



Assessing The Indoor Environment Quality of Industrial Workspaces on Workers'satisfaction: Mixed Methods by Using POE In Iran

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ABSTRACT

Job satisfaction and improving employee performance due to direct relation with individual and environmental factors is one of the most important issues in optimizing the industrial environment. The physical environment of the built environment affects mental health directly and indirectly, meaning that the physical environment, such as the residence and workplace, is a place for human life and some of its psychological effects are unknown. The purpose of this research is to explain the main effect of architecture on job satisfaction in workplace of workers. In this research, a mix method of quantitative and qualitative were used in form of a questionnaire and interview and the corresponding data is further analyzed by SPSS software and using Axial and open coding. 20 specialists were selected for interview and 450 Iranian employees were chosen randomly based on morgan table respectively. Then the model was developed by using grounded theory and open, axial and selective coding. In the following, confirmatory factor analysis was used to examine the validity of the items by SPSS software. The results demonstrated that indices such as environmental and physical ergonomics, visual contrast of space, environmental psychology, spatial separation of space, attention to voice and color are influential. Psychological comfort is an inevitable aspect of user satisfaction studies. These findings help designers, architects, planners, and facility managers to develop workplace design principles. This research can provide a novel insight into architects' views of the primary design platform in office buildings which can fill the existing research gap.

Keywords: *Indoor Environment Quality, Job satisfaction, Industry workspace, POE*

1. Introduction

Achieving the goals of projects in industry requires the accurate cooperation among architecture, engineering and construction [1]. Although, the relation among architecture and other cooperates are well established, but the user need and perception are ignored [2]. The concepts of job satisfaction and productivity are among the

important and basic concepts in production that attention to them can increase quality and thus sales and profits [3]. Job satisfaction is one of the most challenging organizational concepts and the basis of many management policies and policies to improve the productivity and efficiency of the organization [4].

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Job satisfaction is an emotional response to work, the physical and social conditions of the workplace [5]. Satisfaction and dissatisfaction are generally assessed as a function of the observed relationship between what one wants from one's job and what one achieves; hence, job satisfaction is an attitude that indicates the degree of satisfaction or persuasion of the individual in his/her occupation [6]. One of the ways to create job satisfaction of workers is to provide a suitable work environment based on the worker's needs [7]. Nowadays, attention to users' perception of buildings is known as a critical initial stage of design [8,9].

Despite the fact that a lot of research has been done concerning job satisfaction, urban organizations have paid less attention to this issue; While one of the influential factors on the way of providing services to citizens is the level of satisfaction of employees in such organizations and can be said to be the satisfaction of customers within the organization (staff) and one of the customers Therefore, determining the status of individual and environmental factors affecting job satisfaction and increasing the productivity of employees in industrial environments can lead to better planning to improve the work environment [10]

Manpower working in industrial environments with their capabilities and capabilities, if well considered, can play an important and critical role in achieving the goals of the factory, which is the growth and development of services within the operational scope of the factory. In this way, the use of various techniques and methods to improve job satisfaction, including architectural criteria can be effective [11].

Indoor environment quality (IEQ) affects many aspects of workers' life such as their physical and mental health, satisfaction, productivity and their comfort directly and indirectly [12]

Working in buildings that are physically unfavorable affects the human psyche and eventually causes disorders in mood and social interactions. considering the workers' environmental preference according to their needs, makes it conceivable to expect their satisfaction and behavior in different situations [13]. Post-Occupancy Evaluation (POE) has been employed as an evaluation technique for assessing and improving IEQ [14] Shared standards for POE researches contain characteristics of working procedures including colleagues' convenience, communication, attentiveness, privacy, thermal

comfort, facility use and skill, overall fulfillment, and perceived efficiency [15]. Physically disturbing factors in the workplace cause harassment of workers. Considering the role of workers in the mobility, transformation and growth of factories and also the role of the dynamics of organizations in the progress and development of society, the need to study the effect of these factors on various individual and organizational aspects of workers becomes clear [16].

