Emotional Dimensions Regarding Job Satisfaction: The Case of Dashboard Design for City Buses

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Abstract

In studies regarding bus drivers' workstation design, physical and cognitive ergonomics related issues of driving are handled widely. However in order to maintain well-being of bus drivers, emotional issues should also be taken into account.

The aim of this paper is to present the emotional dimensions of job satisfaction for urban bus drivers in Turkey, in order to provide design considerations for the public bus dashboard. The paper outlines the findings regarding emotional dimensions and hedonic needs from the product development project of an urban bus dashboard involving several research studies, the aim of which were not specifically to obtain users' emotional needs. However, as these needs cannot be considered separately from the needs that can be defined as tangible or functional, the outcomes of the prior studies provide important information regarding this issue.

Conference theme: Design & Emotion: Methodological Issues
Keywords: Emotional dimensions of job satisfaction, hedonic needs of city bus drivers, bus drivers' well-being

Introduction

In order to increase well-being of city bus drivers it is important to provide pleasurable driving and work experiences, which eliminate negative emotions and enhance positive ones. In automotive ergonomics literature, physical and cognitive ergonomics related issues of bus driving are studied extensively (You *et al.*, 1997; Göbel *et al.*, 1998), on the other hand there is a knowledge gap regarding the design aspects which cause elicitation of positive and negative emotions to maintain wellbeing of bus drivers. In this paper, the aim is to investigate emotional dimensions of job satisfaction for the city bus drivers in Turkey, in order to provide knowledge input for the design process to meet the hedonic needs of the user group.

In the following sections, first, the factors affecting job satisfaction are examined and the relation between these factors and emotional consequences is investigated by referring the relevant literature; after that methods and techniques that are applied during the studies are briefly introduced; then results of the study is delivered by pointing out the major issues regarding emotional dimensions of job satisfaction; finally conclusions and discussion about the study are presented.

Factors affecting job satisfaction

There are four major categories which are commonly referred as factors that affect workplace and job satisfaction. These categories are *interaction with the physical environment* (Fischer and *et al.*, 2004; Clemens-Crome, 2000; Matthews, 2002; Gifford, 1997; Tse *et al.*, 2006), *organizational factors* (Fischer and *et al.*, 2004; Clemens-Crome, 2000; Gifford, 1997; Tse *et al.*, 2006), *interaction with the social environment* (Clemens-Crome, 2000), and *personality of the individual* (Fischer and *et al.*, 2004; Gifford, 1997).

Although satisfaction with *the physical environment* does not guarantee an increase in performance, it improves well-being of the employees and constitutes a significant dimension of job satisfaction (Bell *et al.*, 1990; McCoy, 2002). Ambient factors related to physical environment, such as noise, indoor climate, air quality, lighting level, motion, and human density are regarded as major components of environmental features, and deterioration of which can trigger negative emotions, such as stress and anxiety (Wickens *et al.*, 2004), that have worsening effects on job satisfaction level (Gifford, 1997). Furthermore, human factors' and

product usability's effect on employee well-being is another issue, which is a common concern for maintaining job satisfaction (Bell *et al.*, 1990; Wickens *et al.*, 2004).

Organizational factors regarding job design such as time pressure during service hours, strict shift patterns, limited resting brakes, social isolation from coworkers, and restricted authority in decision making have important implications on bus drivers' well-being as well as these factors characterize critical stressors for them (Tse *et al.*, 2006). Moreover, restrictions regarding personalization of the workspace may result in failure in job satisfaction, while allowing personalization contributes to the organizational climate and well-being of the employees (Wells, 2000).

Drivers' interaction with the passengers in their work environment, which constitutes their *social environment*, is another critical issue that affects job satisfaction level, and leads to experiencing certain negative and positive emotions. According to the results of the study, which is carried out by Göbel *et al.* (1998), from the hearth rate frequency measurements obtained from city bus drivers, higher hearth rate frequencies, which are an indication of experiencing stress, are observed during interactions with the passengers, especially when an invalid ticket is detected.

Personality of the driver is also a critical mediator, which affect job satisfaction level and how s/he perceives situations and events to create emotional reactions (Tse *et al.*, 2006; Matthews, 2002). Perceptions of a same event differ people to people, as well as their goals and desired conditions. Some individuals perceive a work condition as unsuitable to their ideals, while for others those negative aspects do not have much importance. This tendency to contrast the actual condition to the ideal one is called private self consciousness (PSC). As it is stated by Gifford (1997), PSC degree of an individual is an important factor, which affects his/her satisfaction level from the job. A specific measuring scale is not used, nevertheless during the observations it was noticed that city bus drivers in Turkey have low PSC levels. Although it is apparent that they have major problems with their work environments, they regard them as acceptable or unavoidable conditions.

Apart from the factors affecting job satisfaction, emotional reactions to these factors are of importance for this study. In order to examine how these emotional reactions occur, Hassenzahl's model (2001) for evaluating product appealingness can be considered. In this model, he argues that product qualities are grouped into two main categories; ergonomic quality and hedonic quality, where *ergonomic quality* refers to task related functions or design issues

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that are effectual in accomplishing the task with effectiveness and efficiency, while *hedonic quality* comprises attributes that are not directly in relation with the task related goals, and it includes quality dimensions that are addressing such needs as novelty, change, or social power. Through perception and cognitive appraisal of these qualities behavioral consequences, such as buying a product or using it more frequently, and emotional consequences, such as satisfaction or pleasure, occur. Matthews (2002) also proposes a framework for driver stress, which is similar to Hassenzahl's (2001) model for evaluating product appealingness considering the inputs and the processes that result in elicitation of negative emotions, such as stress, anger, and worry. In this framework, environmental stress factors are coupled with driver's personality traits, and then they are cognitively appraised by the driver to result in performance effects (or behavioral outcomes), such as loss of attention and risk taking behavior, and subjective stress symptoms (or emotions), such as tension, insecurity, anger, or worry.

