:10	23.2
15 March 2009	27.5	22:40	22.0	08:40	25.3
16 March 2009	26.4	00:10	19.9	19:40	24.0
17 March 2009	28.5	20:40	20.7	11:40	24.7
18 March 2009	26.6	03:10	22.1	12:40	24.7
19 March 2009	27.2	23:40	22.8	16:10	24.9
20 March 2009	27.0	00:10	19.8	10:10	23.3
21 March 2009	26.2	22:10	22.9	12:10	24.5
22 March 2009	28.3	23:40	25.4	01:40	26.3
23 March 2009	28.4	00:10	19.7	12:10	23.2

Table B.7. Instant Extreme and Daily Avarage Temperatures of Room -6

Room - 6	INDOOR Max		Min		Average
Date	°C	time	°C	time	°C
24 February 2009	23.4	00.10	20.7	08:40	23.1
25 February 2009	23.4	04.40	23.0	19:40	23.2
26 February 2009	26.8	11:10	22.8	07 :10	23.8
27 February 2009	28.4	13:10	22.6	08:40	24.1
28 February 2009	25.1	15:10	22.9	09:40	23.2
01 March 2009	23.8	23:40	23.2	03.10	23.4
02 March 2009	25.4	21.40	23.5	07:10	24.2
03 March 2009	25.6	21:10	24.5	07:40	25.0
04 March 2009	25.5	04.10	24.1	16:10	25.0
05 March 2009	26.5	21.40	25.1	07:40	25.6
06 March 2009	26.7	22.10	25.7	08:10	26.1
07 March 2009	26.8	06:10	26.2	09:40	26.4
08 March 2009	26.5	01.10	25.0	09:10	26.1
09 March 2009	26.2	00.10	24.5	09:10	25.7
10 March 2009	26.1	03:10	24.4	16:40	25.7
11 March 2009	26.0	18:10	25.0	06:40	25.5
12 March 2009	25.8	22:40	25.0	08:10	25.4
13 March 2009	25.9	21.10	25.1	14:10	25.4
14 March 2009	25.6	16:10	24.9	09:10	25.2
15 March 2009	25.4	18:10	24.4	09.10	25.0
16 March 2009	25.1	23:10	23.1	12:10	24.5
17 March 2009	25.2	21:10	24.0	09:10	24.6
18 March 2009	25.0	13.40	24.2	08:10	24.7
19 March 2009	24.9	20:40	24.4	08:40	24.6
20 March 2009	24.8	17:10	24.4	06.40	24.6
21 March 2009	25.0	23:40	24.1	08:10	24.6
22 March 2009	25.5	09:10	24.9	16:40	25.2
23 March 2009	25.6	23:40	25.0	16:10	25.3

Table B.8. Instant Extreme and Daily Avarage Temperatures of Room -7

Room - 7	**INDOOR**				
	Max		**Min**		**Average**
Date	°C	time	°C	time	°C
24 February 2009	24.8	08:10	19.1	17:10	22.7
25 February 2009	25.5	08:10	18.1	16:40	22.8
26 February 2009	26.5	08:10	22.9	03:10	24.3
27 February 2009	27.2	01:40	21.6	09:10	24.5
28 February 2009	25.7	08:10	22.2	10:10	23.8
01 March 2009	26.1	06:40	20.6	12.10	23.8
02 March 2009	26.4	08:40	21.7	11:40	24.3
03 March 2009	25.3	07:10	22.1	11.40	23.7
04 March 2009	24.4	06.10	21.6	10.40	23.6
05 March 2009	25.4	23:40	21.9	12:10	24.1
06 March 2009	25.4	23:40	22.4	12:10	24.5
07 March 2009	25.6	02:10	21.2	11.40	24.6
08 March 2009	25.4	08:10	22.0	20:10	24.5
09 March 2009	24.9	09:40	21.5	11:40	24.0
10 March 2009	25.8	16:40	20.9	09:40	24.5
11 March 2009	25.0	05:40	21.2	11.10	23.9
12 March 2009	25.2	21:40	23.7	20:40	24.3
13 March 2009	28.5	07:10	24.7	00:10	26.2
14 March 2009	27.2	08:40	20.4	11:10	25.3
15 March 2009	28.9	07:40	25.4	01.40	26.8
16 March 2009	26.7	15.10	24.3	10:10	25.5
17 March 2009	27.6	07:10	19.2	12:40	24.1
18 March 2009	25.5	19:10	19.4	10:10	23.3
19 March 2009	26.8	17:40	24.3	03:10	25.4
20 March 2009	28.0	23:40	25.0	01.40	26.5
21 March 2009	28.5	01.10	24.6	09:40	26.1
22 March 2009	27.7	08:10	23.7	10:40	25.9
23 March 2009	27.8	22:10	21.3	12:10	25.3

Table B.9. Instant Extreme and Daily Avarage Temperatures of Restaurant

Restaurant	INDOOR				
	Max		Min		Average
Date	°C	time	°C	time	°C
24 February 2009	25.1	21:10	15.6	07:10	19.7
25 February 2009	24.3	21:10	16.8	06:40	20.4
26 February 2009	24.3	21:10	16.3	06:40	20.0
27 February 2009	24.7	21:10	15.6	06:40	19.7
28 February 2009	25.6	21:10	16.1	06:40	20.4
01 March 2009	25.6	21:10	16.5	06:40	21.1
02 March 2009	24.1	19:40	17.8	06:40	21.1
03 March 2009	24.8	19:40	18.2	06:40	21.5
04 March 2009	25.3	21:10	18.7	06:40	22.1
05 March 2009	25.4	20:10	19.9	06:40	22.6
06 March 2009	25.5	11:40	21.3	06:40	23.2
07 March 2009	25.7	20:10	21.5	06:40	23.4
08 March 2009	25.6	20:10	20.7	06:40	23.1
09 March 2009	25.3	18:10	20.1	06:40	22.8
10 March 2009	25.9	19:40	20.9	06:40	23.0
11 March 2009	25.6	19:40	19.6	06:40	22.7
12 March 2009	25.9	19:40	19.5	06:40	22.6
13 March 2009	25.6	13:10	16.3	16:10	21.9
14 March 2009	25.6	19:40	18.8	06:40	22.1
15 March 2009	25.3	20:40	18.2	06:40	21.8
16 March 2009	25.3	19:40	17.0	06:40	21.4
17 March 2009	25.2	21:10	18.0	06:40	21.6
18 March 2009	25.2	21:10	18.1	06:40	21.7
19 March 2009	24.8	21:10	18.1	06:40	21.5
20 March 2009	24.8	12:10	17.3	06:40	21.3
21 March 2009	25.5	19:40	17.7	06:40	21.5
22 March 2009	25.3	21:10	18.7	06:40	21.9
23 March 2009	25.6	13:10	18.8	06:40	22.0

Table B.10. Instant Extreme and Daily Average Temperatures of Lobby

Lobby	INDOOR Max		Min		Average
Date	°C	time	°C	time	°C
24 February 2009	25.1	00:40	21.0	11:40	23.1
25 February 2009	24.1	23:40	21.8	21:10	23.1
26 February 2009	24.5	07:40	22.0	19:10	23.5
27 February 2009	24.3	11:40	20.9	20:10	22.7
28 February 2009	24.7	23:40	22.5	11:40	23.6
01 March 2009	24.8	04:40	22.3	14:10	23.5
02 March 2009	25.7	03:40	23.2	22:10	24.4
03 March 2009	25.2	04:40	22.7	21:40	24.0
04 March 2009	25.4	23:40	23.6	20:10	24.4
05 March 2009	26.0	05:40	22.8	09:40	24.5
06 March 2009	25.6	04:10	23.3	13:40	24.7
07 March 2009	25.7	02:40	22.6	20:40	24.7
08 March 2009	25.7	01:40	23.9	23:40	24.8
09 March 2009	24.1	23:40	21.4	09:10	23.3
10 March 2009	25.6	05:10	23.0	09:40	24.0
11 March 2009	25.5	23:40	22.8	10:10	24.4
12 March 2009	25.0	00:10	23.5	12:40	24.1
13 March 2009	24.7	03:10	23.7	23:10	24.2
14 March 2009	25.2	07:40	23.1	23.10	24.1
15 March 2009	25.5	06:10	22.9	07:40	23.9
16 March 2009	25.2	00:10	23.1	09:10	23.6
17 March 2009	26.2	23:40	22.4	08:40	24.1
18 March 2009	26.0	00:10	23.0	16:40	24.0
19 March 2009	25.9	00:40	23.3	22:40	24.1
20 March 2009	25.2	22:40	21.9	07:40	23.7
21 March 2009	26.2	23:40	23.4	09:10	24.8
22 March 2009	26.2	00:40	23.8	18:40	24.8
23 March 2009	25.3	23:40	23.4	11:10	24.4

Table B.11. Instant Extreme and Daily Avarage Temperatures of Tea Saloon

Tea Saloon	INDOOR Max		Min		Average
Date	°C	time	°C	time	°C
24 February 2009	26.2	16:40	20.2	00:40	22.0
25 February 2009	26.4	14:40	20.9	07:10	22.8
26 February 2009	24.8	15:10	21.9	00:10	23.0
27 February 2009	22.8	13:40	21.2	06:10	21.9
28 February 2009	23.2	14:40	21.3	00:10	22.2
01 March 2009	24.9	16:40	20.6	07:40	22.5
02 March 2009	25.6	15:40	21.7	09:40	23.6
03 March 2009	25.7	14:40	24.2	09:10	24.9
04 March 2009	26.0	16:10	22.6	20:10	24.8
05 March 2009	25.0	16:10	22.4	10:10	23.8
06 March 2009	24.1	16:10	22.5	09:10	23.7
07 March 2009	24.4	16:10	22.8	23:40	23.4
08 March 2009	23.1	15:40	22.3	23:40	22.6
09 March 2009	23.4	15:40	21.8	08:10	22.3
10 March 2009	23.0	16:40	21.7	23:40	22.1
11 March 2009	25.5	14:40	21.1	07:10	22.1
12 March 2009	25.7	19:40	20.9	09:40	22.4
13 March 2009	25.7	11:10	22.0	07:40	23.3
14 March 2009	25.0	15:40	22.2	00:10	23.6
15 March 2009	24.9	16:10	21.4	09:10	22.9
16 March 2009	24.7	15:10	21.0	07:40	22.5
17 March 2009	24.2	14:40	21.2	06:10	22.8
18 March 2009	24.5	13:10	22.8	09:10	23.7
19 March 2009	24.5	15:10	23.4	02:10	23.7
20 March 2009	25.0	14:40	21.6	10:10	23.5
21 March 2009	24.3	14:10	22.6	00:10	23.6
22 March 2009	25.4	16:10	22.9	06:10	23.7
23 March 2009	24.5	17:40	22.6	06:40	23.3

APPENDIX C

OUTDOOR AND INDOOR VARIABLES

Readings taken from data logger formatted in excel and classified as temperature data, relative humidity data and Intensity data. As weather conditions affect the thermal behaviour of a building the meteorological data should be characterised in order to evaluate the thermal environment. The outdoor measurements of these parameters are taken from Davis 6120 Vantage Pro Portable type meteorological station. 28 day dynamics derived from measurements are formatted in excel and transfered to graphics.