Regarding to researches, it was demonstrated that occupants' satisfaction in workplace buildings was associated to office IEQ. Nevertheless, conservative IEQ variables for instance building features, individual characteristics, and work-related variables affected workers' fulfillment [17]. Furthermore, mentioned parameters are not restricted to environmental characteristics and occupants' health and can be include community features with emphasis on personal experiences [18]. In this regard, POE method used for IEQ in all types of buildings in order to cover indoor environment, energy, and occupant's satisfaction [19]. While the above research investigated the impact of WELL strategies on occupants, the focus was primarily on occupant satisfaction with environmental factors and less attention was given to topics related to health and well-being of occupants. Lack of adequate Health in the workplace directly and indirectly leads to mental and physical disorder of workers in Iran country. Moreover, user satisfaction and productivity can be affected by workplace design which should be considered. The aim of this study is to define optimize model between employees and IEQ from architecture's parameters prespective point of view.

Therefore, which Indoor parameters should be considered as crucial variables in order to achieve workers' satisfaction?

1.1 Literature Review

Choi and Moon [20] examined the user satisfaction of working modern office based on IEQ and POE by investigating 411 employees of southern California. Results showed that the well-being of employees in their office was a finest design element. Moreover, considering the wellbeing, age and gender were found as two effective variables. Besides, Sant'anna et al. [18] conducted a comparative investigation of workers' satisfaction, green building, and IEQ. They categorized 12 buildings into 'green group'

and 'conventional group' and then, analyzed them. Furthermore, the investigated parameters concerned with costumers' perspectives included ventilation, glare, building noise, furniture design, cleaning, and air quality and those concerned with employees were space size, common areas dialogues, access to needed information, workspace wellbeing, and feeling of belonging to family (office family). The results indicate that generally, workers feel a sense of satisfaction in green buildings more than other buildings. Thermal comfort, illuminance, noise level, and ventilation measurement, which were other influencing factors for employees, were assessed and their influential role was confirmed.

Choobineh et al.[21] To study psychosocial risk factors and skeletal symptoms - Muscular among the employees of Iran Oil Refinery offices as well as the study of the subsequent effects of ergonomic intervention on musculoskeletal discomfort and psychosocial risk factors. They concluded that a high-quality environment, a sense of well-being and satisfaction for people through indicators which may be physical, social, or symbolic. Today, with the introduction of the industrial revolution, active intelligent factories need automatic, faster and more reliable tools to analyze and improve production. Manufacturing companies, in which manpower plays a key role, need tools that can manage complex production systems in terms of resource utilization. Bortolini et al.[22] Examined ergonomics and human body movements and their adaptation to advanced production systems.

Furthermore, Awada and Srour [23] investigated the occupants' satisfaction and building renovation based on indoor environmental quality in the office buildings. The IEQ variables were studied as part of the first layer of analysis; in the second layer, all possible retrofit options were optimized by Genetic Algorithm. The results indicated that distance of employees from windows affected their satisfaction and productivity. Moreover, the association of satisfaction with urban design and landscape was investigated.

The results demonstrated that (a) pleasantness, eventfulness, and the overall quality; (b) regularity; (c) spatial impression; and (d) naturalness were the foremost assessment features of landscapes [24]

In this respect, another research study investigated five offices in the Netherlands in terms of user satisfaction and environmental comfort, particularly personal control. Data collection,

which was conducted through questionnaires, included IEQ parameters. The findings revealed that the effect of personal control on satisfaction was insignificant. Moreover, user satisfaction with environmental concerns could be improved by providing more freedom of space [25].