Method

In order to investigate emotional dimensions of job satisfaction for city bus drivers, data are obtained from several research studies, which are originally conducted with the purpose of providing user information input for the design process of an urban bus dashboard. In these studies, the central aim is investigating user problems and preferences to design a dashboard and workspace in a bus, which maintains user satisfaction and corresponds better to the needs and expectations of users.

The target group is composed of professional users, and it is commonly argued that such users differ from nonprofessional users in terms of expressing their needs and problems regarding the context of use and the product, because of the factors caused by their expertise, such as habituation and decreased cognitive processes caused by automaticity of the actions (Alba and Hutchinson, 1987). Therefore, while designing the research studies, the effect of user characteristics is considered. It is claimed that in order to investigate needs and problems of professional users, who have expertise in product use, both *direct* and *indirect methods* should be applied for eliciting the required knowledge (Burge, 1998). *Direct methods* refers to the methods, which elicit knowledge from the user in an undisguised manner, that is, the user is informed about concerning what s/he is questioned, while *indirect methods* are the ones in which the user is questioned in a disguised manner (Hudlicka, 1996; Malhotra, 2007). Thus data triangulation approach is adopted during this project with the application of both direct and indirect methods including naturalistic observations of bus drivers in their actual working context (two day long study performed in two different buses with four bus drivers); interviews

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about their problems, needs and preferences regarding the bus (with a total of 68 bus drivers participated in different studies and locations); and a participatory design activity (conducted with 20 bus drivers in a laboratory setting).

In these studies, the aim was not specifically to obtain users' emotional needs. However, since these needs cannot be considered separately from the needs that can be defined as tangible or functional, the outcomes of the prior studies are analyzed considering work and task related emotions, and they constitute the source of the current study. While conducting analysis, expressions that refer to emotions regarding the work and tasks are detected and categorized according to quality aspects. Observational data are used for visually illustrating the arguments of the drivers.

In order to detect work and task related emotions, researchers extracted expressions which contain keywords such as *worry, anxiety, liking, stress, unease, joy, calmness, inner comfort, pleasure, demoralization, annoyance, embarrassment,* and *confidence*. These expressions are grouped under six main categories, which are given in Table 1.

Emotional outcome	*Description*	*Detected keywords*
Anxiety	Worry about physical situations that imply potential hazards threatening the passengers, driver himself or the vehicle. Worry about physical situations that increase the possibility of accidents. Referring to the unfavorable experiences of the other drivers.	Worry Anxiety
Stress	Feeling stressed, uneasy, tensed up about physical situations and events which usually are not under control of the driver.	Stress Unease
Psychological Comfort	Feeling inner calm and comfort, deriving from the absence of anxiety and worry.	Calmness Inner comfort
Appreciation	Expressing liking and desire towards a physical object or feature, usually by comparing with other features or brands.	Liking Confidence
Unpleasantness	Undesirable, unpleasant feelings deriving from uncontrollable and restricting physical situations.	Demoralization Annoyance Embarrassment
Pleasure	Feeling of well-being, satisfaction and contentment usually deriving from pleasant and luxurious appearance of the features and physical environment of the vehicle. Feeling of enjoyment in performing the requirements of the job.	Joy Pleasure

Table 1

After the attributes are grouped considering the corresponding emotional outcome, they are labeled as having ergonomic or hedonic quality with regard to Hassenzahl's (2001) model and those with hedonic attributes are taken into consideration in detail.

Results

In this study, statements and observations regarding work related emotions for the city bus drivers mainly focused on ergonomic quality aspects of the workspace, which lead to arousals of negative or positive emotions. On the other hand, from the data, hedonic quality aspects are detected regarding personal space, physical appeal of the dashboard design, and interaction with the passengers. These results are listed in Table 2 with number of drivers, who stated the issues.