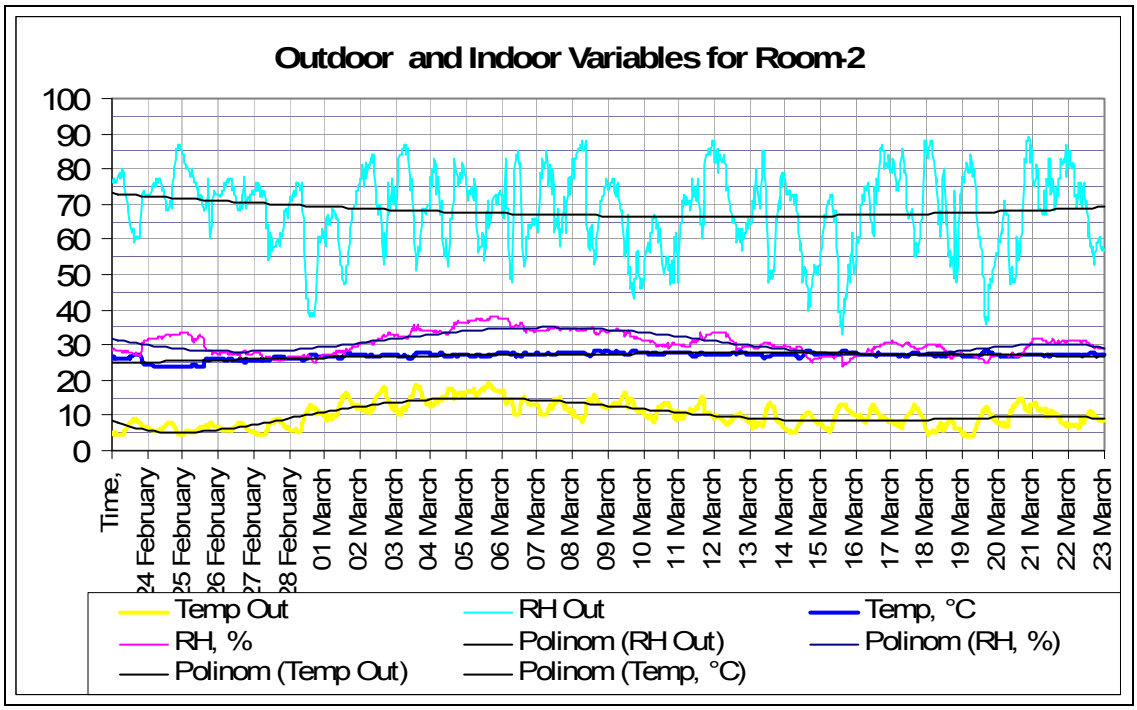

Figure C.1. Outdoor and Indoor Variables for Room-2

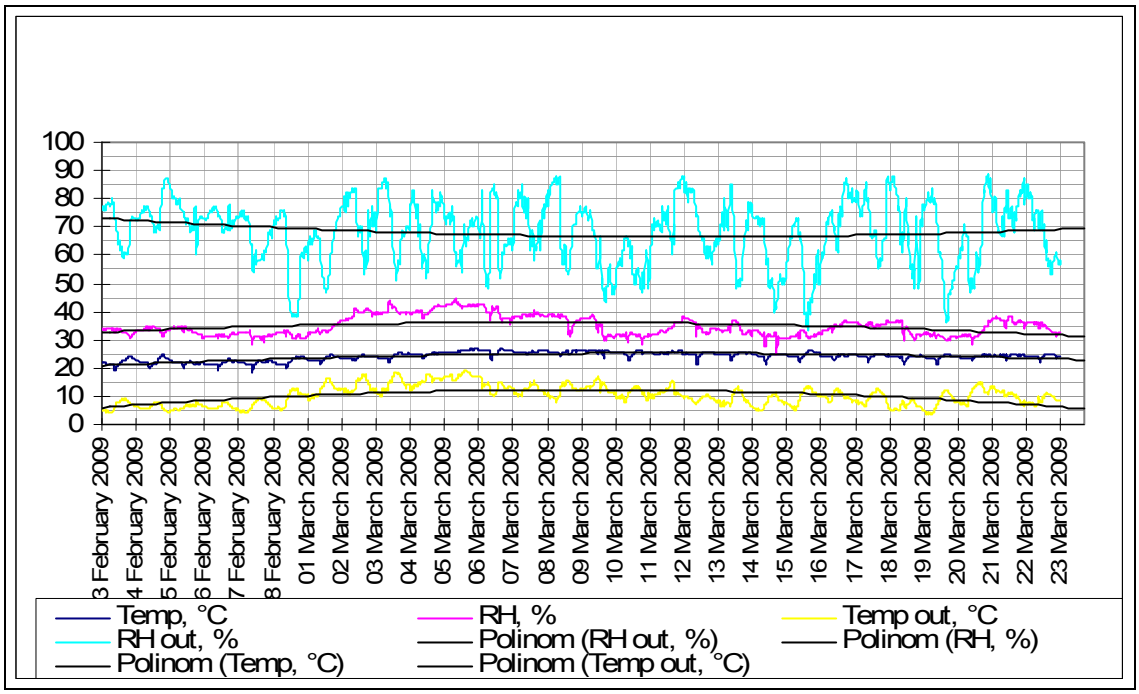

Figure C.2. Outdoor and Indoor Variables for Room-3

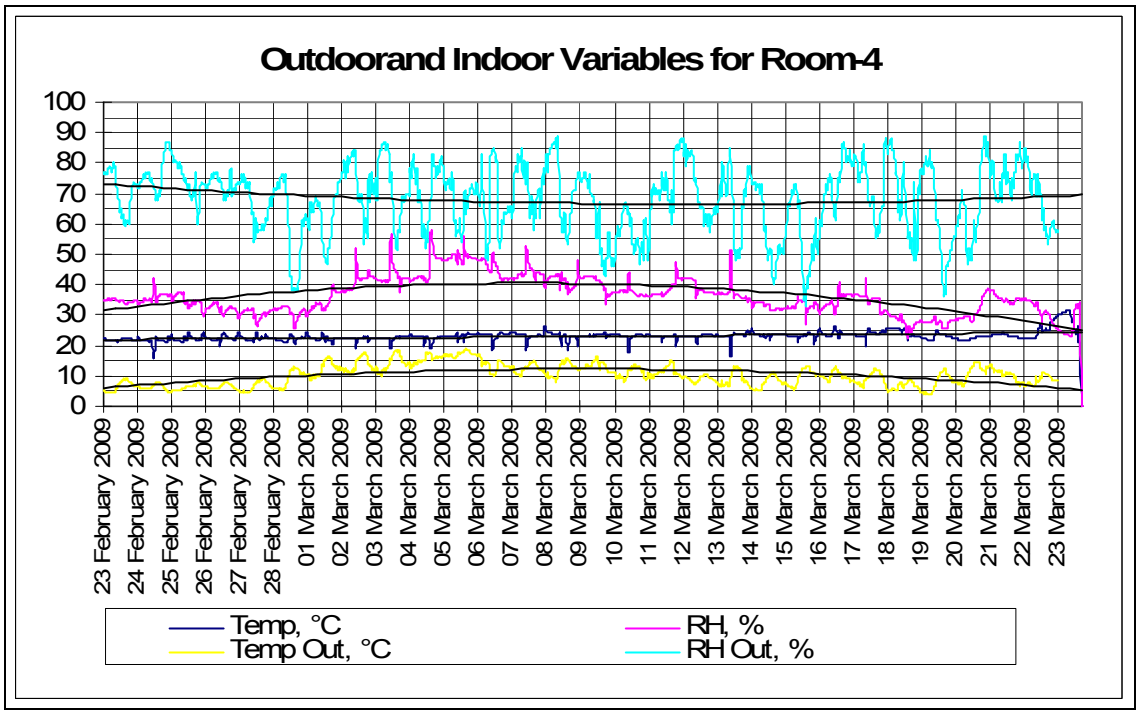

Figure C.3. Outdoor and Indoor Variables for Room-4

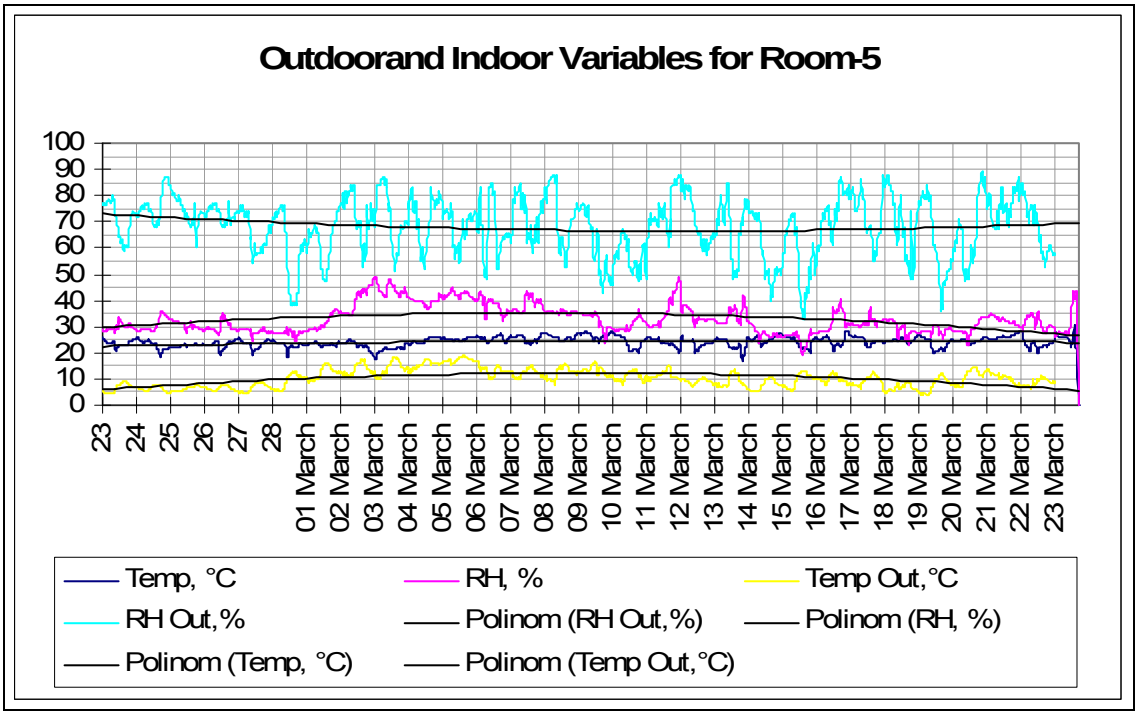

Figure C.4. Outdoor and Indoor Variables for Room-5

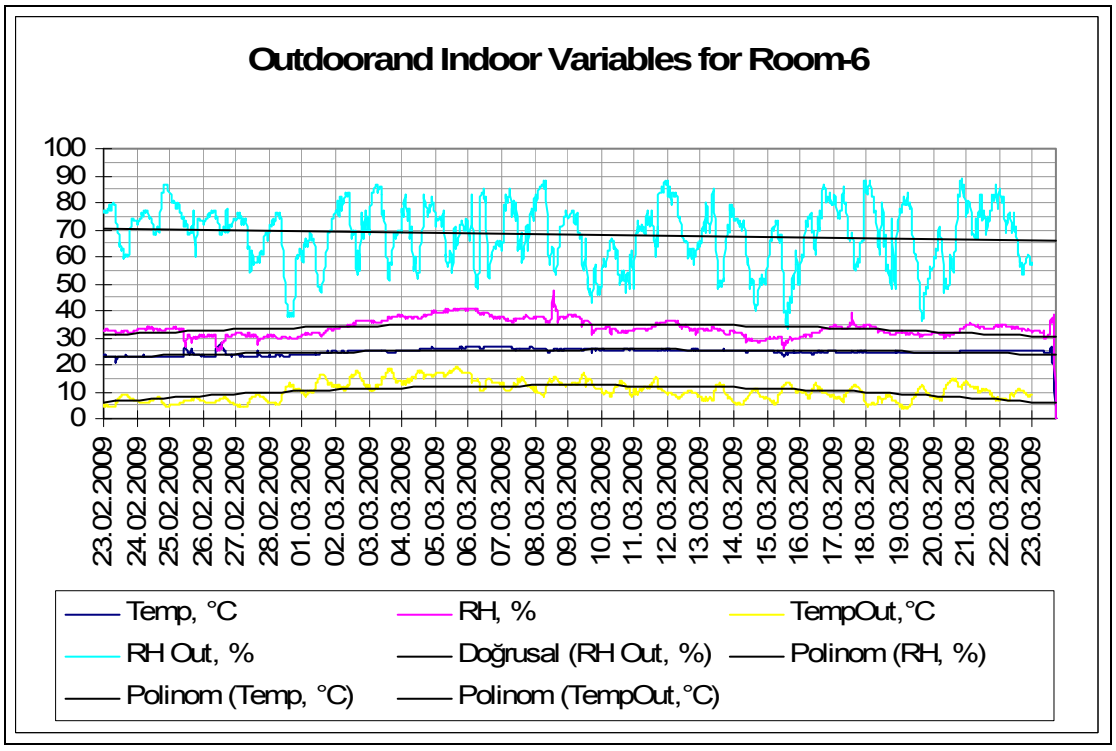

Figure C.5. Outdoor and Indoor Variables for Room-6

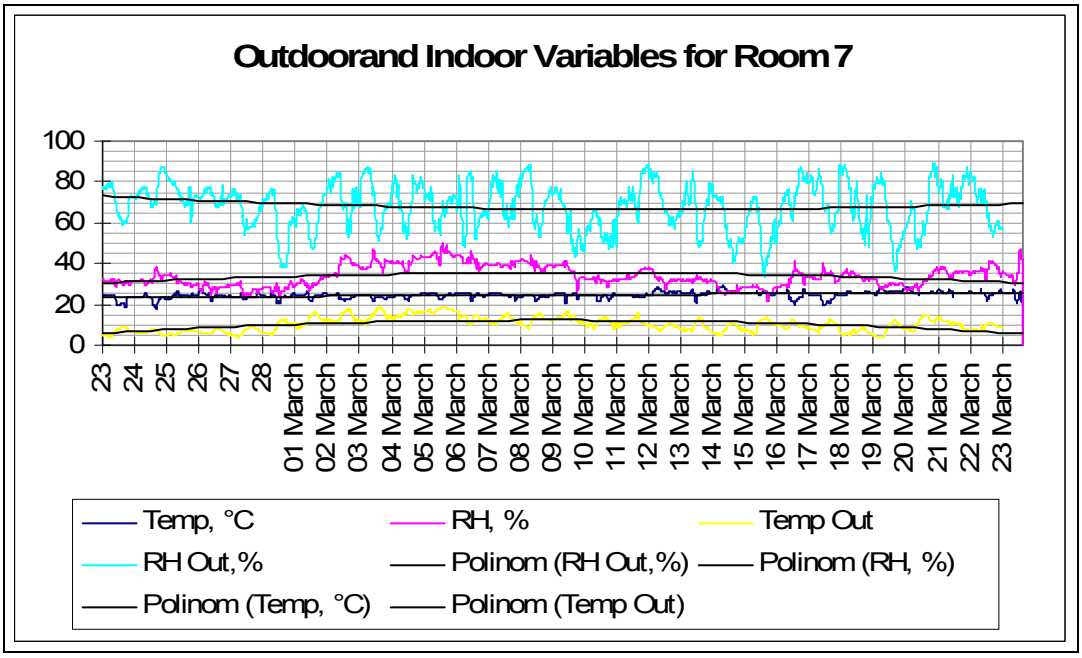

Figure C.6. Outdoor and Indoor Variables for Room-7

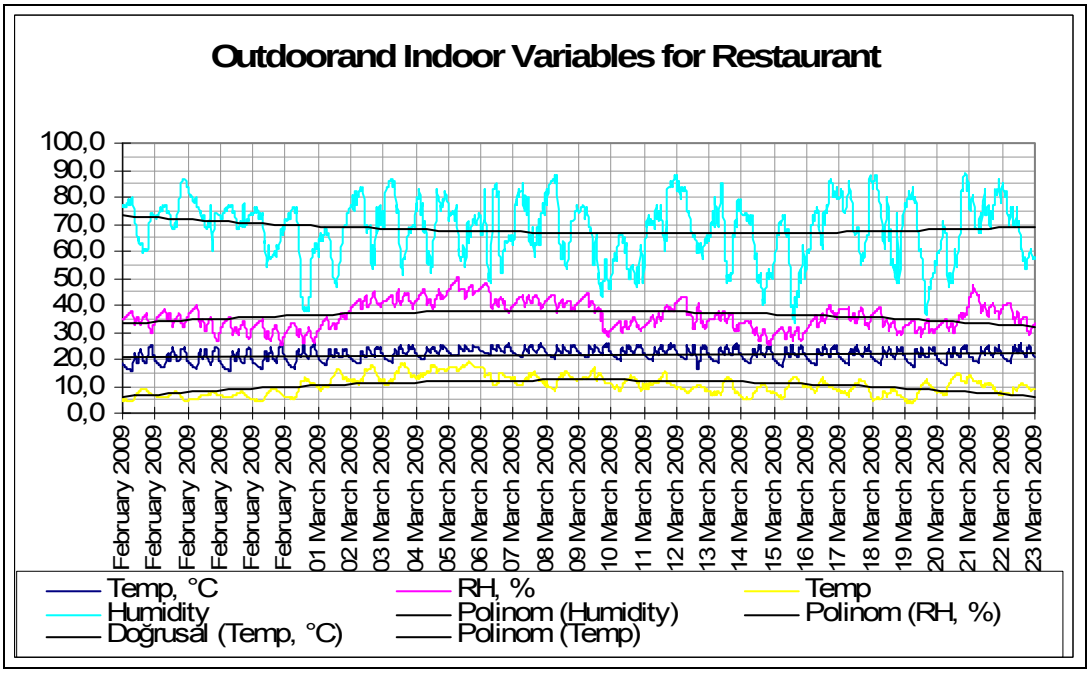

Figure C.7. Outdoor and Indoor Variables for Restaurant

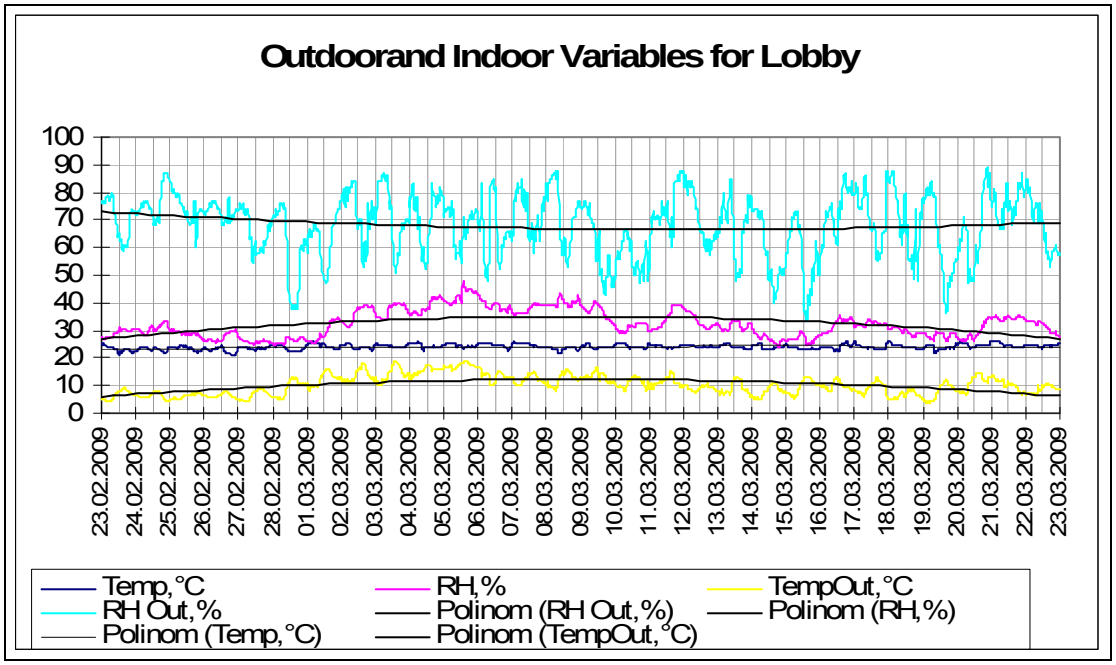

Figure C.8. Outdoor and Indoor Variables for Lobby

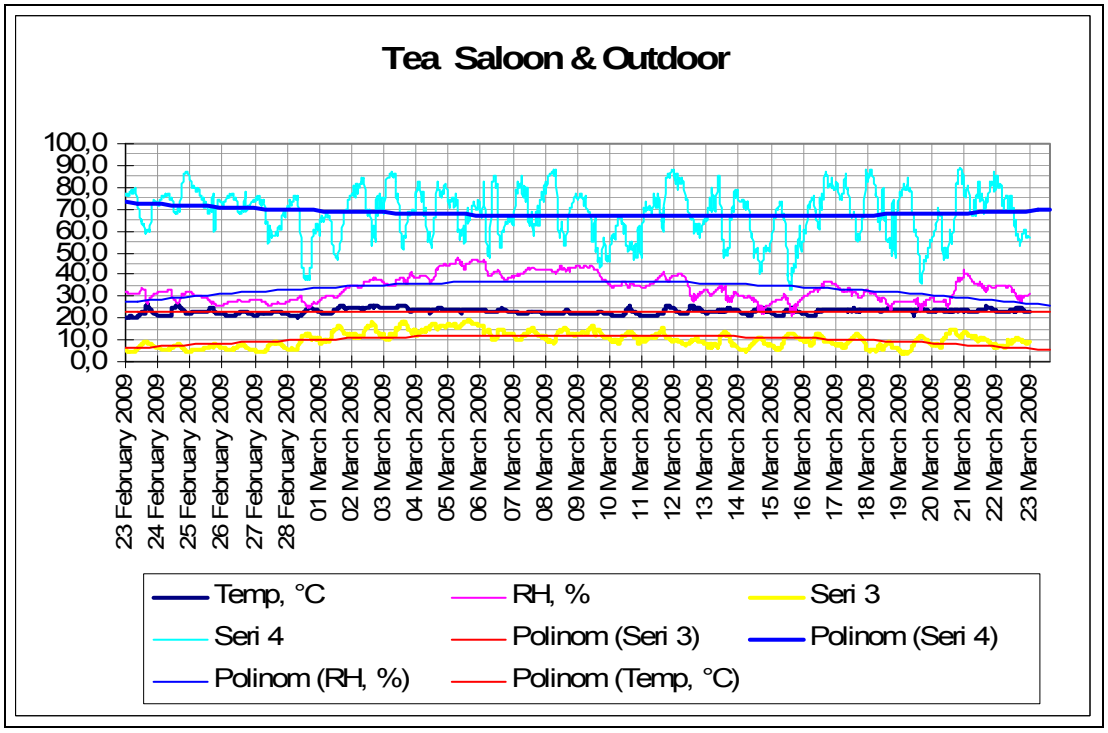

Figure C.9. Outdoor and Indoor Variables for Tea Saloon

APPENDIX D

INTERVIEW TEXTS

Interview study conducted with nine people in seven rooms. There were two couple in this group of people. The couples answered questions together. That's why, seven different interview has been applied. Interviewees defined with codes; I01, I02, I03 ,I04, I05, I06, I07 and researcher is defined with 'R' code in texts. Some necesseary information about intervieweees was given in chapter 3 with a table as 'occupants identification'. Interviews conducted in occupants own rooms. Tape record is used to capture whole speech and in order to prevent missing words and explanations. The recorded speeches are typed and presented below.