Alimohammadi et al [26] investigated the relation to workers' productivity and Continuous sound in Pharmaceutical industries and ampoule production in Iran. The results demonstrated that workers were involved with high sound rate which have been affected workers' satisfaction badly. Besides, The proper design of the workspaces and the correct use of the available spaces in different parts of the workspace and checking the material flow process will increase productivity and job satisfaction [3]. Furthermore, Alami and Hosseininejad studied the impact of ergonomics in the work environment with the productivity of manpower. The current research is the result of the effect of the relationship between ergonomics in the work environment and the productivity of human resources. The statistical population studied in this research was all the personnel of Gonabad University of Medical Sciences, which according to the statistics, there were 990 people, of which 180 people were selected as the research sample. The extracted data has been analyzed using ergonomic questionnaire and productivity questionnaire and with the help of spss software. The output indicated that regarding environmental factors, physical factors and protective issues are at the optimal level and a significant difference is observed at the level of 0.30 and only mental and psychological issues were reported at a lower level. But with the analysis of individual variables, it was found that the environmental factors, ventilation, increasing crowding and noise, and the physical factors of the arrangement of instruments were unfavorable. Also, according to the variance analysis, it was observed that the environmental conditions of the workplace, the physical conditions of the workplace, the amount and appropriateness of protective and security devices in the workplace, and mental and psychological issues have the highest beta and are capable of many changes and fluctuations in productivity. predict the human power and have the greatest impact on the productivity of the human power respectively. Table 1 demonstrates considered variables.

Table 1: considered variables based on literature review

Categories	variables
Subcategory of the general category (paradigm)	Geometric order of the workshop Suitable space design Shed engineering design facilities Workshop architecture Light and brightness Furniture and interior arrangement Color Visual factors The existence of flowers and plants and green environment Pay attention to the sound factor Floor sound insulation Ceiling sound insulation Environmental sound insulation
Causal conditions	Visual division of the workshop Graphical signs
The condition of the workshop windows	Proper ventilation system Visual contrast of space A central phenomenon Proper use of natural energies of underlying factors Practical separation of space Environmental Psychology
Intervening conditions	Compliance with regulations Suitable materials A perceptual sense of space
strategies	Environmental and physical ergonomics Ergonomics in design Insulation of the building in terms of heat and cold Efficient production line Maintain proper heat and cold Workshop layout Convenient amenities and services consequences

Regarding to the literature, the functional and technical performance are considered in this research. This study attempts to evaluate workers' satisfaction with industrial buildings in Iran by using the architectural elements. Considering a comprehensive review of the literature and to the best of the authors' knowledge, there is no comparative study on the association the perspectives of Iranian workers in industrial buildings. Consequently, a comprehensive survey method is used to gather relevant results and compare them properly. Therefore, important novelties and objectives of this research are summarized as follows:

- Investigating IEQ in Iranian industrial buildings;
- Discovering staffs' foremost points of view about satisfaction in industrial buildings;
- Determining supplementary main points regarded with employees using POE.
- Scrutinizing the correlation between user satisfaction and indoor environment; and
- Investigating the user judgement about facilities in Iranian industrial buildings.

2. Materials and Methods

This study aimed to identify the relationship between employee's job satisfaction and architectural criteria. A satisfaction assessment was employed for the workstation employees to explore the effect of IEQ on the worker's satisfaction with their office environment. Therefore, data were gathered from a group of workers working in workshops and industrial factories in Tehran.

In combined or mixed researches, the method of data analysis based on the type of design can be divided into two simultaneous types such as the integrated method and sequential data analysis such as the exploratory and explanatory methods. In mixed research, there is a need to collect data in both quantitative and qualitative ways.

The samples were selected among the factories and workshops of Shamsabad industrial town (which is one of the main industrial areas of Tehran City) using a simple random sampling.

Table 2: Office Building Information

Building Type	20 Office Buildings
	196 Industrial buildings
Measuring period	June-July
Plan Type	Closed Plan Offices
HVAC system	Wall mounted gas Combi boiler
Lighting System	Ceiling fixtures (direct-indirect lighting (partial), diffused flush lenses (partial), and articulated task-lights)
User’s Thermal Control Options	Not Available
Windows	Double-glazed glass; Operable windows

Data were collected using a questionnaire distributed between 450 workers and 20 specialists in the architecture field. Data were gleaned through E-mails containing an online questionnaire link and physical distribution of hard copies in 2022. Besides the questionnaire, extra opinions were collected from face-to-face user participation. Tehran city has a sunny and dry climate, measurements were done in approximately steady weather conditions without climatic variations. The features of the selected buildings are briefly explained in Table 2. Since the method of research has been grounded theory, post – coding and axial coding has been performed that has been proposed to separate the conditions of all central category, strategy, outcomes, and intervenes. Figure 1 demonstrates the research methodology.