	Attribute	Emotional outcome	Ergonomic/ hedonic quality	# of drivers
Interaction with the physical environment	***Accessibility of the dashboard***			
	Ease of reach to the dashboard	appreciation	ergonomic	14
	Visibility of the dashboard and exterior vision			
	Being unable to see in the dark	anxiety	ergonomic	4
	Being unable to see because of glare	anxiety	ergonomic	7
	Displays not being obscured by the steering wheel	psychological comfort	ergonomic	5
	Ease of visibility of the dashboard	appreciation	ergonomic	2
	Inferior exterior vision	anxiety	ergonomic	13
	Feedback regarding the interaction with the dashboard and situational awareness in the bus			
	Inability to anticipate how long the fuel will last	anxiety	ergonomic	6
	Failing to notice if the tires are blown out	anxiety	ergonomic	2
	Failing to comprehend the status of certain controls, such as breaking systems, heating systems, etc.	anxiety	ergonomic	5
	Failing to notice the deficiencies regarding the engine temperature, air pressure and oil pressure which causes serious damage to the bus	anxiety	ergonomic	13
	Inability to observe the passengers in the bus	anxiety	ergonomic	6
	Situational awareness about the technical properties of the bus	psychological comfort	ergonomic	11
	Risk of getting the passengers stuck in the doors or cause them to fall	anxiety	ergonomic	17
	Presence of unnecessary warning signals	stress	ergonomic	12
	Failing to notice the request of passengers to stop at the bus stop	anxiety	ergonomic	8
	Clarity of the dashboard			
	Risk of confusing the controls	anxiety	ergonomic	9
	Risk of not comprehending the warning signals properly	anxiety	ergonomic	12
	Possibility of activating critical controls as breaking systems unintentionally	anxiety	ergonomic	7
	Visual and structural attributes of the dashboard elements, dashboard and the cabin			
	Low durability and accordingly frequent breakdown of displays and controls	anxiety	ergonomic	13
	Physically appealing displays, controls, dashboard and cabin in general	pleasure	hedonic	20
	Cabin's being rigidly separated from the rest of the bus	appreciation	hedonic	9
	Inadequate space for personal belongings	unpleasantness	hedonic	14
	Driver seat being positioned far from the front window	psychological comfort	ergonomic	2
	Additional / rich /deluxe attributes that are present in the dashboard			
	Being able to listen to music while driving	pleasure	hedonic	12
	Being able to keep cold water in the cabin	pleasure	hedonic	8
	Glass/cup holder	pleasure	hedonic	2
	Driver seat with a particular heating system	pleasure	hedonic	6
Organizational factors	***Time schedules***			
	Being obliged to work with strict time scheduling	stress	ergonomic	11
	Shared use			
	Having shared the workspace	unpleasantness	hedonic	8
	Ticket system			
	Inadequacies in ticket system	stress	ergonomic	8
Interaction with the passengers	***Control on the interaction with passengers***			
	Unpleasant interaction with the passengers	stress	hedonic	11
	Lack of perceiving the cabin as a personal space	unpleasantness	hedonic	8
	Control on the behaviors of passengers			
	Inability to control the circulation of passengers in the bus	stress	ergonomic	11
	Intervention of passengers to the cabin and the driver	stress	hedonic	10
	Difficulty of controlling the passengers stamping the tickets	stress	ergonomic	7

Table 2

Figure 1 summarizes main quality aspects and emotional outcomes which are caused by appraisals of these qualities.
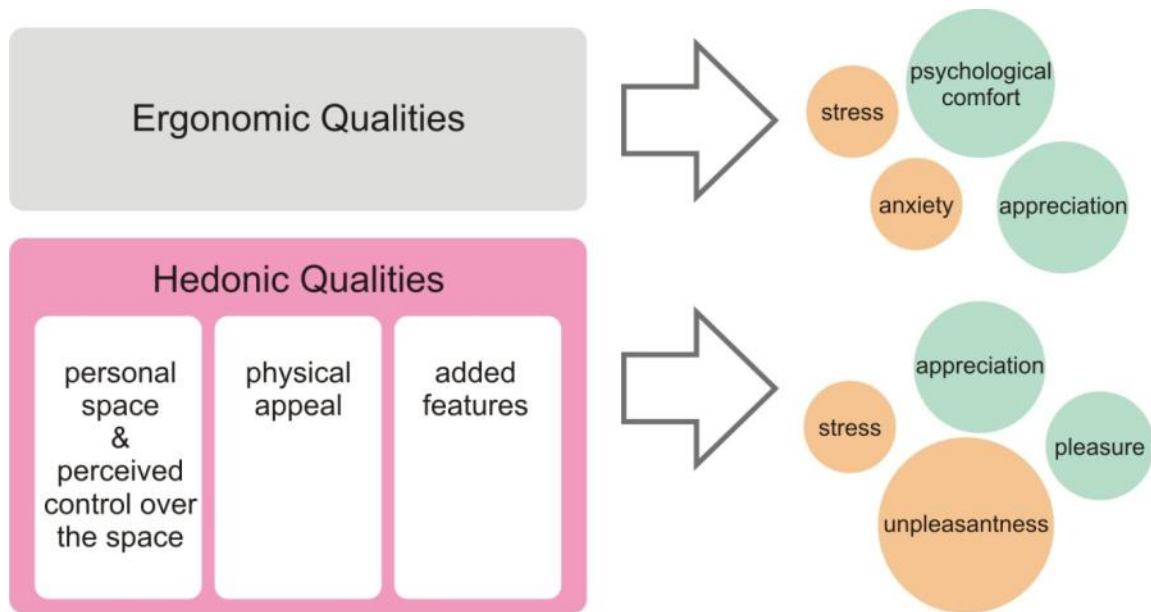

Figure 1

The hedonic qualities regarding the cabin as a physical environment are mainly about the perception of the cabin as a territory and a pleasant work environment. The cabin, as the workspace of the bus driver, can be approached as a stationary office in terms of control and personalization needs.

As it is referred by Miller and Schlitt (1985), White (1959) states that a feeling of satisfaction is derived from being able to effect and manipulate the environment. It will be difficult to make arrangements in order to meet the needs, if the user has no control over the environment (Miller and Schlitt, 1985). Territoriality is a major concept regarding this issue.

It is suggested by some researchers that territories carry great importance in the work environments. Seeing the workspace as a territory helps establishing more personal attachment to it, more perceived control over it and more sense of responsibility for it. Bell *et al.* (1990) state that the possibility of treating the workspace as a territory and personalizing it, leads to job satisfaction and accordingly to higher work performance. Similarly, the results of the study of Lee and Brand (2005) revealed a positive relationship between personal control over the physical workspace and job satisfaction.