Table D.1.Interview Questions in Turkish

Akıllılık değişen koşullara uyum sağlama yeteneği olarak tanımlanmaktadır. Akıllı binalar ise insanoğlunun değişen iklim koşullarına uyum sağlayabilen, bina kullanımında maximum elverişlilik sağlarken; minimum kullanım ve bakım masrafı yaratan binalardır. Temel Amacı: Enerjinin minimum kullanımını yanında sistem işletimi ve konforun optimum düzeyde sağlanması Sizce bu bina akıllı bina tanımına uygun bir bina mıdır? Binanın Hangi özellikleri ile akıllı sistemle çalıştığını düşünüyorsunuz. Sizin akıllı binadan beklentiniz ne olabilir? Sizce akıllı sistemle çalışmakta olan binalar Yaşlılar Evi için uygun mudur? Başka ne tür binalarda uygun olabilir ? (hastane, ofis, okul v.s)

(cont. on next page)

Table D.1 (cont.) .

Isıl Konfor; Kişinin bulunduğu ısıl ortamdan hissettiği rahatlık olarak tanımlanır. Isıl konforu etkileyen beş faktör vardır.

Bireysel Faktörler :

- Aktivite düzeyi (metabolik enerji üretimi),
- Giyilen giysi :(Isı ve hava transferi geçirgenlik dirençleridir.)

Çevresel Faktörler

- Hava Hızı
- Hava Sıcaklığı
- Nem Oranı

Soru:6: Tanımına göre siz bu binadaki ısıl konforu nasıl değerlendiriyorsunuz?

A:Tamamen uygun

B:Tatmin edici

C:Kabul edilir

D:Konforsuz

Soru:7: Isıl konfor koşullarından memnun olmadığınız zaman ne gibi önlemler alıyorsunuz?

Ne gibi eylemlerde bulunuyorsunuz?

- Termostat ayarının değiştirilmesi,
- Kıyafet değişikliği,
- Kapı pencere açma,
- Bina yetkilisi ile temasa geçme,
- Hareket etme- yürüyüş-spor. v.s ile metabolizma hızını arttırma,
- Sıcak ya da soğuk içecek tüketimi,
- Diğer ?

(cont. on next page)

Table D.1 (cont.) .

Soru:8 Odanızda Fun coili Çalıştırıyor musunuz? Ne sıklıkla çalıştırıyorsunuz?

Soru:9 Güneş Kontrolü,: Gündüz güneş ışığından yararlanmak istiyor musunuz?

Ya da rahatsız edici etkisini hissediyor musunuz?

Soru:10: Odanızda ne kadar zaman geçiriyorsunuz ?

Soru:11: Gün içinde ne tür eylemler gerçekleştiriliyor?

(Ör: TV, okuma, uyku, sohbet v.s)

Soru:12: Ne tür eylemler sırasında Isıl konfor açısından rahatsızlığın oluştuğu söylenebilir?

Soru:13: Odanızda ve ortak alanlardaki ısıl konfor koşulları arasında ne gibi farklılıklar hissediyorsunuz?

Soru:14: Odanız dışında hangi mekanları sıklıkla kullanmaktasınız.

Bu mekanlarda ısıl konfor açısından rahatsız edici bulduğunuz yerler nereleridir?

Rahatsızlığı açıklayabilir misiniz?

Soru:15: Odanızın yönlenmesi hakkında kişisel görüşünüz nedir?

Soru:16: Odanızı seçerken yönlenmeyi dikkate almış mıydınız?

Başka bir yöne baksa ya da başka bir katta olsa sizce ne gibi bir farklılık olurdu?

Soru:17: Odanızda ya da genel mekanlarda üşüme, terleme, havasızlık hissi,

baş ağrısı, susuzluk, dikkat dağınıklığı, gözde kamaşma gibi fiziksel rahatsızlıklar hissettiğiniz oluyor mu? Oluyorsa ne sıklıkla ?

Soru:18: Bu rahatsızlıklara neden olduğunu düşündüğünüz fiziksel ortam koşullarından söz edebilir misiniz?

Table D.2.Interview Data of Interviewee-1 (I01)

I01

R:Sizce bu bina akıllı bina tanımına uygun bir bina mıdır?

I01: Evet.

R:Sizin akıllı binadan beklentiniz ne olabilir?

I01: Akıllı binanın minimum enerji kullanımı amacı doğrultusunda enerji tüketiminde güneş enerjisinin tercih edilmesi gerektiğini düşünüyorum.

R: Yapmış olduğum ısıl konfor tanımına göre bu binadaki ısıl konforu siz nasıl tanımlarsınız?

I01: Tamamen Uygun, diyebilirim.

R: Nedenini biraz açıklayabilir misiniz?

I01: İstenildiğinde sıcaklık kontrolü kolaylıkla yapılabiliyor.

R: Isıl konfor koşullarından memnun olmadığınız zaman ne gibi önlemler alıyorsunuz? Ne gibi eylemlerde bulunuyorsunuz?

I01: Memnun olmama soğuk nedeniyle değil, sıcak nedeniyle oluyor. Sıcaktan rahatsız olma halinde banyodaki petek de kapatılabilir, Son tercih olarak da kapı pencere açma yoluna gidebilirim.

R: Odanızda fancoili çalıştırıyor musunuz?

R: Ne sıklıkla çalıştırıyorsunuz?

I01:Fancoili genelde kapalı tutuyorum. Banyodaki radyatör boruları tüm odanın ısınması için yeterli oluyor.

R: Gündüz güneş ışığından yararlanmak istiyor musunuz? ya da rahatsız edici etkisini hissediyor musunuz?

I01:Kış aylarında rahatsız edici olmuyor genellikle. Tül perdeyi bile açık tutuyorum.

R: Odanızda ne kadar zaman geçiriyorsunuz ?

(cont. on next page)

Table D.2 (cont.) .

I01: Yemek harici zamanlarda genelde odamda oluyorum. 4:00 de çay salonuna indiğim oluyor ama her zaman değil, bazen arkadaşlarla telefonlaşıp yarım saat bir saat tavla oynuyoruz ama uzun süre değil, yapılacak işlerim oluyor odamda oluyorum genelde.

R: Ne tür eylemler gerçekleştiriyorsunuz gün içinde?

I01: Örgü örüyorum. Takip ettiğim programlar var (TV), gazetemi okuyorum…

R: Ne tür eylemler sırasında Isıl konfor açısından rahatsızlığın oluştuğu söylenebilir?

I01: Dediğim gibi benim soğuktan yana bir problemim yok. Benim kişisel durumum, devamlı sıcak gelir. Özellikle oturmaya bağlı da bir rahatsızlık durumum yok.

R:Vakit ayırdığınız için teşekkür ederim.

I01: Rica ederim.

Table D.3. Interview Data of Interviewee- 2 (I02)

I02

R: Sizce bu bina akıllı bir bina mıdır? Yapmış olduğum akıllı bina tanımına göre değerlendirecek olursanız, akıllı bina tanımına uygun mu sizce?

I02: Tam olarak uygun değil. Belki yeni olduğu için henüz oturmamış olabilir.

R: Peki, akıllılık tanımına uygun bulduğunuz hangi olumlu özellikleri sizin dikkatinizi çekmektedir?

I02: Isı yalıtımı için önlem alınmış onu biliyorum, duvar kağıtlarının izolasyon özelliği var ayrıca.

R: Sizin akıllı binadan beklentiniz ne olabilir?

I02: Olmaması gerekenleri söyleyebilirim. Yerde halı kaplama olmasını yanlış buluyorum mesela, alerjik rahatsızlıklar için uygun değil. Çok fazla elektrik kesintisi oluyor ve elektrik kesintisi esnasında jenaratör yavaş devreye giriyor.

R: (Isıl konforun tanımlanmasının ardından …) Tanıma göre siz binadaki ısıl konfor için hangi tanımı uygun buluyorsunuz ? Seçeneklerden hangisi uygun?

I02: '*Kabul Edilebilir'* diyebilirim.

R: Isıl konfor koşullarından memnun olmadığınız zaman ne gibi önlemler alıyorsunuz ? Ne gibi eylemlerde bulunuyorsunuz?

I02: Kıyafet değiştirmeyi tercih ederim. Genelde hafif giyinirim, ince bir kazak bazen penye, üzerine yelek, çorap giymediğim bile oluyor. Üşüdüğüm zamanlarda da üzerime battaniye alıyorum otururken, gerçek yün battaniye.
Rahatsızlık durumunda sıcak soğuk içecek tüketimine gidilebilir. Daha çok yaz aylarında hararetі gidermesi amacıyla tabi.

R: Odanızda Fancoil Çalıştırıyor musunuz? Ne sıklıkla çalıştırıyorsunuz?

I02: Fancoil aşırı rüzgar yaratıyor. Astım hastası olduğum için rahatsız oluyorum, ayrıca fancoil çok gürültülü çalışıyor. Bu yüzden kullanamıyorum onu. Elektrikli ısıtıcım var burada benim, onunla ısınıyorum. Bir de banyodaki petek ısıtıcı çalışıyor devamlı.

(cont. on next page)

Table D.3 (cont.).

R: Gündüz güneş ışığından yararlanmak istiyor musunuz ya da rahatsız edici etkisini hissediyor musunuz?

I02: Güneşe alerjim var benim, onun için direk güneşi almak istemiyorum. Perdeler genelde kapalıdır. Güneşi tül arkasından almayı tercih ederim.

R: Odanızda ne kadar zaman geçiriyorsunuz?

I02: Yemek zamanında restorana inerim, onun dışında yemek zamanları hariç odamda geçiririm. Tam gün.

R: Ne tür eylemler gerçekleştiriyorsunuz gün içinde?

I02: Almanca çalışıyorum, Dil Çalışma, TV seyretme, müzik, resim, step tahtam var step tahtası ile egzersiz oda içinde.

R: Ne tür eylemler sırasında ısıl konfor açısından rahatsızlığın oluştuğunu söyleyebilirsiniz?

I02: Masada çalışmak istediğim zaman giriş kapısından soğuk geldiğini anlıyorum orası soğuk oluyor. Kapı açıldığında hemen koridordan gelen soğuğu hissediyorum rahatsız oluyorum.

R: Odanızda ve ortak alanlardaki ısıl konfor koşulları arasında ne gibi farklılıklar hissediyorsunuz?

I02: Koridorlar, yemekhane ve çay salonu soğuk.

R: Odanız dışında hangi mekanları sıklıkla kullanmaktasınız? Bu mekanlarda ısıl konfor açısından rahatsız edici bulduğunuz yerler nereleridir?

Rahatsızlığı açıklayabilir misiniz?

I02: Genel mekanlarda kapıların açık kalmasına bağlı olarak oluşan hava akımı çok rahatsız edici oluyor. Koridorlarda hava akımı çok fazla. Oralardan geçerken üşüyorum. Sabahları yemekhane soğuk oluyor. Çay salonunda da kapıların açılması nedeniyle hava akımı çok.

(cont. on next page)

Table D.3 (cont.).

R: Odanızın yönlenmesi hakkında kişisel görüşünüz nedir? Odanızı seçerken yönlenmeyi dikkate almış mıydınız?

Başka bir yöne baksa ya da başka bir katta olsa sizce ne gibi bir farklılık olurdu ?

I02: Güney doğuya bakıyor burası. Akşam 5:00'e kadar güneş alıyor. Memnunum.

R: Odanızda ya da genel mekanlarda üşüme, terleme, havasızlık hissi, baş ağrısı, susuzluk, dikkat dağınıklığı, gözde kamaşma gibi fiziksel rahatsızlıklar hissettiğiniz oluyor mu? (Oluyorsa ne sıklıkla ?)

I02: Odamda rahatsız edici bir durum yok. Ancak ben astım hastası olduğum için nefes problemim var. Alerjik astıma bağlı rahatsızlıklar yaşıyorum. Bir de kemik erimesi problemim var. Ramotoid Artoid. Protez kullanıyorum. Dolayısıyla genel mekanları ben pek kullanamıyorum ama, hobi odaları olsun, fitness salonu olsun, güneş almayan yerler, iyi ısınmıyor, genelde soğuk oluyor.

R: Evet, Sorularımız bu kadar. Çok teşekkür ederim vakit ayırdığınız için.

I02: Ben teşekkür ederim. Kolay gelsin.

Table D.4. Interview Data of Interviewee- 3 (I03)

I03

R: Ne zamandır buradasınız?

I03: Ekimden bu tarafa devamlı buradayım fazla soğuk problemi yaşamadım. Binanın şartları ile klima dahi çalıştırmadım. Çünkü tesisatı değişik banyoda şey var o sıcak demir çok güzel ısınıyor. Devamlı banyo kapısını açık bırakınca dediğim gibi klima dahi çalışmadı. Aslında binanın vaziyetinden dolayı güneş de alıyor bakın bütün gün güneş içinde. Burası batı oluyor. Güneş bakın karşıda şimdi bir de onun da etkisi var. Güneşi tamamen öğleden sonra alması…

R: Şimdi öncelikle akıllı bina kavramı hakkında konuşalım isterseniz. Bu bina aşağıdaki tanıma göre akıllı bina olarak tanımlanabilir mi?

(Görüşmeci öncelikle tanımı dinleme gereği olmadığını belirterek cevaplamıştır.)

I03: Evet, okumanıza gerek yok. Ben de çünkü muhtelif yerlerde yaşadım. Büyük binalarda büyük okullarda görev yaptım. Büyük farklı yaşadığımız yerlerden bu şartlar çok daha güzel.

R: Ben yine de kısaca bir bilgi vereyim. 'Akıllılık değişen koşullara uyum sağlama yeteneği olarak tanımlanmaktadır… ' (tanım okundu). Buna göre; sizce bu bina akıllı bina tanımına uygun bir bina mıdır?

I03: Konforu yerinde bu şartlar medeni şartlar. Havanın değiştiğini fazla hissetmedim. Gerek sıcağını gerek soğuğunu… Kaldığım süre içinde bir kışı geçirdim. Yazın sıcaklarda kalmadım bilemiyorum artık o zaman ne yapacağız. Belki klimayı çalıştıracağız. Ama bina yaşamaya elverişli bir bina. Bina yapısı olarak…

R: Hava sıcaklığının çok düşük olduğu günlerle düşük olmadığı günler arasında iç ortam sıcaklığı farkını hissedebiliyor musunuz?

I03: Genelde tabi fark oluyor ama bizi rahatsız edecek kadar olmadı. Burada da soğuk günler, çok soğuk günler oluyor. Mesela ben sabahları camı açıp odayı havalandırmak istediğim de müthiş bir soğuk ve rüzgar giriyor içeri.

(cont. on next page)

Table D.4 (cont.).

R: Odanızda fancoili çalıştırıyor musunuz? Ne sıklıkla çalıştırıyorsunuz?

I03: Klimayı… yani klimayı birkaç defa açtım mesela o çok soğuk günlerde banyo alacağım zaman. Zaten o demir içeriyi çok güzel ısıtıyor. Ondan bir şikayetim olmuyor.

R: Odayı da ısıtıyor yani? Sıcaklığı buraya kadar geliyor?

I03: Geliyor. Kapıyı devamlı açık bırakıyoruz. Biz arkadaşlarla da görüşüyoruz. Hepsi aynı şeyi söylüyor. Yani klimayı çalıştıran pek az oldu benim bildiğim. Yani pek çalıştırmıyoruz. Şimdi bakın mesela bugün klimayı hiç açmadım ben. Çok çok ender kullandık. İçerideki o şey… Soğuk oldu mu onu açıyoruz ve öyle idare ettik. Ama daha fazla soğuk olursa… Bakın deneyeceğiz şimdi. Martta birkaç gün İzmir çok soğuk olur diyorlar onu bilmiyorum. Deneyeceğiz. Belki o günlerde bir iki defa… Ama zaten devamlı çalıştırmıyoruz. Çünkü zaten klima da çok ses yaptığı için çalıştırmaya gerek kalmadan biz burada yaşadık Allah'a çok şükür.