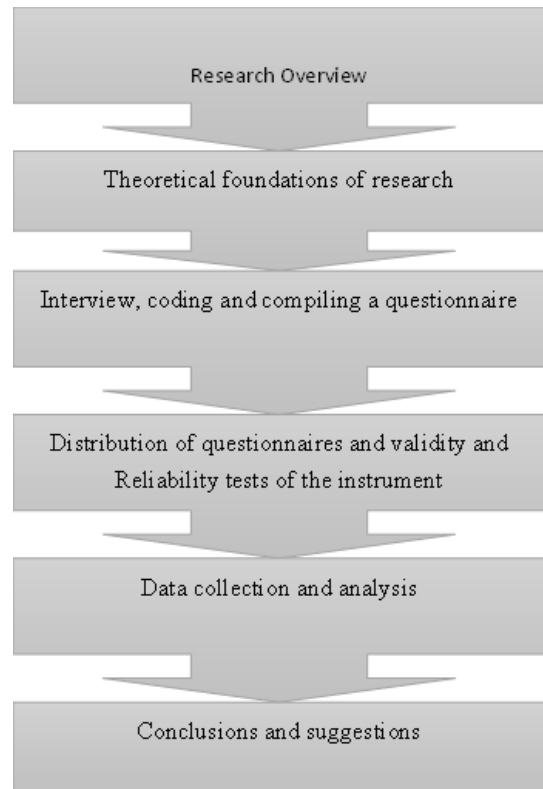


Fig.1 Research methodology

2.1 Participants

A total of 450 respondents (of both genders) from several industrial buildings, who were randomly selected, cooperated with the survey. The main group at focus here comprised specialist employees. Besides, 20 specialists were asked to fill the questionnaire in order to validation of the questions. The statistical population of the research in the first part of the research, which is

conducted with the aim of explaining the model of optimizing the relationship between the worker and the industrial environment through architectural criteria, are the professors of the field of management, architecture and industrial managers in Shams Abad industrial town. Descriptive statistics of participants’ gender and their age are given in Table 3.

Table 3: Descriptive statistics of employees

marital status		Gender		Age			
Single	Married	Male	Female	20-30	31-40	41-50	>50
16.41%	83.59%	51.56%	48.44%	17.97%	21.87%	35.94%	24.22%

2.2 Questionnaire

The given questionnaire emphasizes satisfaction with IEQ in industrial buildings based on employees' viewpoints. The prominent classifications of common attitudes towards building evaluation include approaches that address the "(i) conditions for functional suitability of buildings including space utilization, physical condition, safety, and statutory requirements; (ii) building quality assessment; (iii) serviceability of buildings with respect to occupants' needs and facilities provided; (iv) environmental performance in terms of indoor environmental quality, air quality, intrusion, control, appearance, and lighting; (v) energy consumption and indoor air quality; (vi) user satisfaction with the design and construction of services in buildings; (vii) Post Occupancy Evaluation (POE) of technical, functional, and behavioral aspects of buildings. A wide range of tools have also been developed for each of these approaches" [27]. Therefore, standard POE questionnaire was used as the main questionnaire, which was proven appropriate in evaluating the IEQ. The first and second parts of the questionnaire included general questions about participants and buildings, respectively. At the final part of the questionnaire, respondents' comments were gathered. Furthermore, the validity of the questionnaire was assessed using consulting with specialists and professors of architecture, and the necessary corrections were made. Then the desired model was developed using grounded theory and open, axial, and selective coding methods. Also, the reliability of the questionnaire was evaluated by the KMO method.