Personalization is considered to be a kind of territorial behavior (Altman, 1975) and is the modification of an environment by its occupants to reflect their identities (Sundstrom, 1986). As referred by Wells (2000), the study of Edney and Buda (1976) reveals that personalization of a space may lead to feelings of personal control which increases satisfaction, reduces stress and enhances work performance, well-being and mental health.

It is relatively easy to provide a physically defined, permanent territory in static work environments, on which only the owner of that space has the right to dominate. However, in case of a public bus driver's cabin as dynamic work environment, the situation is more complicated. Because of the facts deriving from the organizational issues and physical restraints, the cabin is observed to reveal difficulties to provide satisfaction in this context. These issues are going to be handled in the following sections.

Personal space and perceived control over the space

Lack of perceiving the cabin as a personal space

It is not common that participants define the cabin as the private area of the driver where no passenger may intrude for sure, whereas the comments of considerable number of them reveal lack of perceiving the cabin as the personal space. The reason for this fact is crowdedness and inability of the driver to control the passengers in order to keep them away from the cabin. There is also an implication that the drivers judge passengers having no respect to the driver and his territoriality.

Location preferences for private belongings and certain controls, unintentional activation of which may cause safety problems, are therefore at left hand side of the driver, since this part is seen as out of reach of the passengers. Figure 2 illustrates the need for space for personal belongings and left side usage is preferred for security reasons.
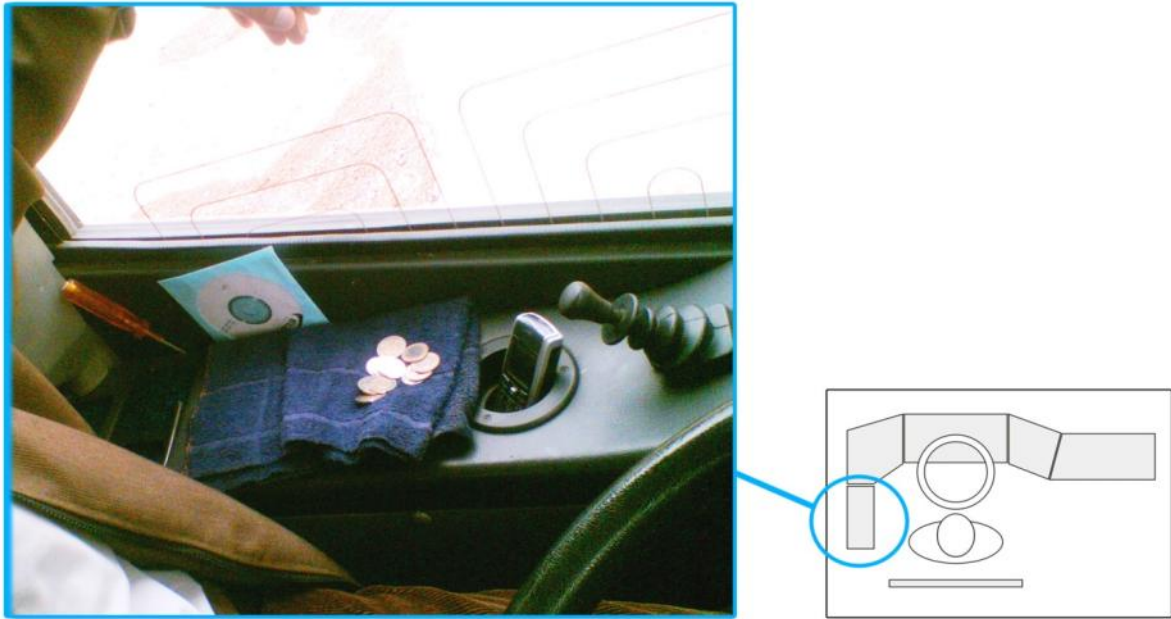
Figure 2

<u>*Appreciation of a cabin that is rigidly separated from the rest of the bus*</u>

Cabin's being totally set apart from the passenger room with a rigid separator is appreciated by the majority of the drivers. This outcome points out the necessity for a defined territory and privacy. Some of the participants have made it clear that they would like to be totally isolated from the passengers, however some others have stressed the impossibility of realization of such a system since there are occasions that the driver must interact with the passengers, such as giving information about the route and controlling them as they are getting their tickets stamped. Therefore at the right side of the cabin a compromise is to be made, between communicating the dominance of the driver on the cabin and allowing the necessary interaction with passengers.

<u>*Discomfort of being observed while driving and stress caused by being intervened by the passengers*</u>

It was mentioned that being observed by the passengers while driving caused the feeling of discomfort for the driver. In addition, it is stated that a similar stressful situation occurs when the passengers intervene to the driver regarding the manner and speed of the drive, etc. Besides being visually away from the passengers, there are some drivers who propose alternative solutions like television or video systems which drive the attention of passengers away from the driving activity.