R: Duyduğum kadarıyla, çalıştığı zaman havayı da kurutuyor herhalde ondan da rahatsızlık oluyor.

I03: Şimdi, bakın o oldu tabi. Ben size anlatmadım. Bu bilhassa bu odadaki, daha büyük. Bazı odalarda daha küçük. Onlar o kadar rahatsız olmadı. Ben rahatsız oldum. Çünkü bu üflediği zaman havayı buraya veriyor ve o rüzgar sizi üşütüyor. Yoksa havada üşüyecek hal yok. O gelen rüzgar üşütüyor. Sorumluyu çağırdım rica ettim dedim böyle böyle. Şeyini yarıya indirdi onun.

R: Hızını. Fan hızını?

I03: Üfleme hızını ve sıcaklık hızını yarıya indirdi zaten açmıyorum. Şey de .. o işte.. bir iki açtım. Hem denemek için açtığım zamanlarda bu sefer buraya çok rüzgar veriyordu. Hem ısınmak için açıyorsunuz onu ama rüzgar sizi rahatsız ediyor. Fakat azaltıyorlar onu neyse onun sistemini bilmiyorum ben. Yarıya indirdiler. Dediler ki; bilmem neyi onu azalttık! Biz şimdi zaten açmıyorum. Açtığım zaman da fark etmiyorsunuz. Rüzgar da gelmiyor. Bir iki defa açtım o kadar banyo alırken o da.

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Table D.4 (cont.).

R: Peki gün içinde odanızda sıcaklık farkını gözlemleyebiliyor musunuz? Sabah soğuk öğlen sıcak gibi mesela? Fark ediyor mu? Yoksa aynı mı?

I03: Pek fazla fark etmedim. Çok güneş olduğu için. Bakın şimdi gitti güneş ben de perdeyi çekmiyorum biraz fazla sıcak oluyor tabi. Ama güneş çekildiği zaman da üşümüyorum. Oda ısınmış oluyor. Her yerde öyledir zaten . Sobayı çok yakarsan çok ısınır az yakarsan az ısınır.

R: Binanın Hangi özellikleri ile akıllı sistemle çalıştığını düşünüyorsunuz. Ya da Sizce akıllı bir binada ne gibi özellikler olmalıdır?

I03: Pek yani binanın yapısını derinlemesine incelemedim bilmiyorum. Akıllı sistem olarak şeyi görüyorum. Genellikle binanın önce yapılışını… Akıllı bir şekilde yapılmış. Depreme karşı bir sağlamlığı var. Bir de anlıyoruz ki soğuğa sıcağa karşı bir sağlamlığı var . Kapıların çerçevelerin yapılışında bir sağlamlık var. Akıllılık bir defa orada, yani iyi yapım. Ama onun gerisinde teknik şeylerini fazla bilmiyoruz biz. Sonra işte o rahatlığı var dediğim gibi. Isı vaziyetinden anlamıyorsunuz soğuğu. Dışarıdan giriyorsunuz içeri her taraf ılık ama… Bazı yerler yanıyor. Mesela sabah iniyoruz şeyi (restorandaki ısıtma sistemi) açılmış oluyor, yemek odası mesela sıcak. Fark etmiyoruz soğuğu tabi. Sair zamanlar kapatıyorlar. Bazı gittiğimiz zaman soğuk oluyor. Yemek zamanında açılmayıp aniden bir ara gittiğimizde… Zaten her yere de aynı sıcaklığı vermenin bu iktisat devrinde gereği de yok. Evimizde nasılsa burada da elektriği de açık bırakıp gitmiyoruz. Hepimizin dikkat etmesi lazım. Hem elektrik, hem klimalar için gerektiği zaman açmak gerektiği zaman kapamak vatandaş olarak bir insanın buna riayet etmesi lazım. Tahmin ediyorum, buradaki insanlarda ona riayet ediyorlar.

R: Akıllı sistemlerin gelişmiş örneklerinde bina ekonomisi sağlamak için güneş kontrolüne önem verilmiş. Mesela burada panjur sistemi olsa geceleri ya da yazın güneşin çok yoğun olduğu zamanlarda, gerektiği zaman kapatılıp gerektiği zaman açılsa… Hem binanın yazın fazla ısınmaması için hem de kışın özellikle gece ısı kaybını önlemek için.

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Table D.4 (cont.) .

Isıtma ve soğutma masraflarını azaltabilir. Böyle bir sistem gerekli olabilir miydi bu bina için?

I03: Evet, ama burada herhalde ona gerek görmediler gerek olsa belki yaparlardı. Mesela benim evimde de güneşe karşı panjur vardır. Sonra bakın burada tamam akıllı sistem her şey çok güzel ama güneş enerjisi konmamış buraya. Benim mesela geldiğim evde güneş enerjisi vardı. Hakikatten güneş enerjisi kışın çok soğuk olunca ısıtmıyor suları. Güneşin keskin olduğu günlerde kışın dahi ısıtıyor. Ben hatta zannediyordum bu sıcak sular burada güneş enerjisi ile oluyor. Belki zamanla olur. Artık her şeyi güneş enerjisi ile olacak biliyorsun evlerin ısıtması bile. Şimdi bakın o güneş enerjisi çıktı. Ege sahilleri Akdeniz bütün o büyük oteller hep güneş enerjisi ile ısınıyor aksi halde onların sarf edeceği elektrik … Çünkü turistik bütün gün sıcak su bulundurmak lazım o ne ile ısınır ya kömürle ya elektrik ile. Onun için yani güneş enerjisi Türkiye'de buralarda çok bol olduğu için ne oluyor? Mümkün olduğu kadar o yöne gitmek lazım.

R: (Isıl konfor tanımı okundu.) Tanımına göre siz bu binadaki ısıl konforu nasıl değerlendiriyorsunuz ?

I03: Bir defa konforsuz katiyen diyemeyiz. Türkiye de sayılı örneklerden biri emsallerine bakarsanız ben burayı konforlu buluyorum kendi görüşüme göre çünkü şikayet edilecek bir tarafı olmadı şimdiye kadar buradaki kısa yaşantımda. Siz işin bu kısmını görüyorsunuz biz bir de idari kısmını görüyoruz tabi. İdari kısımdan da bir şikayetimiz yok. Bu şeylerden (fun coili göstererek) de bir şikayetimiz yok. Herhangi bir şikayetimiz olduğu zaman zaten hemen düzeliyor.

R: Diğer mekanlarda mesela yemekhaneye gittiğinizde veya koridorlarda bir sıcaklık farkı hissediyor musunuz?

I03: En alt kata indiğimizde zemin kat oluyor herhalde yemekhane katında. Orada personelin falan da kullandığı yerler var. Kapıları açık bırakıyorlar. Halbuki bakın dikkat edin, kapıların üzerinde lütfen kapıyı kapatın yazar. Maalesef genellikle milletimiz, dönüp arkalarına kapıyı kapamazlar, bırakırlar. Evlerimizde bile öyle.

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Table D.4 (cont.) .

Onun için tabi bazı şeylerde ..mesela havalandırmak için koridordaki merdivenlerle çıkılıyor ya, bir de ayrıca asansör var. Bunları gördünüz. O merdivenlerde camları açıyorlar. Tabi haklı olarak. Bina her dakika kapalı olduğu anda bu defa hava sıfıra iniyor. Havasız kalıyor. Mesela o koridorlarda camları açıyorlar. Girip çıkarken kapıları açık bırakırsanız zaman zaman ama bilhassa bu alt katta soğukluğu hissediyorsunuz. Ama o soğukluk sizi rahatsız edecek bir soğukluk değil oradan geçip gidiyorsunuz. Yoksa diğer yerler muntazam . Tabi yemekhane sabahtan gece yarısına kadar açık kalmıyor. Yemek saatlerinden önce oradaki personel oradaki şeyi açıyor. Gittiğimizde sıcak oluyor. Bundan da şikayet edemeyiz ki ama koridordan geçerken mesela, iniyorsun asansörden dediğim gibi, bu şeylere açılan kapılar var personelin de çalıştığı yerler oraları açık bırakıyorlar. Dışarıdan tabi biraz soğuk geliyor. Ama geçip gidiyorsun öyle rahatsız edici bir şeye rastlamadım.

R: Isıl konfor koşullarından memnun olmadığınız zaman ne gibi önlemler alıyorsunuz? Ne gibi eylemlerde bulunuyorsunuz? Mesela termostat ayarına müdahale ettiğiniz oluyor mu?

I03: Termostat için tabi bize en başta bilgi verildi. Gelip kontrol edip gösterdiler bize . zaten çağırıyoruz herhangi bir şey olduğunda. Şimdi onu buranın şeyine göre ayarladı. Bir düğmesine basıyorum. Bir açma bir kapama .

R: Termostat ayarını değiştiriyor musunuz?

I03: Yok kullanmıyorum gerek yok. Bazı odalarda belki siz şey yaparken kimisi diyecek ki; klimayı daha çok kullanıyorum diyecek mesela. Geçenlerde o soğuklarda banyo alırken kullandım. Sair zaman şey olmuyor. Zaten ben de fazla sıcağa gelemiyorum. Şey icabı herhalde bazen terliyorum. Hele geceleri çok sıcak geliyor ama camı da açıp yatamıyorum daha. O bakımdan yani benim ısınmadan fazla bir şikayetim yok.

R: Peki termostat ayarı ile oynama dışında ne gibi eylemlerde bulunursunuz ısıl konfordan rahatsız olduğunuz zaman? Kıyafet değişikliği, kapı pencere açma, bina yetkilisi ile temasa geçme, v.s?

(cont. on next page)

Table D.4 (cont.) .

I03: Aa, tabi tabi bunlar olur . bunlar normal. Üşüdüysem mesela kalkarım sırtıma bir yelek giyerim. Sonra bu köşe mesela burası.(köşe daire olması) Çok rüzgarlı oluyor. Mesela şimdi geliyorum bazen cam çok açık kalmış oluyor, bayağı odayı soğutuyor. Açtığım zaman bir saat mesela kahvaltıdan geliyorum oda buz olmuş oluyor ama ben klimayı açmıyorum çünkü zaten o kadar sıcak istemiyorum. Camı indiriyorum bir yelek giyiyorum sırtıma eğer üşüdüysem çaresi var. Sonra bir sıkıntımız olduğu zamanda hemen haber veriyoruz. Gelip ne ise o sıkıntımızı gideriyorlar.

R: Fiziksel aktivite ile ilgili . hareket etme ,yürüyüş , spor v.s ile metabolizma hızını arttırma eylemlerine başvurma ihtiyacınız oluyor mu kişisel ısıl konforunuzu sağlamak için?

I03: Şimdi bizim bir sıkıntımız da o. Yiyiyoruz. İçiyoruz, çıkıp oturuyoruz. Yapacak başka şeyimiz yok. Temizliğimiz de oluyor. Her şeyimiz de oluyor. Ama ben uzun zaman, geldiğimiz zaman, muntazam, yemekten sonra yola kadar şu asfalta kadar yürüyorduk. Sonra ben de bir şey oldu. Bir rahatsızlık oldu ve kış oldu. Dışarıda rüzgarlı havada bir iki gün yürüdük biraz o dokundu bana sonra doktor şimdilik yürümeyin dedi. Biz üç arkadaş yürüyorduk sonra kestik o yürümeyi şimdi ben hiç değilse biliyorsunuz koridor dar. Neredeyse km gibi. Çıkıyorum 6-7 defa o uzun bir baştan bir başa gidiyorum geliyorum. Bazen dışarı çıkıyoruz urla' ya gidiyoruz. Orada dolaşıyoruz. İniyorsunuz çıkıyorsunuz işte yemeğe inmek için bile koridoru kat ediyorsunuz. İşte bu tip hareketlerle idare ediyoruz kendimizi. Aşağıda spor salonu da var. Ben pek oraya gitmedim. Giden arkadaşlar var. Yani gidip sporlarını da yapıyorlar. Yani her aktivite var. İsteyen istediğini yapabiliyor.

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Table D.4 (cont.).

R: Gündüz güneş ışığından yararlanmak istiyor musunuz? Ya da rahatsız edici etkisini hissediyor musunuz?

I03: Perdeleri çekiyorum o zaman. Bazen, öğleyin. Yani, şimdi burada oturduğum için hiç rahatsız etmiyor. Hani olursa biraz şu perdeyi çekiyorum o kadar. Güneşten insan hiçbir zaman şikayet etmez. Keşke güneş olsun. Bütün mesele orada.

R:Odanızda ne kadar zaman geçiriyorsunuz ?

I03: Sabahleyin geliyoruz. Aşağı yukarı… Saat mi istiyorsunuz? Şimdi şöyle zamanımızı genellikle oda da geçiriyoruz.

R: Yemek haricinde yani?

I03: Yemek haricinde odada geçiriyoruz. Bazen aşağı iniyoruz aşağıda çay salonumuz var. Gördünüz. 4:00 de orada çay saati… Arkadaşlarla orada oturuyoruz. Konuşuyoruz. Ama ben pek sık inmiyorum.

R: Akşam saatlerinde ..?

I03: Akşam saatlerinde birbirimize gidiyoruz ama pek sık değil. Arkadaşlar birbirleri ile merhabalaşıyorlar veyahut ya da odalarına gidiyorlar. O da benim anladığım kadarıyla çok fazla olmuyor herkes odasında geçiriyor.

R: Genel mekanlar pek fazla kullanılmıyor o zaman? Örneğin TV seyretmek için çay salonuna inildiği oluyor mu?

I03: 4:00 de işte. Bir o mekan kullanılıyor. İnen, TV pek seyretmiyor. Herkesin odasında TV olduğu için zaten. Oraya ahbaplığa iniyorlar. Odada TV seyrediliyor. Ayrıca toplantılar oluyor burada müdürümüz tarafından bazı toplantılar yapılıyor. Doğum günleri oluyor. Muntazam onu takip ediyor idaremiz. Her doğum gününde o salonda toplanıyoruz. İkramlar oluyor falan vakit geçiyor, ahbaplıklar oluyor. Yani bir yere sabit kalınmıyor. Siz de biliyorsunuz herhalde.burada devamlı bir kayıt yok. İsteyen istediği yere gidiyor. Kimse kimseye nereye gittin demiyor.

Bakın şu güneşin güzelliğine şimdi, bazen çok güzel grup oluyor.

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Table D.4 (cont.).

R: Ortak alanlarda ısıl konfor koşullarını nasıl değerlendirirsiniz? Bir rahatsızlığınız oluyor mu?

I03: Hayır yok. Bilakis umumi kullanılan yerler daima sıcak. Kapıdan giriyorsunuz zaten o bütün idare katı daima sıcak. Koridorlarda üşüme dediğim gibi. Koridorlar daima ılık geliyor insanın yüzüne. Girdiğiniz zaman dediğim gibi o soğukta da anlıyorsunuz. Yani ben ısı durumundan fazla şikayetçi değilim.

R: Sizin kullanmayı tercih ettiğiniz mekanlar arasında buranın havası sıcaklığı daha iyi o yüzden burada oturmayı tercih ediyorum dediğiniz bir yer var mı?

I03: Bina olarak? Ha , evet. Ha , hayır. Öyle bir şey var mesela biz şimdi yemekhanede devamlı yemek yediğimiz masa cam kenarı ağaçlara bakıyor terasa bakıyor, eh aydınlık da orası. Ama sıcak soğuk , pek farkında değiliz.

R: Manzara etkili olmuş yani yer seçiminde. Sıcaklık dengeli olduğundan demek ki mekanda. Isınacak bir yer arama ihtiyacınız olmamış

I03: Hayır. Hayır. Zaten yanıyorsa her taraf sıcak oluyor. Mesela bazen haklı olarak şey yapanlar oluyor. Daha önce ısınmamış oluyor. Çok erken saatte gidiyor çocuklar orayı hazırlıyorlar ki , biz iniyoruz sekizde diyorlar ki soğuk ama açınca hemen ısınıyor. Yani bunu da şikayet konusu yapmanın alemi yok. Evimizde de çünkü neler olabiliyor biliyorsunuz. Gaz gelmiyor bilmem bir şey oluyor her şey onun için yani.

R: Mekanlar arasında sıcaklık farkı oluyor mu? Farklı sıcaklık bölgeleri var mı binada? Mesela restoranda diğer mekanlara göre daha soğuk olduğunu hissettiğiniz oldu mu?

I03: Evet. Sıcaklık farkı tabi bazen oluyor dediğim gibi. Bazen erken açılıyor bazen de biraz geç açılıyor. O zaman zaten derhal uyarılıyor. Ve o sorun gideriliyor. Fazla bir sorun yok. Bilmiyorum şimdi arkadaşlardan da bir şey işitmedim o konuda. Olabilir. İnsanlar değişik. Bazı şeyleri benim algıladığım gibi algılamıyorlar. Farklı algılıyorlar mesela.