Therefore, content validity is a structural feature of the tool that is tied to it at the same time as the test is written. The validity of the content of a test is usually determined by experts in the studied subject. Therefore, the validity of the content depends on the judgment of the judges. In evaluating the content validity in a quantitative way, the relative coefficient of content validity (CVR) has been used. To determine CVR, experts have been asked to review each item based on 5 Likert scales. Then the answers are calculated according to the formula (CVR). To measure content validity, the Lavshe method was used.

The data processing results were measured using SPSS and LISREL software by designing various statistical tests, and the findings were categorized. It was found that there is a direct and significant relationship between job satisfaction and architectural criteria.

2.3 Narrative

Content validity is also called logical validity, which implies whether the data collection method or tool represents the same content that should be measured. In other words, in content validity, attention is paid to the ability of objects or tool items or the method of data collection to cover the entire content of a certain structure, and for this purpose, first the variables are specified and defined carefully, and then the objects or tool items are made in such a way that Measure the defined content. Therefore, if the data collection tool or method includes all dimensions and content of the desired variable or concept, it has content validity, otherwise it lacks content validity. In other words, content validity is a type of validity that is usually used to examine the components of A measuring instrument is used. The validity of the content of a measurement tool depends on the questions that form it. If the questions of the measurement tool represent the special characteristics that the researcher intends to measure, the test has content validity. In order to ensure the validity of the content, it is necessary to act in such a way that the questions constituting the measurement tool represent the different components of the selected content when creating the tool (such as designing the questionnaire).

2.4 Reliability

There are several methods to determine reliability, of which "Cronbach's alpha" coefficient method is one of them. This method is used to calculate the internal consistency of the measuring instrument that measures different characteristics. The closer the expressed percentage is to 100, the more reliable the questionnaire is, and the alpha coefficient below 60 is usually considered weak, the range above 70% is considered acceptable. Of course, the closer the trust factor is to one, the better. In this research, Cronbach's alpha method and SPSS version 20 software were used to determine the reliability of the measurement tool. Table 4 demonstrates reliability of the research.

Table 4: Cronbach's alpha

Cronbach's alpha	Number of questions
0.788	32

2.5 Open coding

In this type of coding, the concepts within the interviews and the documents are classified based on their relationship to similar topics. The result of this step is to summarize the information obtained from the interviews and documents into concepts and categories that were similar to these questions [28]. The criteria were considered in several categories including lighting, furniture and interior layout, color, visual factors, the presence of flowers and plants and green environment, visual segmentation of the workshop, graphic signs, geometric order of the workshop, environmental and physical ergonomics, ergonomics in design, attention to sound factor, thermal insulation of the building status of workshop windows, profitable production line, floor sound insulation, roof sound insulation, proper thermal protection, proper space design, environmental sound insulation, proper ventilation system, Silo engineering design, workshop layout, appropriate welfare facilities

and services, proper use of natural energy facilities, workshop architecture, regulation, visual contrast of space, appropriate materials, perceptual sense of space, environmental psychology and practical separation of space, according to the questionnaire distributed among workers who worked in several different industries of the country regarding open coding and according to the relationship between different concepts extracted from the questionnaire in several categories.

2.6 Axial coding

The purpose of axial coding is to create a relationship between the generated categories (in the open coding stage) [29]. In fact, at this stage, the sub-categories resulting from open coding are classified into several general categories according to their thematic relationship with each other, so that they can be seen in summary form table 5.

Table 5: Axial Coding

Secondary category	The general category (paradigm)
The geometrical order of the studio, Space Design, Visual Engineering Design, Installations, Workshop Architecture, Light and light, Furniture and internal setup, Color, Visual factors, The presence of flowers and plants and the green environment, Attention to Sound Agent, Floor, Ceiling, Environmental voice insulation	causal circumstances
Visual segmentation of the workshop, Graphic signs, workshop window status, Proper ventilation system, Visual contrast of space	Axial factors
proper utilization of natural energy	Underlying factors
practical space segregation, Environment Psychology	interfering factors
Rules, The right materials, perceptual sense of space	Strategies and Strategies
Environmental and physical ergonomics, agronomy in design, The insulation of the building in terms of heat and cold, The productive production line, Maintaining good heat and cold, Workshop layout, Suitable utilities and service.	Consequences

2.7 Selective coding

Selective coding based on the results of open coding and axial coding is the main stage of theorizing. In this way, it systematically relates the central category to other categories, provides the relationships in the context of a narrative

and modifies categories that need further improvement and development. As you can be seen in figure 2, the frequency of factors is shown in each paradigm. Causal circumstances have a greater share in this category.