<u>*Lack of personalization in the cabin*</u>

Personalization which is a main indicator of territoriality and which correlates positively with job satisfaction is quite limited in bus drivers' situation. Above all, the cabin's containing inadequate space for keeping belongings is one of the concerns for unpleasant evaluations. Some examples of the solutions introduced by the drivers to this issue are seen in Figure 3, Figure 4, Figure 5, and Figure 6.
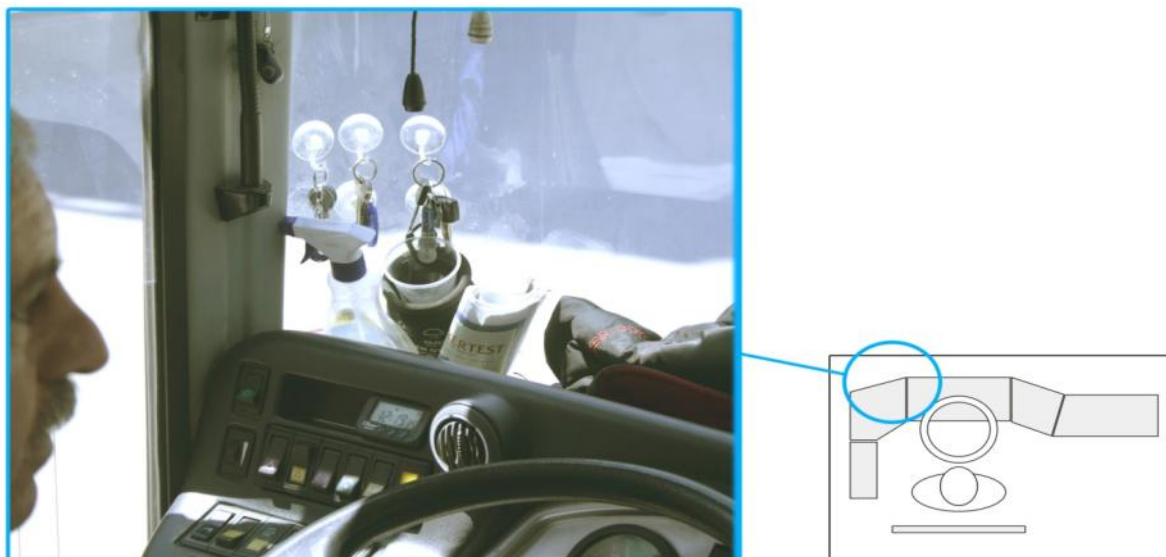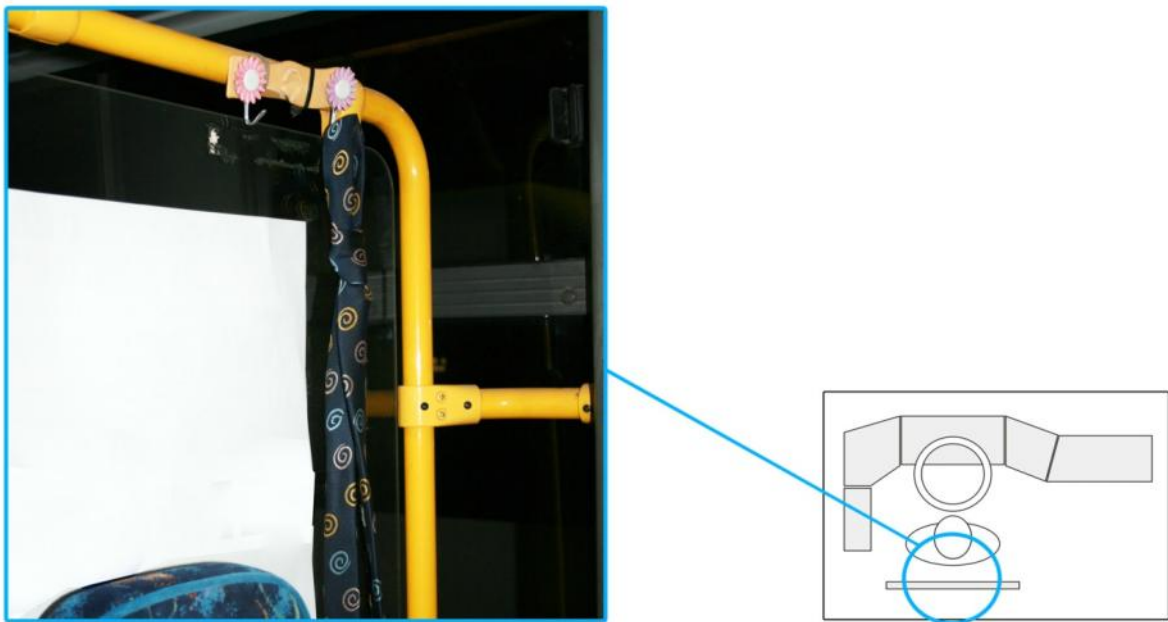

Figure 3

Figure 4

Figure 5

Figure 6

The extent that a bus driver can personalize a cabin relies heavily on organizational factors. Since each municipal city bus is driven by a number of drivers and a driver is not assigned to a fixed bus for a long period of time, these drivers are highly aware of the fact that their workspace is a shared one and accordingly they are substantially far from having a close, personal connection with their work environment. Accordingly they do not have the possibility and the motive to personalize the workspace. The situation is diverse with the private buses where the driver has a fixed workspace. These drivers tend to regard the busses that they drive