R: Evet, kişisel farklılık çok oluyor.

(cont. on next page)

Table D.4 (cont.).

I03: Bu kadar insan içinde her şey olacak, onu da kabul etmek lazım.

R: Kendi odanız içinde ne tür eylemler gerçekleştirirsiniz gün içinde (TV, okuma, uyku, sohbet v.s) ve ne tür eylemler sırasında ısıl konfor açısından rahatsızlığınızın oluştuğunu söylenebilirsiniz?

I03: Ee, zaten odanın şeyi belli. Tabi ben TV karşımda olduğu için, şu koltuk da daha rahat olduğu için bu kısmını kullanıyorum. Mutfak kısmını zaten fazla kullanmıyorum. Yapılacak fazla bir şey yok.

R: Peki, ortak mekanlar.. ? Odanız dışında hangi mekanları sıklıkla kullanmaktasınız?

Odanızda ve ortak alanlardaki ısıl konfor koşulları arasında ne gibi farklılıklar hissediyorsunuz? Isıl konfor açısından rahatsız edici bulduğunuz mekanlar var mı?

I03: Ortak mekanlarda oturduğumuz şey o salon daha önce antrede o girişte koltuklar var ya orada oturuyorduk fakat orası zamanla bizleri rahatsız etti. Çünkü gelen giden oluyor. Dışarıdan yabancılar geliyor. Ayakaltı. Hatta kahvemizi falan orada içiyorduk sonra dedik ki o salon çok daha güzel bahçeye bakıyor. Niye burada oturalım sonra müdüre hanıma da söyledik tabii dedi orada esas oturulur. Burada gelen geçen. Şimdi bir şey oldu mu mesela geçiyoruz o salona kahve içiyoruz 3 arkadaş ondan sonra çıkıyoruz buraya dinlenmeye. Yani genellikle o salon kullanılıyor. Ama şimdi sabahleyin 10:30 da Urla'ya gideceksiniz vasıta var. Tabi biliyorsunuz. Oraya iniyorsunuz 10 a 10 kala. E ne yapacaksınız bir koltuğa oturuyoruz şoför arkadaşlar gelince çıkıp gidiyoruz.

R: Evet, lobiden bahsediyorsunuz. Zaten o sırada sokağa çıkmak üzere giyinik vaziyette oturduğunuzdan kapının açılıp kapanması de sizi etkilemiyor olabilir.

I03: Hayır, orda şey yok zaten (hava akımı), o giriş çok güzel. (Rüzgarlık ve çift kapı) Sonra iki kapılı zaten, birinci kapıdan girdikten sonra ikinci kapı açıldığı zaman sıcaklık yüzünüze vuruyor. Orası devamlı. O kat devamlı. Belki esas ısıtma şeyleri onun alt katında olduğu içindir bilemiyorum artık sıcaklığı iyi. Giriş olmasına rağmen.

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Table D.4 (cont.).

R: Odanızın yönlenmesi hakkında kişisel görüşünüz nedir?

Odanızı seçerken yönlenmeyi dikkate almış mıydınız? Başka bir yöne baksa ya da başka bir katta olsa sizce ne gibi bir farklılık olurdu sizce?

I03: Hayır, tesadüf, şu bakımdan tesadüf ama sırayla odaları gösterdiler. Ben çok aydınlık ve manzara, tabiat aşığı olduğum için… tabi diğer odalarda daha az pencere… bakın daha çok bakın, burada şeyin içinde gibisiniz. Yandaki odalar… gösterdiler birkaç yer. Aman dedim burası olsun. Ama düşünmedim ki; güneş mi alır? Soğuk mu sıcak mı? Bunu düşünmedim tamamen beni yönlendiren bu manzara açıklık ferahlık oldu. Şimdi devamlı hakikaten şu odada geçiyor ömrünüz, daha kasvetli, daha kapalı olsa, sıkıntılı olur. Şimdi bütün mesele burası açık. Yalnız işte dediğim gibi inşallah yazın kullanabilirim. Balkon çok rüzgarlı oluyor bir çiçek bile yetiştiremedim. Ben saksı maskı getirdim fakat rüzgar hepsini parçalıyor. Geçenlerde belki siz de şey yapmışsınızdır; çok şiddetli bir fırtına oldu. Denizler falan gökyüzüne çıktı her yerde. Sabaha kadar beni uyutmadı o masa o sandalye oradan oraya. Neredeyse fırlatıp atacak, camı kıracak diye korktum. Sonra çağırdım mesulü dedim evladım sen bunu şimdi kaldır aşağı sonra yazın hava iyi olduğu zaman sandalye masayı buraya koyarız dedim. Çünkü gene bir rüzgar çıksa gene uyutmayacak insanı. Kapıyı(balkon kapısı) açıyorum, o camı açıyorum, burası çok rüzgarlı oluyor. İdare ediyoruz evladım.

R: Odanızda ya da genel mekanlarda üşüme, terleme, havasızlık hissi, baş ağrısı,susuzluk, dikkat dağınıklığı, gözde kamaşma gibi fiziksel rahatsızlıklar hissettiğiniz oluyor mu? (Oluyorsa ne sıklıkla ?)

I03: Yok öyle bir şey. Benim bünyem terlemeye müsait. Gece de ben terliyorum. Yorganı biraz fazla üstüme çektiğim anda gece de ben terliyorum. Yani o şekilde bir sıkıntım olmadı Allah'a çok şükür.

R: Evet, soracaklarım bu kadar. Çok teşekkür ediyorum.

I03: Ben teşekkür ederim. İyi günler.

Table D.5. Interview Data of Interviewee- 4 (I04)

I04

R: (Akıllı bina ile ilgili tanım okundu). Tanıma göre sizce bu bina akıllı bina tanımına uygun bir bina mıdır?

I04: Öyle midir burası acaba biz pek emin değiliz ama!

R: Bilmiyorum biz de onu araştırıyoruz. Bu araştırmada her ne kadar bina ekonomisi değil de konfor daha doğrusu ısıl konfor yönüyle değerlendiriliyor. Ama tabi ki akıllı binaların asıl amacı istenilen konforu sağlarken bir yandan da ekonomik olmasıdır.

I04: Burada ekonomiye azami özen gösterilmemiş, Urla gibi bir yerde ben böyle akıllı bir bina imal etsem. Tepesine güneş enerjisi panelleri koyardım.

R: Evet,

I04: tabi, yani şimdi günah değil mi? LPG dünyanın masrafı. Yani öyle bir masraf var ki burada tahmin edemezsiniz. Yani böyle bir akıllı bina bana göre pek akıllı bina değil. Isıtma yönünden. Isıtma ve soğutma yönünden… Gerisi nasıl bilemiyorum, elektrik v.s… bizim hissettiğimiz şekilde … herkes biliyorsunuz doğal enerjilere dönüyor. Güneş enerjisi rüzgar enerjisi ne bileyim ben bunun gibi mesela ben yeni okudum. Güneş tarlaları. Aynalar koyacaklarmış , o aynalarla güneş… Hani nasıl biz çocukken bir şey koyardık, güneşi toplardık güneşi toplardık ateş yakardık, onun gibi aynalarla toplayıp, yerin altına borularını döşeyerek işte bir şekilde suyu 250C de ısıtıp o suyun buharından elektrik enerjisi elde ediliyor. İşte akıllı bu, ama bu bina LPG ile ısınan bir bina, akıllı bir bina değil. Ben onu kabul etmiyorum

R: Belki ilaveten pencerelerde güneş kontrolü için hareketli sistemler…

I04: Tabi canım, bunu Amerikalılar yapmışlar, kendilerinin kullanmadığı teknolojiyi getirmişler buraya. Açıkçası ben size söyleyeyim ben akıllı olduğunu zannetmiyorum.

(cont. on next page)

Table D.5 (cont.).

R: Bu fan coilleri kullanıyor musunuz?

I04: Şimdi hanımefendi bizim 2 oda burası, biz iki oda aldık. Bu tuvaletler, bak kapıyı açık bıraktık. Burada banyonun WC nin orada havlu panelleri var. Onları biz kalorifer gibi kullanıyoruz.bunları yakmamaya çalışıyoruz. Neden o da biliyor musun? Ben biraz enerji tasarrufu yapayım bu müesseseye diye çok acil olmadıkça bunları yakmıyoruz. Bu kapıların ikisi de o koridor tarafı da açık bırakıyoruz. İzmir'in havasını biliyorsunuz. Şurada biliyorsunuz yapsa yapsa 1 hafta 10 gün soğuk yapıyor. Öbür tarafı açıyoruz burada otururken. Neden? Çünkü çok gürültü yapıyor. Bu bile iyi yapılmış bir şey değil. Ben onu kullanırken burada eşimle zor konuşuyoruz. Ya, böyle bir şey olur mu? Biz onunla ısınıyoruz gördünüz mü? (Banyodaki petek)

R: Evet, gördüm.

I04: Kapıları açık bırakıyoruz,biz çok acil olmadıkça yaktığımız çok seyrek.

R: Peki, siz dış ortam koşullarının içerdeki etkisini direk olarak görüyor musunuz? Mesela dışarının çok soğuk olduğu günlerde içerisi de o oranda soğuyor mu?

I04: Soğuyor tabi yalıtımda herhalde iyi değil soğumaması lazım tabi. Ama soğuyor.

R: Böyle günlerde çalıştırdığınız oluyor mu fancoili? Soğuk havalarda?

I04: Çalıştırıyoruz ama bir odayı çalıştırıyoruz öteki tarafı da şey yapıyor gürültüsü daha az gelmiş oluyor. Mesela bir arkadaşımız bunu çalıştırmamak için buraya soba aldı. Radyatörlü ısıtıcılar var ya. Aldı odasına koydu. Ekrem bey. Ekrem beyle de konuşacaksınız. O mesela elektrikli şey aldı. Bunun gürültüsünden kurtuldu.

R: Yani genelde fun coil rahatsız edici bir alet gürültüsüyle hava hareketi yaratıyor mu içeride sizi rahatsız eden?

I04: Bir takım kötü şeyleri de üflüyor aynı zamanda. Çok sağlıklı bir şey değil. Klimalarda sağlıklı değil. Biliyorsunuz onlarda anti bakteriyel şeyler var.

(cont. on next page)

Table D.5 (cont.).

R: Binanın otomasyon sistemi fun coil ile sağlanıyor. Onun dışında, banyodaki ısıtıcı akıllı sistemin bir parçası değil.

I04: O sayılmaz onu biz kendimiz, burada bir bağışçı hanımefendi söyledi. Ben böyle böyle yapıyorum diye. Biz de baktık sahiden bunları açtık sonuna kadar yani onunla idare ettik. Bununla olmaz. Bu bu yani, böyle bir ısınma sistemi ne akıllı ne bir şey…

R: Fun coil kullanılmadığı zaman bina akıllı sistemle çalışmaktan çıkmış oluyor. Kaloriferli bir bina gibi.

I04: Aynen öyle.

R: Odanızın yönlenmesi… burası güneye mi bakmış oluyor.

I04: Burası batı, bu taraf da güney… güneybatı.

R: Sizin, peki, oda seçiminde özellikle dikkat ettiğiniz bir şey miydi güneş alması?

I04: tabi tabi ben güneş… gün batımını seyretmek istedim.

R: Hıı, ama görsel olarak sanırım. Siz yani,.. manzara olarak.

I04: görsel, görsel

I04: Eşim yalnız,.. buranın ısınmasını kastetmiyor. Yani güneş enerjisinden istifade etmeyi kastediyor.

I04: Bayağı sıcak oluyor, güneş geldiği zaman. Kışın da buradan da istifade ediyorum.

R: Ne zamandır buradasınız?

I04: Biz hanımefendi, mayıs ayında girdik buraya 2008 in 1 ay oturduk. Bir yaz geçirmedik burada. Bizim çeşmede yazlığımız var . Yazın burada değildik. Gelip gittik. Arada ama. Yazın buranın sıcaklığını soğukluğunu onu pek bilemem. Geldiğimiz de çok mecbur olunca bunları çalıştırırız tabi.

R: (Isıl konfor tanımı yapıldı.) Tanıma göre siz bu binadaki ısıl konforu nasıl değerlendiriyorsunuz ?

A:Tamamen uygun. B:Tatmin edici. C:Kabul edilir. D:Konforsuz.

(cont. on next page)

Table D.5 (cont.) .

I04: Şimdi ben '*Kabul Edilebilir'* i seçeceğim de şimdi buradan çıktınız. Aşağıda restorana gidiyorsunuz restorana giderken aradaki bölümler buz gibi. Akıllı binada binanın her tarafının eşit ısınması lazım. Burada çok fark var. Aşağıda biz mesela yürüme bantlarına gidiyoruz. Hele o koridorda mesela benim eşim bazen hastalanıyor. O kadar soğuk orası.

I04: Olmaması lazım.

I04: Çok büyük ısı farkı var. Şimdi buralarda tamam dolaşıyoruz. Biz ama öyle bir yere inerken insan başka şeyler giymek zorunda kalıyor.

R: Isıl konfor koşullarından memnun olmadığınız zaman ne gibi önlemler alıyorsunuz?

I04: Giysi değiştiriyoruz, yahut ek şeyler alıyoruz.

R: Termostat ayarının değiştirilmesi… ?

I04:Termostat tamam değiştirilebilir ama esas şey, ana şey yanlış. Sistem yanlış bana göre.

R: Kapı pencere açma… ?

I04: Sıcak geldiği zaman açıyoruz tabi tel var. Havalanması için.

R: Temiz hava alalım diye kahvaltıya inerken doğal havalandırmaya başvuruyorsunuz. Bu ısıl konforu nasıl etkiliyor?

I04: Herhalde dönünce serin olursa havada soğuk olursa o zaman içerideki bu yukarıdaki şeyi funcoili çalıştırıyoruz.

R: Peki ısıl konfor için hareket yürüyüş vs, metabolizma hızını arttıracak eylemlerde bulunuyor musunuz ya da sıcak soğu içecek tüketimi

I04: Yazın dedim ya biz burada olmadığımız için biz o tür şeyleri hissetmedik.

R: Gündüz güneş ışığından yararlanmak istiyor musunuz? Ya da rahatsız edici etkisini hissediyor musunuz?

I04: Valla, benim eşim perde kapatmayı sevmiyor gece bile. Burada çünkü müsait yakında bir şey de yok. Onun için bu perdeler açık kalıyor. Çoğu zaman açık.

(cont. on next page)

Table D.5 (cont.).

R: Gündüz güneş ışığı ile ısınmayı tercih ediyorsunuz.

I04: E, tabiii

R: Onun dışında rahatsız edici olup da kapatmaya ihtiyaç duyma….

I04: yok

R: İhtiyaç duyduğunuz oluyor mu?

I04: yok. yazın yaşamadığımız için çok böyle bir şey hissetmiyoruz. Değil mi?

I04: çok güneş olursa biraz çekiyoruz. Burada oturan rahatsız oluyor. Buradan güneş alıyor o zaman ya tülü ya şu şeyi çekebiliyoruz. Tabi buralarda oturuyoruz. (cam kenarı olmayan yerleri göstererek)

R: Ne tür eylemler sırasında Isıl konfor açısından rahatsızlığın oluştuğu söylenebilir?

I04: yok, öyle bir rahatsızlığım aşırı bir rahatsızlığımız yok.

I04: aşırı bir rahatsızlığımız yok.

I04: bunlar genelde yetiyor. Çok soğuk havalarda onlardan (funcoil) istifade ediyoruz.

R: Odanızda ve ortak alanlardaki ısıl konfor koşulları arasında ne gibi farklılıklar hissediyorsunuz?

I04: Koridorlar.

R: Restoran için ne söyleyebilirsiniz?

I04: Orayı da ısıtıyorlar oranın ısısı da… o da tuhaf bir ısınma binanın akıllı ısınması değil de, ayrıca açıyorlar bir şey… har har har.

R: O sistemin dışındaymış evet.

I04: sesimizi bile zor duyuyoruz. Bazen de diyoruz ki kapat da birbirimizi duyalım.

I04: Isınma teşkilatı iyi değil.

I04: Değil. O manada öyle akıllı makıllı falan hikaye hepsi

(cont. on next page)

Table D.5. (cont.).

R: Peki mesela restorana girdiğiniz de sıcaklık farkı hissediyor musunuz?

I04: bazen oluyor öyle bir farklılık , evvelden evet bir ara ayarsızdı.ama şu son zamanlarda onu nasıl ayarladılar bilmiyorum. Restoranlarda ki garsonlar da hükmediyorlar. Bir merkez hükmediyormuş. Biz bazen kapat mapat diyoruz, bir şeyler oluyor bir süre sonra kapanıyor

R: Odanız dışında hangi mekanları sıklıkla kullanmaktasınız?