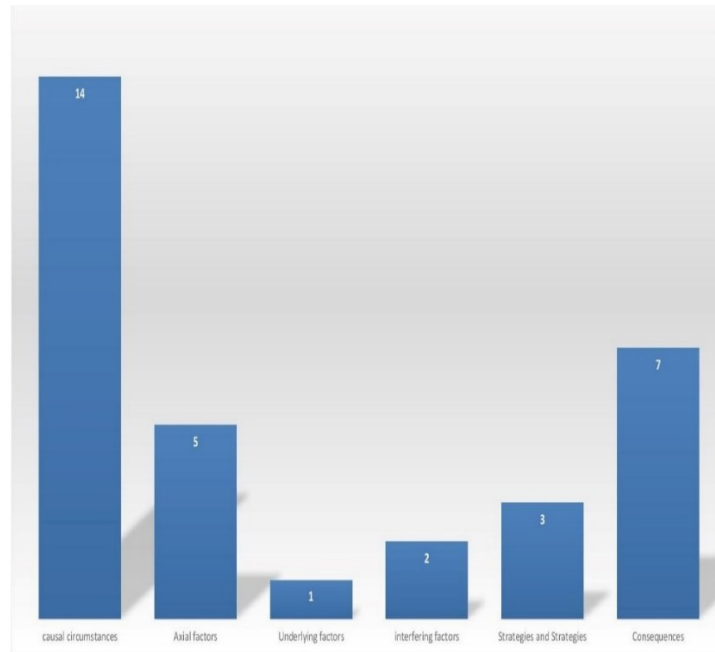


Fig.2 Paradigm Abundance

3.Results

In this study, the KMO sampling adequacy index has been used to investigate the necessary conditions for factor analysis. Based on the test results shown in Table 6, the KMO test result with a value equal to 0.663 shows that the relevant data can be reduced to several underlying and basic factors. Also, the result of the Bartlett test is 1.311E4, which is significant at the level of one percent error, indicating that the correlation matrix between items is not

a single matrix. That is, there is a high correlation between the items within each factor, and on the other hand, there is no correlation between the items of one factor and other items. Therefore, it can be concluded that there is a significant relationship between the items of this variable, and it is possible to discover a new structure of data and a new structure has been formed. Therefore, factor analysis is allowed.

Table 6: KMO and Bartlett test

Kaiser-Meyer		0.633
Bartlett	Chi-square	1.311E4
	df	317
	Sig	.000

Since the research measurement model is reflective, the tests for the research are reflective which are as follows:

3.1 Homogeneity test

Confirmation of the validity of the research assessment tool is required through the confirmatory factor analysis (CFA) technique before modeling the structural equation in order to the research hypotheses test (Table 7). Table 6 shows a factor analysis model of the confirmatory factor analysis that is appropriate for all times and it's more than 0.5, therefore the model is accurate.

In connection with the axial phenomenon, it is necessary to pay attention to indicators such as visual contrast of the space and proper ventilation system, visual segmentation of the workshop, graphic signs, and the condition of the workshop windows. Concerning strategies, a perceptual sense of space, appropriate materials, and observance of regulations are important. Concerning the basic factors of the proper use of natural energy, concerning the interveners, some indexes such as environmental psychology and practical separation of space and with the consequences, environmental and physical ergonomics, design ergonomics, thermal insulation of the building, profitable production line, proper welfare facilities and services, proper temperature maintenance and workshop layout are effective in this field.