as their possessions and it is observed that they personalize their cabins to different extents. Some examples can be seen in Figure 7, Figure 8, and Figure 10.
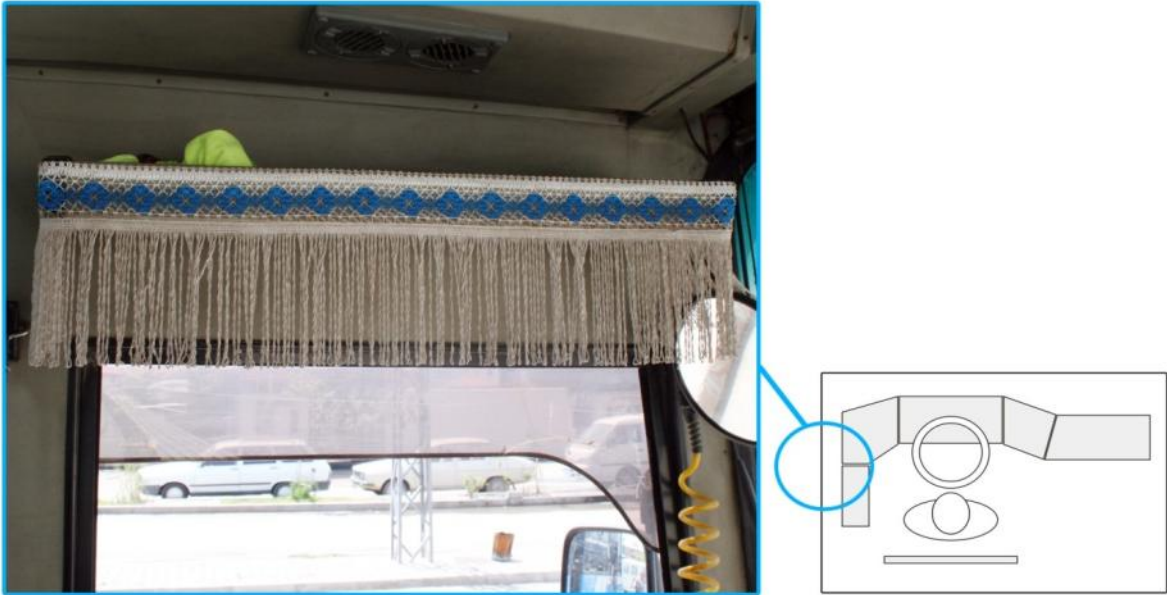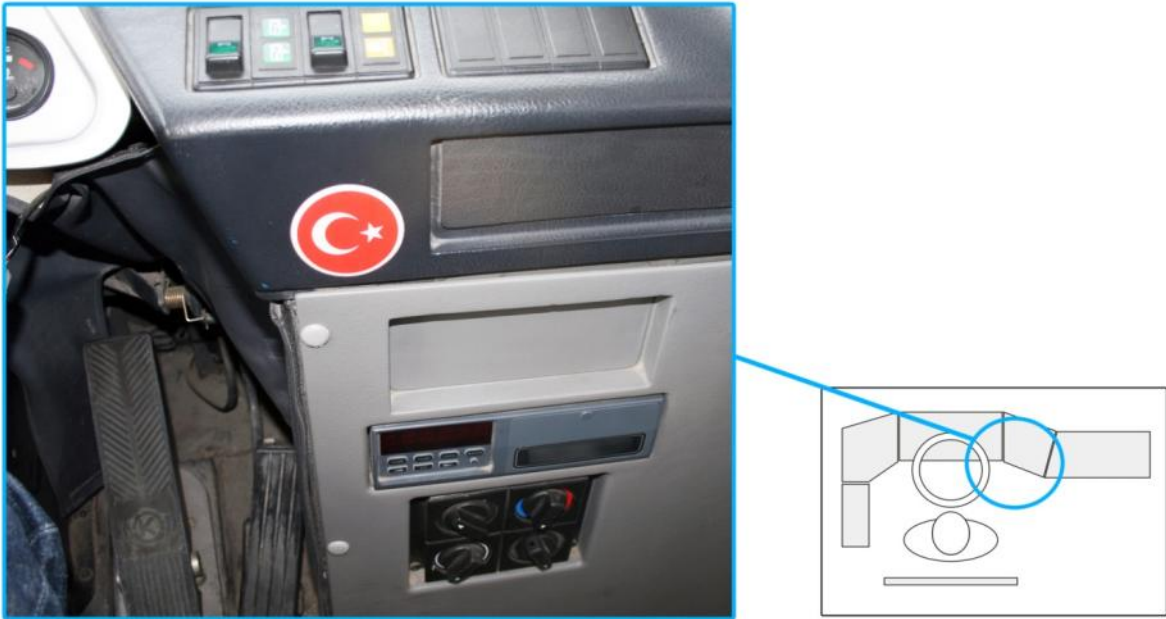