I04: Genel mekanlar şimdi saat 4:00 de çay falan bir şeyler veriyorlar . genel mekan olarak orayı kullanıyoruz.

I04: Çay salonu.

I04: Aşağıda spor salonu var bantlar var yürüme bantları onu kullanıyoruz, yüzme havuzunu aralıklı yazın bilhassa ben kullanıyorum spor olarak. Onun dışında bilemiyorum daha başka

R: Girişteki lobide oturduğunuz oluyor mu?

I04: Lobide artık pek oturmuyoruz. Çay salonunda oturtuyoruz daha çok.

R: Lobide oturmamanızda ısı ile ilgili bir neden var mı?

I04: Hayır hayır

I04: Değil değil.

R: Çay salonunda ısı ile ilgili gözleminiz nedir?

I04: Orayı da ısıtıyorlar.

I04: Orada da bir sorun yok.

R: Hava akımından kaynaklanan bir sıkıntı oluyor mu bu mekanda kapı pencere açmaya bağlı?

I04: açılmıyor pencere. birazcık aralık bırakıyorlar. Açılamıyor çünkü kediler hayvanlar giriyor içeri. yani bina kendisini ayarlamıyor. Yani bana göre sizin bize sormak istediğiniz o. Kendisini ayarlamıyor biz kendi kendimize azarlamaya çalışıyoruz. Akıllı binada Dersiniz ki bu bina 15 yahut da 19C da ayarlasın kendini. Yaparsınız ayarını. Böyle bir şey yok

(cont. on next page)

Table D.5 (cont.) .

R: Sadece sıcaklık değil nem ve hava hareketi de

I04: Onları biz bilmiyoruz, nemi ben nerden bileyim.

R: Mesela diyelim standart 22ºC e ayarlanmış ve 22 ºC fun çok fazla üflüyorsa kişi bu sıcaklık da kişi üşüyor olabilir. Onu görmek istemiştim.ama çalıştırılmadığı için görmek mümkün değil

I04: Valla biz çalıştırdığımız yerde oturmuyoruz. Arkayı çalıştırdığımız için… Ama burayı çalıştırsak rahatsız oluyoruz. Çok gürültülü.

I04: Hava akımı çok.

I04: Rüzgar dediğiniz gibi sirkülasyon yapıyor fazla o rahatsız ediyor

R: Nem oranını düşürüyor olabilir.

I04: Bir de üfleyince mesela o doğrultuda yani çok sıcak geliyor.

I04: Şimdi, şuraya otursanız size üfürüyor

I04: Doğru size…

I04: Orada oturmak istiyor insan yani sistem iyi değil.

R: Odanızda ya da genel mekanlarda üşüme, terleme, havasızlık hissi, baş ağrısı, susuzluk, dikkat dağınıklığı, gözde kamaşma gibi fiziksel rahatsızlıklar hissettiğiniz oluyor mu? Oluyorsa ne sıklıkla ?

I04: Yok, yok.

I04: Arada hep havalandırdığımız için…

I04: Kendimiz havalandırdığımız için öyle bir şey hissetmiyoruz.

I04: Dışarıda hava çok güzel oksijen fazla.

R: Dezavantaj burada doğal havalandırma sırasında içerinin soğuması olabilir. O da çok rahatsız edici değil anladığım kadarıyla

I04: Değil, değil. Son olarak söyleyeyim; bina böyle bir akıllı ısıtma soğutma sistemine haiz değil.

R: Anladım. Teşekkür ediyorum.

I04: Ne kadar kalacak bu burada?

Table D.6. Interview Data of Interviewee- 5 (I05)

I05

R: (Akıllı bina ile ilgili tanım okundu). Tanıma göre sizce bu bina akıllı bina tanımına uygun bir bina mıdır?

I05: Değil. Ben Size olmadığını söylemiştim.

R: Ne için değil sizce?

I05: Akıllı bina olarak yapmaya kalkmışlar akılsızlar yapmış akıllı olmamış.

R: Değişen ortam koşullarına uyum sağlayabilen bir sistem olması gerekiyor.

I05: hayır yok yani yapımda çok hata yapılmış. Siz gittiğinizden beri ben burada klimayı çalıştırıyorum. pencere açık olmasına rağmen sıcaklık 21ºC in altına düşmüyor. Akşam da bu şey olmasa avize olmasa avizede 9 tane 40W lık ampul var TV var, bilgisayar var. Onların sıcaklığı ile ısınıyor oda. Yazın 30ºC-31ºC lere çıkıyor.Akıllı bina benim bildiğim otomatik olarak kendini ayarlar.

R: ve her odada farklı sıcaklık sağlanabiliyor olmalı ihtiyaca uygun olarak.

I05: Onun da otomasyonla aşağıdan idare edilebiliyor olması lazım.

R: Genellikle gördüğüm kadarıyla fan coiller kullanılmıyor. Banyoda bir ısıtıcı varmış galiba?

I05: Banyoda bir ısıtıcı var havlupan dedikleri sadece havluların kurutulmasına yarayan bir şey.

R: İnsanlar sadece onun sıcaklığı ile idare ettiklerini yani onun sıcaklığının yeterli olduğunu söylüyorlar.

I05: Fakat kapıdan çıkınca koridor buz gibi.

R: Sıcaklık farkı var diyorsunuz?

I05: Korkunç öyle Az buz bir şey değil.

R: Müdahale ile düzeltilebilir mi bu durum.

I05: Valla, manuel olarak bir şeyler yapıyorlar ama akıllı binada manuel olur mu?

(cont. on next page)

Table D.6 (cont.).

R: Sizin akıllı binadan beklentiniz ne olabilir?

I05: benim akıllı binadan anladığım… Ne bileyim ısıtması soğutması suyu sıcak suyu her şeyi normal olarak kendi kendine hazır olan bir sistem benim anladığım.

R: Konfor çok öznel kişiden kişiye değişen bir kavram. Gerekli ihtiyaç belirlendiği zaman

I05: Onu ben kendim buradan da belirleyemiyorum, aşağıdan da belirleyemiyorlar. Geçen hafta (–°C) lere düştü burası 0°C'lere düştü geceleri. Geceleri benim burada şimdi fan coil çalışmıyor. Çalışmamasının nedenlerinden bir tanesi de şuradaki yukarıdaki fan coile gelen vanaları kapattırdım artık çünkü acayip bir şey geliyor ses geliyor kapattırdım ve şu anda ben burada fun coil siz yaşıyorum.

R: Sizin burada kış ayında soğuktan değil tam dersi sıcak oluşundan…

I05: Bunu yazı var yazın ne olacak yazın 31 ºC lere çıkıyor.

R: Peki bina kabuğu açısından düşünürsek dışarıya karşı yalıtımlı mı sizce? Dışarıda çok soğuk havanın olduğu zamanla havanın daha iyi olduğu zaman arasında iç ortam sıcaklığında fark edilir bir fark oluyor mu?

I05: Hayır. Dışarısı soğuksa hala içerisi sıcak. Bu da yalıtımın iyi olduğunu gösterir. Ama yalıtımın iyi olması buranın sistemini doğru çalıştığı anlamına gelmez. Akıllı binadan kasıt ne? İçindeki sistemin sağlıklı çalışmasıdır. İçindeki sağlıklı bir sistem olmadığına göre dışarısı soğuk olduğunda burasının sıcak olması fun coiller çalışmadığı halde sıcak olması… yani bunun cevabını ben veremiyorum.

R: Genelde oda sıcaklığı…

I05: Pencere açıkken mesela dün gece sabaha kadar açıktı. 02.03.2009 akşamı sabaha kadar açıktı 21°C.

R: Peki bu ısınmaya sebep olan?

I05: Onu kendileri de bilemiyorlar. Akıllı bina diyoruz, her odada data sisteminin olması gerekiyor. Data sistemini getiren kablolar eski buraya 4MB ile gelen kapıya gelen telekomun santrali odaya 1MB ile bile gelmiyor kopuyor. Bir

(cont. on next page)

Table D.6 (cont.).

kablo çekilmiş değil. O sistemi oturtmuş değiller. Akıllı bir binada bunların çalışması lazım.

R: (Isıl konfor tanımı yapıldı.) Tanıma göre siz bu binadaki ısıl konforu nasıl değerlendiriyorsunuz ?

A:Tamamen uygun. B:Tatmin edici. C:Kabul edilir. D:Konforsuz.

I05: Konforsuz bana göre

R: Konforsuz

I05: Evet

R: Isıl konfor koşullarından memnun olmadığınız zaman ne gibi önlemler alıyorsunuz? Ne gibi eylemlerde bulunuyorsunuz?

I05: Kendim ben bir tane klima taktım onunla idare ediyorum.

R: Ya da kapı pencere açıyorsunuz sanırım

I05: Kapı pencere açmak fayda etmiyor soğutmuyor. Bir de ikinci bir şık daha var. Benim oda da ben bunu hallettim ama diğer odaların hiçbirisinde filtre yok fun coillerde havanın içindeki bütün mitelar bilmem neler fun coil tarafından çekiliyor ve aynı şekilde soğutularak ve ya ısıtılarak aynı odaya pompa ediliyor.

R: Ayrıca bir havalandırma sistemi yok değil mi?

I05: Ben özel kendim yaptım bunu sigara içtiğim için diğer odalarda yok

R: Odanızda Fun coili Çalıştırıyor musunuz

I05: Kullanmıyorum

R: Odanızın yönü

I05: Güneydoğu

R: Odanızı seçerken yönlenmeyi dikkate almış mıydınız?

I05: Daha evvelden öbür bloktaydım. Öbür bloğu hiç ısıtamıyorlar.

R: Hangi blok?

I05: B4 mü oluyor orası B4 bloktaydım.

R: Kuzeye mi bakıyor orası?

I05: Yoo, kuzeye bakmasından değil bu sistem çalışmadığından ısıtamıyorlar. Ve ısıtamadıkları için de odamı değiştirmek zorunda kaldılar.

(cont. on next page)

Table D.6 (cont.).

R: Orada soğuk olduğu için problem yaşadınız?

I05: Orası buz gibiydi . Zaten hiç ısıtamıyorlar.

R: Güneş de görmüyorsa…

I05: Buranın da güneş gördüğü söylenemez. Sabahleyin doğudan doğuyor 1 saat ya görüyor ya görmüyor güneş ve dönüyor.

R: Yani o zaman, güney doğu değil

I05: Yo, hayır. Hayır, şöyle söyleyebilirim. Doğu, doğu… Şuradan doğuyor

R: Yani tahmin ediyorum sizin oda seçiminizde güneşin ısı enerjisinden istifade etmek yönünde güneşle ilgili bir seçiminiz olmadı. Sıcaktan rahatsız olduğunuz için…

I05: Benim için ideal sıcaklık 20 C maximumdur. Özellikle gece uyumak için 20C dir. Gece yattığınız yerin biraz serin olması lazım. Ama şu anda kaç derece orası bakın. 22.2 C . Bakın pencere açık. Hiçbir şey çalışmıyor. Pencere açık 22.2 C . ben muslukları yeni yaktım daha TV çalıştırmadım. İki saat sonra 26°C. Koridorlar ise buz gibi.

R: Gündüz güneş ışığından yararlanmak istiyor musunuz? Ya da rahatsız edici etkisini hissediyor musunuz?

I05: Bu saat almıyor güneşi. Kontrol edeceğim bir şey yok. Öbür taraf, bunun karşı şurası… hele yazın akşam saat 21:30 a kadar güneş vuruyor. Böyle olmasına rağmen burası 30 °C falan oluyor yazın.

R: Ne tür eylemler sırasında Isıl konfor açısından rahatsızlığın oluştuğu söylenebilir?

I05: Soğutamıyorlar.(Soru yanlış anlaşılıyor)

R: Hangi mekanlarda, odanız dışında, Isıl konfor açısından rahatsızlık hissediyorsunuz? Mesela restoranı nasıl değerlendirirsiniz?

I05: Restoran da ona keza. Mesela sabahleyin gidiyorsunuz bazen çok soğuk bazen çok sıcak. Sonra restorana giriyorsunuz bir fun coil çalıştırıyorlar. Fun coil mi çalışıyor fabrika mı belli değil.

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Table D.6. (cont.).

R: Gürültülü mü ?

I05: Evet.

R: Gürültü dışında, fun coilin oluşturduğu hava hareketinden bir rahatsızlık oluyor mu sizde?

I05: Bence dengeyi kuramamışlar. Yani üfleme ile emiş arasındaki dengeyi kuramamışlar. Fun coiller normal çalışmıyor. Yani burada düzenli bir şey daha henüz oturmuş değil. Oturur mu ileride? Bilmem.

R: Mesleğiniz nedir?

I05: Elektrik mühendisiyim.

R: Odanız dışında hangi mekanları kullanıyorsunuz?

I05: Dinlenme salonu var. Çay salonu.

R: Oradaki durum nasıl?

I05: Oradaki durumda aynı. Bazen çok soğuk oluyor, bazen çok sıcak

R: Orada hava akımı oluşuyor mu iki taraflı kapı pencere açılması ile?

I05: Oluyor tabi. Benim şikayetim yok ama hava akımı olur

R: Lobide oturuyor musunuz?

I05: yok. Lobide oturmam

R: Oturmama sebebiniz sıcaklıkla ilgili olabilir mi?

I05: Oturmadığım için sıcaklık konusunda da bir fikrim yok. Mesela düne kadar orayı zorla ısıtıyorlardı. Koridora çıkıyorsunuz buz gibi. Şimdi ısınıyor ama nasıl ısıtıyorlar bir fikrim yok

R: Spor?

I05: Ara sıra inmek istiyoruz ama ne camı var ne çerçevesi. Havalandırması var. Pencere olmayan bir yerde spor yapmanın anlamı var mı sizce?

R: Oralar ısıtılıyor mu gün içinde?

I05: Yo, işte birisi isterse açıyor, ısıtıyorlar. Yani bizim akıllı bina böyle işte.

R: Akıllılığı sorgulanır diyorsunuz. Teşekkür ederim.

Table D.7. Interview Data of Room - 6

I06

R: (Akıllı bina ile ilgili tanım okundu). Tanıma göre sizce bu bina akıllı bina tanımına uygun bir bina mıdır? Binanın Hangi özellikleri ile akıllı sistemle çalıştığını düşünüyorsunuz?

I06: Onun nasıl ayarlanıp ayarlanmadığını bize herhangi bir şekilde intikal ettirmedikleri için zaten ben onu anlayamam. Bu bir. İkincisi, şuraya koydukları şeyler var ya mesela derece çok sıcak olursa 19C a getirirsiniz. Ondan sonra bir de 30C ye kadar kışın sıcaklığını ayarladılar. 30C ye kadar çıkar, çıkabilir dediler. 30C zaten fazla ki bizim buradan güneş aldığı için… Ama başka ne gibi akıllılıkları var, neleri var , neleri yok. Bununla ilgili herhangi bir şey söylemediler

R: Yani, 19ºC ile 30ºC arasında istediğiniz sıcaklığı seçebiliyorsunuz?

I06: Zaten de mesela galiba bugün 23ºC – 24ºC dir burası. Ben pencere falan açıyorum yani havalansın diye açıyorum. O zaman tabi derecesi düşüyor. Ama başka ne gibi akıllılık vereceği… onu bilmiyorum

R: Buradaki fun coillerin kontrolü akıllı sistem dediğimiz otomasyon sistemi ile aşağıdan ayarlanıyor ve kontrol edilebiliyor

I06: Evet evet, onları aşağıdan hallediyorlar.

R: Odanızda Fun coili Çalıştırıyor musunuz? Ne sıklıkla çalıştırıyorsunuz?

I06: ben icabında kullanıyorum. Tabi, tabi mesela 2 gün evvel çok soğuklar oldu. Burası 23ºC idi. 23ºC de olmasına rağmen hani bir anda amcan üşümesin, bilmem ne olmasın diye yaktım. 24ºC -25ºC e kadar çıktı o gün. Bir de banyonun içinde var onu görmüştünüz. Radyatör var onu devamlı çalıştırıyorum şu anda. Sabahları amcan tıraş olurken bilmem ne yaparken o orada çalışmış oluyor. Orası yatak odası daha rahat edebiliyor. Bunlarla idare

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Table D.7. (cont.).

edebiliyoruz. Yani bizim şimdilik bir sorunumuz yok. Ama bu akıllı sistem nedir? Bilmem ne sistem nedir? Bize anlatmış olsalar, biz daha iyi hareket ederiz.

R: Akıllı sistemde sizin ihtiyaçlarınıza göre ya da belirlenen ihtiyaçlara göre binanın kendini ayarlaması istenen koşulları yerine getirmesi beklenir. Değişen koşullara uyum sağlayabiliyor olması. Buna göre sizin akıllı binadan beklentiniz ne olabilir

I06: Uyum sağlayabiliyor, tabi tabii. Buraya ilk geldiğimizde biz dedik şöyle mi böyle mi? Onların orada ayarlanacak yerleri var, aşağıdan da ona göre ayarlıyorlar. Rahat ayarlanıyor yani.

R: Normal ısıtma sistemlerinden farklı olarak devamlı müdahale yerine istenen koşul belirlenip bir değer girilip 20- 21 C mesela onu bu değeri sistemin günün saatine göre güneşin etkisine göre yani değişen dış ve iç koşullara göre ayarlayabilmesi, dengeyi kurabilmesi…

I06: Tabi tabi onlar ayarlanabiliyor. Onu bilmiyorum . Ben müdahale etmiyorum. Ama ben buradan bu ayarına basıyorum. Mesela bu durduğu yerden burası 25ºC bu 25ºC bu an için sıcak. Bunu 22ºC ben indireyim diye tesisatın herhangi bir şeyi yok. Yani benim yanımda. Ama ben basarsam bu bana sıcak oldu, 25ºC bana sıcak, 22ºC de durdur dersem ona ayarlıyorum. buradan soğuk püskürmeye başlıyor

R: Peki siz Funcoili kullandığınız zaman sıcaklığı düşürmek istiyorsunuz düşüyor arttırmak istiyorsunuz artıyor. Sıcaklığı arttırmak istiyoruz ama hava ısınmıyor yada tam tersi düşürüyoruz mama soğumuyor gibi bir problem yok değil mi

I06: Şimdi benim şeyim şu yavrum, bunları çalıştırdığımız zaman o ilk püskürtmede soğuk aşağıda yemekhanede de öyle ilk anda soğuk üflüyor bunlar. Hep böyle midir? Bilmiyorum. Klimalar da böyle. Nazilli'deki evimde klima taktırdım yeni orada çalıştığında burada sana sanki sıcak hava değil de sıcakla soğuk hava geliyor. Bir acayip şeyler genelde öyle herhalde.

R: Ama o sadece ilk çalıştığı anda oluyor sanırım.

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Table D.7. (cont.).

I06: Hayır hayır ilk çalıştırmada da olsa şey de olsa… çünkü ben de amcanda üşümeyelim diye. Geçen sene nazilli de kaldık. Marta kadar kaldık ve ben devamlı çalıştırdım ve bana da dokundu. Normalde astıma da dokunur. Dokununca ben hasta oldum. Bronşlarım hasta oldu sıhhatli bir şey değil

R: Bu fan hızı yüksek demek ki.

I06: yüksek de olsa alçak da olsa işte. Nazilli'de de öyle 24ºC -25ºC de o üflüyor. Beni rahatsız etti. Herkese göre değil bence. Kız kardeşimi de rahatsız ediyor. Kız kardeşimin de bronşiti var.

R: Genelde hava üfleyerek ısıtanlarda bu sorun oluyor.

I06: Kaloriferlilerde değil bak. Peteklerde de değil. Radyatör peteklerde değil bunlarda böyle

R: Peki havayı kuruttuğunu fark edebiliyor musunuz?

I06: Benim de nefes darlığım olduğu için onu şey edemiyorum ama ben de yaptı. Nefes alamadım. Oksijen verdiler, öyle bir şey oldu ki …

R: Sizin böyle neme duyarlı bir rahatsızlığınızın olması bu konuda hassas olmanız bizim de termal konforu ve etkilerini anlamamız açısından önemli yani sağlıklı insanın fark edemediği konforsuzlukları sizin hissetmeniz…

I06: Tabi. Ben o şekilde yani kurumayla mı ben bu şekle dönüşüyorum onu da şey yapamadım yemekhane de yemek yerken daha hayır dedim ben gidiyorum hemen aşağı indim bana O2 taktılar O2 ile açıldım ondan sonra o sıcak şeyler var onlardan alıyorum kendimi ihmal eden bir insanım ben etmemem gerekiyor. Yani kurutuyor. Kaloriferli evlerde dahi hiç böyle püskürten klima olmayan evde de başıma geldi ani yetiştirdiler beni acıbadem hastanesine ambulansla Kadıköy'e. Bir hafta10 gün kadar kaldım. İstanbul Darüşşafaka'da idik. Ondan sonra buraya geldim

R: Peki ama siz bu fun coil çalışmadığı durumlarda bu rahatsızlığı hissetmiyor musunuz? Hava kuruluğunu? O çalışmayınca banyodaki o petekle ısınıyoruz diyorsunuz o yeterli oluyor mu?

(cont. on next page)

Table D.7. (cont.).

I06: Yeterli oluyor çünkü biz devamlı güneşin içindeyiz.

R: Güneye mi bakıyor odanız?

I06: Hayır yok batıya bakmış oluyor karşısı batı oluyor.

R: Sizce akıllı sistemle çalışmakta olan binalar Yaşlılar Evi için uygun mudur?

I06: Şimdi uygun olabilir ama bu bronşiti olmayanlar açısından

R: Ama her şeyin sağlanması gerekir sadece ısıtma değil, nemi de koruyacak…

I06: Nemi de sağlaması lazım. Buhar verici aletlerde çıktı biliyorsunuz

R: Sadece ısıtma fonksiyonunu yerine getirmekle kalmayacak, diğerlerini de dengeleyecek burada bu denge var mı sizce?

I06: Valla ısıtmalar veya soğutmalar için denge var ama rahatsız olan biri için bronşiti olan bir astımı olan bir hasta için bu normal değil evet benim öksürüğüm bilmem neyim vardı ama nazilli de ilk hissettim ben bunu hem yatak odamda hem oturma odamda klima vardı ikisini de çalıştırdım. Mutfaktaki elektrikli ocaklardandı orada o kadar bir şey olmadı. Bunlar evet evi kaloriferli gibi yaptı ama bu nefesimi demek ki tehdit etmeye başlamış ben İstanbul'a gidince daha beter oldum . Orada kaloriferli ev, ama nefes alamadım.

R: Isıl Konfor Tanımı:;İnsanın bulunduğu ısıl ortamdan hissettiği rahatlık olarak tanımlanır. Isıl konforu etkileyen 5 faktör vardır.

Bireysel Faktörler :

1. Aktivite düzeyi (metabolik enerji üretimi),
2. Giyilen giysi :(ısı ve hava transferi geçirgenlik dirençleridir.)

I06: Tabi tabi, kimine sıcak gelir kimine soğuk gelir.

R: İnsanların metabolizma hızına ve de giyinme durumuna bağlı.

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Table D.7 (cont.).

R: Sizin rahatsızlığınızın kaynağı anladığım kadarıyla sıcaklık değil de nem . çünkü üçü etkiliyor termal konforu. Sıcaklık nem ve hava hareketi

I06: Evet tabi sabahleyin açıyorum hiç olmazsa oksijen gelsin diye nefes alayım diye. Ama bu nefes alamamadan değil içeriye bir oksijen girsin. Yani bu benim şahsi görüşüm ama başka birisine sorduğunuz zaman çok memnunum diyecek onun herhangi bir hastalığı olmaması nedeniyle gayet iyiyim diyecek

R: Ama önemli olan burada hassas bünyenin tepkisi.

I06:Konforsuz değil konfor var. Kabul edilebilir ve tatminkar da tamamen şahane diyebilmem için ben şahsen söyleyemiyorum rahatsızlığımdan olabilir.

R: Kabul edilebilir diyorsunuz?

I06: Kabul edilebilir evet

R: Nem kontrolü olmaması nedeniyle buradan nemi ayarlayamıyorsunuz?

I06:Hayır, nemi yok ben onu bilmiyorum bize dediler ki işte 19ºC ye kadar düşürebilirsiniz.

R: Sadece sıcaklık kontrolü?

I06: Sıcak ayarı var sıcak ve soğuk ayarı.

R: fun kontrolü için müdahale edebiliyor musunuz? Yani üfleme hızını?

I06: Benim burada yok galiba ama aşağıda var sanıyorum. Aşağıda var sanıyorum aşağıda baktım da üç fonksiyonlu. Bir de siz bakın (beraber inceledik)

R: Fan, evet fan hızı. Hava hızını kontrol edebiliyorsunuz?

I06: O zaman evet fun budur. buradan da sıcaklığı arttırıp indirebiliyorsunuz çünkü kış diye 30ºC demişler ama ben 30ºC falan yaptırmadım. Ama bu da şey yaptınız mı duruyor. Bunlarda üfleme şeyleri.. belki ben bir an evvel ılırsa diye üfledim şuradan bana serinlik geldi.. siz daha iyi anlarsınız diye düşünüyorum fun ını falan demek ki bunlar yükseltiyor… Aşağıda da var girişte de var oralarda da var.

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Table D.7 (cont.).

R: Onlar otomasyon dışındaymış, Manuel ayarlanıyor.

I06: Onları bilmiyorum. Elle müdahale ise, biz de burada elle müdahale ediyoruz.

R: Odaların hepsi aşağıya bağlı. Ama onlar bağımsız sistemlermiş.

I06: Onu bilmiyorum. Gazete okuduğumuz salonlar var ya orada da aşağıdan bakarız dediler bir bakın soğuk dedik. Geçen gün de arkadaşlar üşüdük dediler. Tamam ayarladık dediler yani aşağıdan ayarlanabiliyor demek ki güzel bir sistem de dedim ya dokunana zor ama ben 8 aydan beri buradayım. Bu bana dokundu diyemem bana daha önceden klimalar dokundu nazillide ocakta şubatta ordaydım ben 4 ay kaldım sonra buraya döndük memnunuz normalde burası huzur evi gibi değil bize yetiyor.

R: Isıl konfor koşullarından memnun olmadığınız zaman ne gibi önlemler alıyorsunuz? Ne gibi eylemlerde bulunuyorsunuz?

Termostat ayarının değiştirilmesi ?

I06: Evet, termostatı değiştirme imkanı var

R: Kıyafet değişikliği?

I06: Hayır , hayır.

R: Kapı pencere açma

I06: havalandırma amaçlı açıyorum ve burası oksijeni bol olan bir yer o nedenle açıyorum. Havalandırmak için açıyorum.

R: Hava kuruluğundan açıyor olabilir misiniz?

I06: hayır hayır, onu zaten hissetmiyorum. Hava kuruluğu mu var nem var mı yok mu onları bilmiyorum. Çünkü bronşlarım var ve ben de koku alma duyusu yok. Beyin ameliyatı oldum. Koku alma duyum olmadığı için nemi de hissetmiyorum. Benim ancak bronşlarıma düştüğü zaman anlıyorum öksürüğüm olduğu zaman anlıyorum

R: Bina yetkilisi ile temasa geçme?

I06: Geçilebilir her an geçilebilir

R: Diğer?

(cont. on next page)

Table D.7 (cont.).

R: Hareket etme- yürüyüş-spor. v.s ile metabolizma hızını arttırma?

I06: Var, arkadaşlardan yapanlar var ama ben çıkmadım benim diz ameliyatlarım var.

R: Odanızda Fun coili Çalıştırıyor musunuz? Ne sıklıkla çalıştırıyorsunuz?

I06:Çalıştırmıyorum şu an. Normalde çalıştırıyoruz. Soğuk havada çalıştırabiliyorum. Sıcak havada da çalıştırabiliyorum.

R: Sabah ya da akşam özellikle diyebilir misiniz?

I06: Yok yok yani bu odanın sıcak ya da soğukluğuna göre ayarlıyorum çok uzun müddet de çalıştırmıyorum

R: Bir gün içinde mutlaka çalışıyor mu?

I06: Geçen gün ki soğuklarda bile çok çalıştırmadım(1-2 defa) iki gün evvel miydi neydi yemekten geldik yak istersen dedi yaktık bana üfürüyor gibi geldi bazen yemeğe inerken yakıp gidiyorum hiç olmazsa gelinceye kadar ısınsın diye gelince söndürüyorum. Gürültüsü var bir de rüzgar gibi etkisi var ya gelince kapatıyorum. Bir de petek şeylerimizin kapılarını açıp gidiyorum sabahleyin

R: Gürültü olmasa aslında çalıştırılacak galiba?

I06: Tabi tabii çalıştırılabilir ihtiyacım yok. Dedik ya kişiye göre değişebilir pek öyle şeye ihtiyacım olmadı ama sabahleyin mesela giyinip gidiyorum pencereyi açıyorum balkon kapısını açıyorum. Havalansın da hiç olmazsa diye geldiğim zaman birkaç derece düşmüş oluyor kapıları kapatıyorum ama bunu pek çalıştırmıyorum çok nadir yani bu sene ben haziranda geldim yazı atlattık kışı da atlattık sayılır marta geldik devamlı çalıştırdım diyemem ama şeyi çalıştırdım banyodakini çalıştırdım ondan memnunum. O iyi düşünülmüş hakikatten iyi düşünülmüş oraya.

R: Yani kısaca fun coili pek sık kullanmıyorsunuz sanırım

I06: Yok, yok yani şey geliyor… Bir de tahmin ediyorum kendileri de bir şey çalıştırıyor umumi bir şey de çalışıyor sanıyorum şurada

R: Koridorda mı ?

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Table D.7 (cont.).

R: Koridorda değil, giriş kapısının arkasında. Girdiğimde de ben orada bir sıcaklık hissediyorum. O da böyle püskürtüyor gibi de olmuyor, orada bir sıcak hava geliyor giriş kapısının yanında. Oradan bir sıcaklık da olabilir onun için ben ihtiyaç duymadım.

I06: Güneşten rahatsız olma şöyle bir şey olabilir. Tam karşınıza geliyor tam batıdayım burası da Ege bölgesi biliyorsunuz. 35 – 40 C ye kadar çıkan bir güneş … perdeyi çekme şeyim olabilir. Normal.

R: Yani kış ayında da olsa, öğleden sonra, perdeyi çekmeyi gerektirecek bir güneş oluyor mu?

I06: Tabi tabii oluyor öğleden sonra 30 ºC ye kadar çıktığını biliyorum. 30ºC -31 ºC ye çıktı güneş geldiği vakitler.

R: Burada dereceniz var mı sizin?

I06: Hayır oradan belli oluyor. Ben görüyorum. (kumanda panelinden bahsediyor.) O devamlı var orada kapalı iken de gösteriyor. Kendisi çalışmasa da gösteriyor.

R: Yani ısıtma sistemi devrede değilken de sadece içeri giren güneş ile 30 31 C olabiliyor? O zaman perdeyi çekmeye de gerek duyuluyor diyorsunuz

I06: Perdeyi çekmeye gerek duyuluyor tabii güneşle de oturamazsınız bir yerde

R: Odanızda ne kadar zaman geçiriyorsunuz?

I06: Valla o durumumuza bağlı yemek haricinde aşağıda gazeteleri okuyoruz icabında yukarı çıkıyoruz öğle vaktine kadar gazetemizi dinlenme salonunda okuyoruz bazen oradan yemeğe gidiyoruz geldiğimizde odaya çıkıyoruz dinleniyoruz arzu edersek 4:00 de çayımız var oraya iniyoruz, televizyonumuz var görmüşsünüzdür. Tavla oynayanlar… icabında oyun salonu da var. Ben kendim eşimle beraber gazetemizi okuyoruz.

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Table D.7 (cont.) .

R: Yemek dışında 2-3 saat oturduğunuz oluyor mu?

I06: Bazen oluyor, bazen de olmuyor.

R: Odanızın yönlenmesi hakkında kişisel görüşünüz nedir? Odanızı seçerken yönlenmeyi dikkate almış mıydınız?

I06: Batıya baksın istedik yani güneş görsün. Hasan bey güneşi sever daha çok.

R: Güneşten yararlanmak istediniz?

I06: Evet evet.

R: Rahatsız edici bir etkisi?

I06: Hayır, hayır.

R: Odanızda ve ortak alanlardaki ısıl konfor koşulları arasında ne gibi farklılıklar hissediyorsunuz?

I06: Yok fazla bir fark yok. Yalnız yemeğe indiğimiz zaman salon soğuk gibi gelirse açmadınız mı biraz daha evvel açsaydınız diyoruz veyahut da mutfak da bazen soğuk oluyor. Tahmin ediyorum burası tam daha oturmuş değil. Bundan 2-3 sene sonra 5 sene sonra kendiliğinden oturur. Benim buraya müracaatım 11. kişiyim ben 2007 nin ortalarında açılmış 40-41 kişi kadar bir şey bugün daha buraya yerleşen. Hepsi de gelmiş de değil. Almış yatırım yapmış 65 yaşından sonra gelinebiliyor. Çok kişilerin burada yeri var ama gelip oturmamış şöyle bakıyorum bazen 10 kişi oluyor bazen 15 kişi. Yazlığınız varsa kalkıp gidebiliyorsunuz. Bu yüzden tahkik de olmadığından tam verimli buraya bir şey veremez. 170 tane odası var. Şimdi 170 odanın dolması ile 40 odanın satılıp 20 kişinin gelmesi de bir şey. Yani bu imkanlar gene de iyi veriliyor. Ticaret gayesi yok. Çocuklar okuyor çünkü.