Figure 7
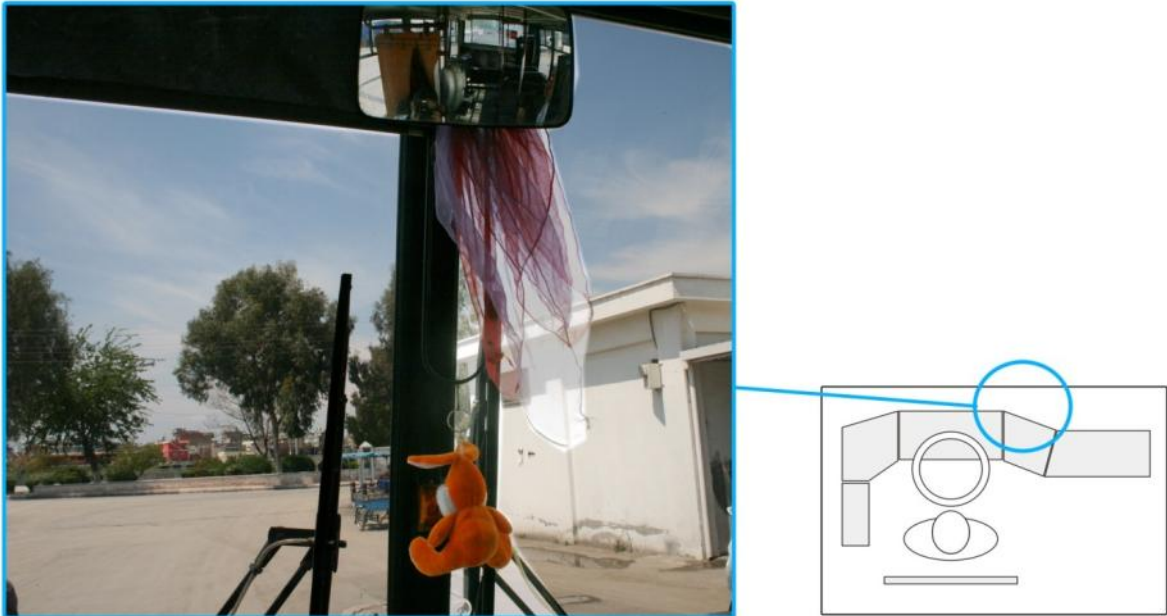
Figure 8

Figure 9

Personalization examples such as hanging blue bead against the evil eye (Figure 10); throwing on the floor or hanging up the first money that is earned that day since it is believed to make the rest of the day profitable (Figure 11 and Figure 12); short prayers to keep the bus away from accidents and other trouble (Figure 13) are highly cultural.
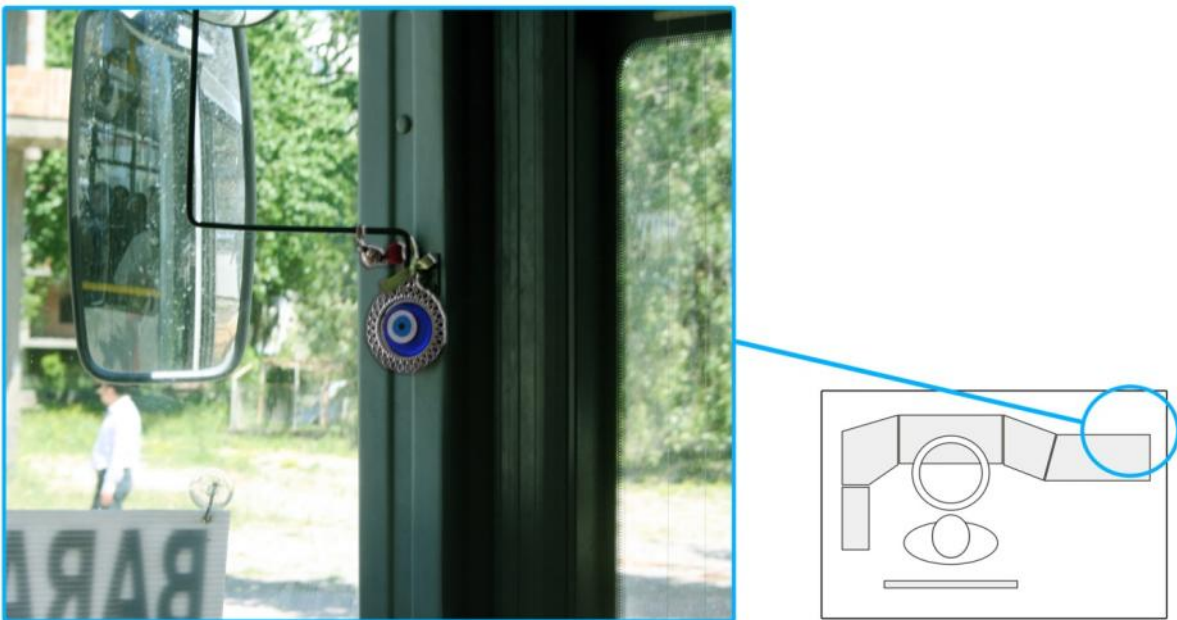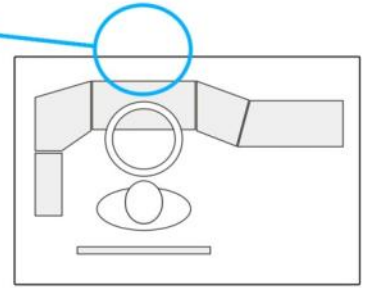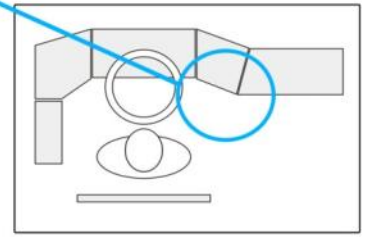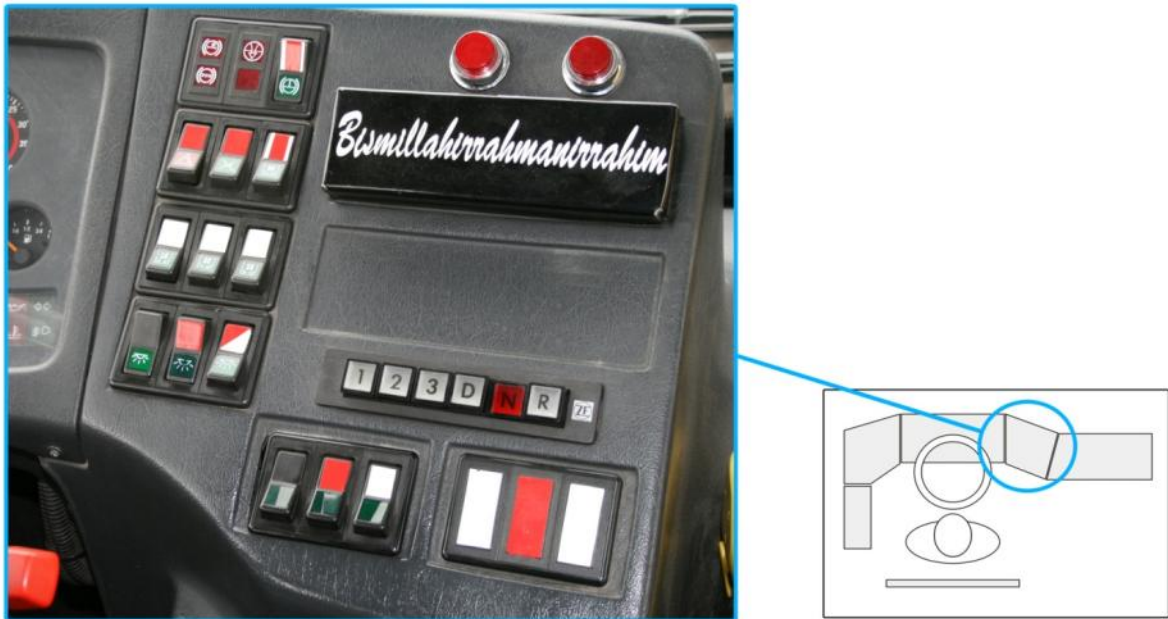