R: Yani bina işletim masrafları da düşünülmeli diyorsunuz.

I06: Evet. Onun için nerede elektriği var söndürürüm. Bu elektrikte 70000 kişinin parası var.ne kadar elektrik ne kadar su yakarsan millet için de kendin için de zarar ama bunu bilen yok. Kapılara yazı yazmışlar kapıları kapatın diye çalışan müstahdemi bunu yapmıyor. Ben de kalkıyorum nerede açık kapı var kapatıyorum. Daha aşağılar tam faaliyette değil. Aşağıda bir sürü yerler var.

(cont. on next page)

Table D.7. (cont.) .

R: Odanızda ya da genel mekanlarda üşüme, terleme, havasızlık hissi, baş ağrısı,
susuzluk, dikkat dağınıklığı, gözde kamaşma gibi fiziksel rahatsızlıklar hissettiğiniz oluyor mu? (Oluyorsa ne sıklıkla?)

I06: Hayır, hayır . buralarda hiçbir sorunum olmadı Allah var. Dedim ya işte bir anda yemek salonuna girdiğiniz zaman soğukmuş gibi geliyor ama. Yemek salonunu gördün mü çok büyük onu hiç olmazsa biz gelmeden bir saat evvel yaksalardı diyoruz. Bazen de aman Allah amma da yakmışlar diyoruz. Yani bu kişiden kişiye değişiyor. Kimi üşür kimi üşümez. Sıcak olduğu günler kimi terler kimi kat kat üstüne giyer.

R: Peki, çay salonunda hava akımından bir rahatsızlık oluyor mu çift taraflı açılınca?

I06: Sigara içen arkadaşlar var orada. Onlar açtıkları zaman bir de karşılıklı açarlarsa hava akımı oluyor.

R: Yemekhanede de oluyor mu ? Buna benzer hava akımı?

I06: Hayır, hayır olmuyor. Açılmadığı için olmuyor. Ama yazın açılacak bilmem ne olacak.

R: Genel mekanlarda siz de üşüme terleme v.s

I06: Yok olmadı.

R: Nefesle ilgili… ?

I06: Nefes problemim var.

R: Nemden oluyor demiştik. Bir de üflemeden. Ne sıklıkla? – Kış aylarında?

I06: Kış aylarında, evet.

R: Teşekkür ederim.

I06: Rica ederim yavrum.

Table D.8. Interview Data of Interviewee- 7 (I07)

I07

R: Odanızın yönü nedir biliyor musun?

I07: Burası öğlen güneşini de alıyor akşam güneşini de alıyor.

R: Odanızı seçerken yönlenmeyi dikkate almış mıydınız?

I07: Ben dikkat ettim çünkü babam küçüklükten beri güneş görmeyen ev tutmazdı ve bize bunu aşıladı. Buraya geldiğimizde de birkaç tane yer gösterdiler. Buraya geldim bir açtım baktım güneş de vuruyor aydınlık da iyi.

R: Ne zamandan beri buradasınız?

I07: Mayıs ayından beri.

R: Yazı burada mı geçirdiniz?

I07: burada geçirdim. Yeni Foça da yazlığım var. Oraya da gittim.

R: Yön açısından soruyorum. Çok sıcak olduğu zamanlar oldu mu yazın.

I07: Ben öyle çok ciddi şikayetçi olacak durumla karşılaşmadım.

R: Yaz ya da kış?

I07: Evet.

R: Gündüz güneş ışığından yararlanmak istiyor musunuz? Ya da rahatsız edici etkisini hissediyor musunuz?

I07: Benim sese karşı duyarlılığım çok olduğu için bu da çok sesli çalışıyor. Bence herhalde bunlar bağış yolu ile geldiği için Amerika'da kullanılmayan bir teknolojiyi buraya zorlamışlar. Çünkü böyle çalışan bir ısıtıcı ya da soğutucu görmedim

R: Banyodaki havlupanın burayı ısıtmaya yettiği söyleniyor

I07: Ben şimdi orayla burayı ısıtıyorum. Bir de güneş görüyor ya oda onun avantajı var.

R: Güzel o zaman. Enerji tasarrufu yapılabiliyor burada?

I07: Ben içeride olmadığım zamanlarda Funcoili çalıştırıyorum. İçeride olunca söndürüyorum. O şekilde idare ediyorum. Bir de banyodaki havlupan ile idare ediyorum. Yani hem Funcoili kısa bir müddet çalıştırıp kapatıyorum. Hem banyodaki havlupanı açarak idare ediyorum.

(cont. on next page)

Table D.8 (cont.) .

R: (Akıllı bina ile ilgili tanım okundu). Tanıma göre sizce bu bina akıllı bina tanımına uygun bir bina mıdır?

I07: Bence ısıtmada yanlış yapılmış. Su ısıtması için gaz yakılıyor. İzmir günlük güneşlik bir yer bedava oluyor, bence güneş enerjisi ile ısıtmak varken o şey bence çok pahalı. Buradaki her şey pahalı yapılmış ve teknoloji çok eski bir teknoloji. Avizeler bile 40 yıl evvel ki teknoloji ışık bile vermiyor.

R: Yani bu bina akıllı bina olarak olması gerektiği gibi ekonomik değil diyorsunuz. Peki ekonomik olma dışında konfor sağlamada sizce yeterli mi?

I07: Nasıl zevkin sonu yoksa konforun da yoktur. Konforu ne ile ölçeceğiz onun bir kıstası varsa sen ver bize, ben de sana diyeyim ki…

R: (Isıl konforun kişisel olması anlatıldı.) İnsanın bulunduğu ısıl ortamdan hissettiği rahatlık olarak tanımlanır. Isıl konforu etkileyen 5 faktör vardır.

Bireysel Faktörler :Aktivite düzeyi (metabolik enerji üretimi), Giyilen giysi :(ısı ve hava transferi geçirgenlik dirençleridir.)

Çevresel Faktörler;hava hızı, hava sıcaklığı, nem oranı

I07: Bazı insanlar var devamlı üşüyor ben mesela sıcağı sevmem ben kendi evimde de soğuk oda da uyudum hep. Buna alıştırmışım kendimi. Sıcağı sevmeyen bir yapım var. Neden? Kanım iyi. Standart 22C demek de şey değil. Sonra burası bir huzurevi her ne kadar 5 yıldızlı otel gibi dense de 96 yaşında olanlarda var burada. En genç biziz işte 65-66. Bizim üşümemizle turan amcanın üşümesi arasında fark var. O şey giyip geliyor. Ben böyle t-shirtle gidiyorum yemek yemeğe anlatabiliyor muyum?

R: Evet, ben de o açıdan şimdi sizin kişisel durumunuzu soruyorum.

(Tanıma devam ederken)

I07: Bence bu funcoil denen şeye benim evdeki klima 100 basar neden daha sessiz çalışıyor. Ayarını yaptın mı kendini açıp kapıyor. Bu devamlı çalışıyor. Ayarı yok bir şeyi yok. Orada bir 2 3 yazıyor ama 3 de aç devamlı çalışıyor 2 i de aç devamlı çalışıyor. Oraya bir derece koymuş, gerçi ben hiçbir zaman o ısıya ulaşıp da kapanacak şekilde çalıştırmadım. Yani ben size bu şeyle ilgili çok net cevaplar veremem. Niye çünkü kullanmıyorum.

(cont. on next page)

Table D.8 (cont.) .

R: Genelde kullanılmıyor zaten . ya gerek duyulmuyor ya da gürültülü diye.

I07: Yani insanlar çok soğuk bir hava olursa… yazın kullandık ama gerçi ben bu balkonu açıyorum. Burada denizden gelen güzel bir rüzgar var imbat deniyor. O imbat serinletiyor. Yani ben yazın sıcak günlerinde de çok sıkıntı geçirmedim. Ne odamda ne odamdan dışarıda.

R: Peki şunu anlıyorum. Çalıştırmadım Funcoili çalıştırmaya da gerek duymadım. Bu durumda ortamdaki ısıl konforu nasıl tanımlarsınız.

R: (Isıl konfor tanımı yapıldı.) Tanıma göre siz bu binadaki ısıl konforu nasıl değerlendiriyorsunuz ?

A:Tamamen uygun. B:Tatmin edici. C:Kabul edilir. D:Konforsuz.

I07: bence konforsuz ve eh deyip yani kabul edilir. Hiç yoktan iyidir. 4 üzerinden 2 yani.

R: Peki Funcoili kullanmayı tercih etmiyorsunuz soğuk havada ısınmak için ne yaparsınız?

I07: Hiçbir şey yapmıyorum bunu çalıştırıyorum. Kapatıyorum hemen banyoya gireceğim duş alacağım diyelim, duş almadan evvel açıyorum bunu sonuna kadar yani 3 de çalıştırıyorum. Çünkü banyodayken 10 -15 dk ısıtıyor.

R: Siz burada iken çalıştığı sırada hızlı üflemeden dolayı sıcaktan çok soğuk hissettirdiğini düşünüyor musunuz?

I07: Yok ben tahmin ediyorum burada 3-4 gün soğuk oldu onda da 1 ile (fun hızı) çalıştırdım bunu. Onun sesi daha az onunla idare ettim ve üşümedim. Sonra buralar çok korunaklı duvarlarda cam yünü olduğundan R: Peki, fun hızı 1 de iken sıcaklık kaçta idi?

I07: Bilmiyorum ki onu ben ayarlamadım bakayım istiyorsan 24ºC ye ayarlı.

R: Sıcaklık 24ºC hava hızı da minimum.

I07: Isıl konfor koşullarından memnun olmadığınız zaman ne gibi önlemler alıyorsunuz?

(cont. on next page)

Table D.8 (cont.).

R: Ne gibi eylemlerde bulunuyorsunuz? Termostat ayarının değiştirilmesi,Kıyafet değişikliği, Kapı pencere açma, Bina yetkilisi ile temasa geçme, Sıcak ya da soğuk içecek tüketimi.

I07: Yok canım hemencecik o şeyi açarım. Sese de biraz dayanırım.

R: Hareket etme- yürüyüş-spor. v.s ile metabolizma hızını arttırma.

I07: Ben 7:00 de her sabah yüzmeye gidiyorum. Giderken açıyorum 2 de çalıştırıyorum. 20 dk çalışmış oluyor. Geldiğimde kapatıyorum yani ben sana söyleyeyim benim bu şeyi çalıştırdığım yarım saat bir saati geçmez. Bir de çok soğuk havalarda belki, en küçük hızda çalıştırdım öyle de uyudum o zaman.

R: Gündüz güneş ışığından yararlanmak istiyor musunuz? Ya da rahatsız edici etkisini hissediyor musunuz?

I07: Güneş biraz alıyorum kitap okurken örtüyorum.Açık renk gözlü olduğum için.

R: Işıktan dolayı diyorsunuz, Peki, sıcaktan rahatsız olduğunuz oluyor mu?

I07: Bazı arkadaşlarda oluyor ama bana öyle olmuyor

R: Genelde güneşten istifade ediyorsunuz o zaman?

I07: Kapıyı da açıyorum havalandırıyorum.

R: Odanızda ne kadar zaman geçiriyorsunuz?

I07: değişiyor resim kursuna gidiyorum çarşamba perşembe sabah 9:00 da çıkıyorum 15.30 -16.00 da dönüyorum. Ama diğer günlerde de çok fazla kalmam ben saat 11 de gazete okuyup da gelirim buraya 11 12 arası odamda vakit geçiririm 12 de yemeğe giderim. Yemekten sonra bazen 1 saat uyurum bazen tavla oynarız. Benim günde odamda geçirdiğim saat üç saati geçmez sıkılıyorum.

R: Ne tür eylemler sırasında Isıl konfor açısından rahatsızlığın oluştuğu söylenebilir. Oluştuğu zaman fun coili kullanıyor musunuz?

I07: Yatmıyorsam burada oturuyorsam birazcık açarım. Yatarken yorgan çekiyorum zaten. Veyahut da banyodaki ısıtıcıyı açık bırakırım o buraya yetiyor zaten.

R: Fancoilin yarattığı hava akımından dolayı soğuk hissettirdiğini söylüyorlar sizce de öyle oluyor mu?

(cont. on next page)

Table D.8 (cont.).

I07: Yok bende öyle bir şey olmadı. Onlar biraz 5 . katlarda oluyormuş galiba ama ben de olmadı.

R: Odanız dışında hangi mekanları sıklıkla kullanmaktasınız? Bu mekanlarda ısıl konfor açısından rahatsız edici bulduğunuz yerler nereleridir? Rahatsızlığı açıklayabilir misiniz?

I07: Ortak alanda vakit geçiriyorum ben. Bir sefer ben her gün 1 -1.30 saat gazete okurum. Çay salonunda veyahut da o lobinin arka tarafında eskiden biz hepimiz lobide otururduk şimdi çay salonunda hem okuma salonu oldu hem de çay salonu.

R: Lobi de ısıl konfor açısından rahatsızlığınız oluyor muydu? Dış kapıya yakın olmasından kapı açılmasından etkileniyor muydu?

I07: Şimdi orada bir şey var. Çay salonunu havalandırsınlar diye kapıyı açarlarsa. Lobide oturan adama o kapı açılınca boru gibi soğuk geliyor. Bugün karşılaştığım bir şey üzerimde ceket olmasına rağmen üşüdüm ve söyledim oğlum kapatın şunu dedim kapıları dedim. Sabahları serin oluyor hava

R: Yani lobiye kadar hava akımı geliyor?

I07: Burada kapı kapatma diye bir şey yok çalışanlarda aynı çalışanlara bu eğitim verilmemiş herkes açıyor.

R: Yani dolaşım alanlarında bir hava akımı oluşuyor. Oraların sıcaklığı daha mı düşük oluyor? Fark ediliyor mu yürürken?

I07: Burası lüx ısıtılan bir yer değil. Lüx ısıtılan bir yerde koridora çıktığın zaman da bu bizim zemin altında gezsen de her yer aynıdır. 9 . kata da çıksam aynı olur. Bazı katlarda şeyler bile çalışmıyor. Ne diyorsunuz adına…. Onlar bile çalışmıyor… Burayı yapan adam herhalde iflas mı etmiş ne olmuş kaçıp gitmiş. Yani burası akıllı sistemdi yok bilmem ne diye kimse kimseyi avutmasın.

R: Odanızda ve ortak alanlardaki ısıl konfor koşulları arasında ne gibi farklılıklar hissediyorsunuz?

(cont. on next page)

Table D.8 (cont.).

I07: Benim gezdiğim yerlerde yok. Ben çok sıcak aramadığım için.ama burada bazı bayanlar var yemekhaneye iniyor nerdeyse Uludağ'a gelmiş gibi palto üstüne palto giyip de geliyor. Benim için öyle bir şey yok yani şahsi değerlendirme yapıyorsanız. Ben bir şey olduğunda ceketle bir şeyle geçiştiriyorum. 40 yılda bir olur. Çok erken inersem ısıtıcılar çalışmamış oluyor ya o saatte. Yoksa zaten ben saat 9:00 da iniyorum kahvaltıya sıcacık da oluyor.

R: Sizi rahatsız edecek düzeyde olmasa da sıcaklık farkı olduğunu hissediyor musunuz?

I07: Vardır, tabi. Burada her yerde var o . Yoktur diyen yalan söyler.

R: Ben rahatsız olmuyorum ama sıcaklık farkı var diyorsunuz?

I07: Şöyle söyleyeyim. Buradan çık doktor odasına git. Geçerken 3 tane ayrı sıcaklık şeyinden geçersin. Onun için de burada ısıtma konforu yok soğutma konforu da yok.

R: Bünyesi hassas olanlar etkileniyor. Çay salonunda hava akımı var ama beni rahatsız etmiyor diyorsunuz. Restoranda nasıl hava akımı oluyor mu?

I07: Arkadaşlar var diyor. Ben dipte oturuyorum. Biraz benim oturduğum yer soğuk oluyor. Ben onu istiyorum zaten. Dipte olduğum için hava akımı varsa da etkilenmiyorum. Sonra ben çok şeyci bir adam değilim. Kusur bulmak için … Kendim ona bir çare buluyorum. Ya bir yelek giyerim ya bir şeyler yaparım yani.

R: Odanızda ya da genel mekanlarda üşüme, terleme, havasızlık hissi, baş ağrısı, susuzluk, dikkat dağınıklığı, gözde kamaşma gibi fiziksel rahatsızlıklar hissettiğiniz oluyor mu?

I07: Valla yok. Ben zaten bir yüzmeye gidiyorum. Sabah 7:00 de akşam 5 :00

R: Genel olarak bina ile ilgili yorumunuz? Akıllı bina olarak

I07: Yani 4- 4lük akıllı bina değil ama çok da böyle ağlanacak bir bina da değil.

R: Türkiye'de ortalamanın üstünde bir bina olduğu kesin ama akıllılık tanımına uymuyor diyorsunuz sanırım.

I07: Evet, akıllı bir bina olduğunu söyleyemem.