Figure 10

Figure 11

Figure 12

Figure 13

Pleasure of listening to music in the cabin

Although it is banned to listen to music while driving in public buses, it is the desire of the majority of the drivers. The demand for being able to listen to music in the cabin, which will not be heard from the rest of the bus, is also a sign of desire to have a personally controlled space.

Physical appeal of the cabin and its elements

Pleasantness of driving a bus with an aesthetic appeal

There are several participants, for whom aesthetic appeal of displays, controls and the dashboard in general was one of a main concern, in determining the general criteria for the design. Moreover, some of them consider about self confidence that the driver gains in front of the passengers, when driving a bus with an aesthetic, technological, and appealing control and display panel. It can be concluded that using such a panel, makes drivers consider themselves and their job more important, and this would contribute to job satisfaction.

Another conception that is put forward by a number of drivers regarding this issue is the pleasure of taking care of an aesthetically pleasing control and display panel. This issue points

out the contribution of the physical appearance of the dashboard to the feeling of possession and attachment accordingly.

Conclusion

Recently, automotive industry became more interested in satisfying hedonic needs of the users. This interest is more apparent in consumer automobiles, where the driver is the owner of the product, but is not very common for public vehicles. As a matter of fact, bus drivers' well-being is more sensitive to this issue, when it is compared to nonprofessional drivers; therefore their hedonic needs and factors affecting their emotions should be investigated in detail with further studies.

From the methodological perspective, it is hard to direct such a professional user group to talk about hedonic qualities or emotional needs regarding their job, since it was inferred that their expectations regarding these issues are limited because of personality traits or organizational factors. However, in these studies, even though the goal was different, some of the hedonic qualities and relevant needs, which can have important implications on the driver's well-being, were revealed.

Many of the findings of the research are specific to the bus driver population in Turkey, because of the cultural and contextual issues. Extreme crowdedness is an important factor, which effects job satisfaction of drivers. Although comfortable interpersonal distance is known as relatively tight in Turkey, drivers' discomfort from crowdedness is originated from their feeling of lack of control over their work space, which is an important contextual factor. In order to meet emotional needs of drivers regarding their job, it should be taken into account that they are working in a public space, where they are exposed to outside intruders, which are also a part of their jobs, and because of that, feeling of control over the work space is limited.

The following concerns and design suggestions can be proposed considering the findings of the study:

- It was observed that drivers perceive the space that is distant from passenger traffic as their personal space, and they feel more control over it. Therefore this space should be considered for the location of storage units and critical controls, unintentional activation of which can cause severe problems.

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- Isolation of the driver cabin from passengers cannot provide a complete solution for their need of private space, since controlling tickets and providing information about the route, which are also some of their duties, require interaction with passengers. Thus driver cabin should be designed in such a way that it should be enclosed enough to increase perceived control over the space while allowing interaction with passengers, when it is necessary. Transparent materials and small openings can be used to constitute an enclosed cabin space, where passenger's intrusion is avoided, while interaction is provided with the help of the material and openings.

- Drivers' need for personalizing the space and having control over this space is limited due to organizational factors and intervening passengers. In order to meet these needs, the cabin should be properly adjustable for different drivers. Since the cabin is a shared space for them, individual storage units, which can be detached from the cabin, can be provided for each driver, in order to provide quicker and practical way to personalize their work environments.

- Since it was observed that they regard a neatly designed cabin as a status symbol, physical appeal and added features are important qualities for drivers that can lead to positive feelings about their job and satisfaction from the workspace.

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