Table 7: Confirmatory factor analysis (CFA)

A lot.	Very High	category (question)	
5.080	0.945	workshop geometry	causal circumstances Axial factors Underlying factors interfering factors Strategies and Strategies causal circumstances Axial factors Underlying factors interfering factors Strategies and Strategies causal circumstances Axial factors
3.294	0.571	Suitable Space Design	
2.499	0.677	Visual Engineering Design	
2.270	0.570	utilities	
3.885	0.710	Workshop Architecture	
3.904	0.807	Light and light.	
4.373	0.585	Furniture and internal setup	
12.805	1.294	color	
6.746	0.713	visual factors	
8.555	0.617	The presence of flowers and plants and the green environment	
5.326	0.596	attention to voice factor	
5.588	0.503	floors insulation	
9.378	0.783	roof sound insulation	
7.087	0.597	Environmental voice insulation	
7.108	0.554	Visual segmentation of the workshop	
5.635	0.538	graphical signs	
6.081	0.580	workshop status	
6.293	0.744	proper ventilation system	
5.949	0.683	visual contrast of space	Axial factors
6.703	0.693	proper use of natural energy	
4.304	0.571	spatial separation of space	Underlying factors interfering factors
3.207	0.645	environmental psychology	
6.187	0.661	rules	Strategies and Strategies causal circumstances
6.187	0.661	The right materials	
8.151	0.716	perceptual sense of space	Axial factors
8.945	0.755	environmental and physical ergonomics	
4.688	0.563	ergonomic design	
4.808	0.593	building insulation in terms of heat and cold	
5.814	0.534	production line	
16.953	0.617	maintaining proper heat and cold	
27.808	1.031	workshop layout	
4.950	0.594	utilities	

4. Discussion

Upon assessing the POE performance, the obtained outcome was divided into IEQ and DQ. Building layout, interior appearance, exterior appearance, and accessibility were categorized as Design Quality (DQ). Based on the result of Ali Mustafa's research [27], adequacy of horizontal circulation, adequacy of vertical circulation, and proportions and dimensions of spaces, distribution of furniture, access to facilities, air quality, acoustic and thermal comfort were recognized as effective parameters in user satisfaction. In addition to the mentioned parameters, light control, green spaces, and visual contrast of space were revealed in this research. Furthermore, thermal comfort, illuminance, noise levels, and ventilation measurement were found as effective parameters in ensuring employees' satisfaction [18]. Based on our findings, structural stability of the building, ventilation system, interior design and layout of the building, thermal comfort, appropriate space design, green yard and landscape, and noise levels were recognized as effective parameters, as well. Furthermore, Choi and Moon [20] revealed that gender and age were recognized as two effective factors in worker satisfaction. The findings of this research confirmed Chio and Moon's result and found "environmental and physical ergonomics" as another major effective factor in employees' satisfaction. Further to the aforementioned finding, Jeon and Jo [24] emphasized pleasantness, eventfulness, overall quality, regularity, spatial impression, and naturalness as major parameters for satisfaction assessment, among which pleasantness was common in both papers.

Although this paper shares common points with other researches, other researches have not dealt with the overall design of the causal section. The findings of this study indicate that in the overall design of the causal section, the geometric order of the workshop, space proper design, engineering design of sheds, facilities, workshop architecture, lighting, roof sound insulation, floor sound insulation, attention to sound factor, the presence of flowers, plants and green environment, visual factors, color and furniture

and interior layout should be considered. Psychological comfort is an inevitable aspect of user satisfaction studies. These findings help designers, architects, planners, and facility managers to develop workplace design principles.

5. Conclusion

In this research, through open coding and axial coding, sub - criteria were identified. The use of industrial production systems due to the high speed of building can have a great impact on the creation of a suitable environment for building construction. Therefore, the use of industrial production systems based on technical condition of building is selected and developed. Environmentalists consider the use of proper insulation in the building on the basis of standards for saving energy consumption. Figure 3 demonstrated the result of interview method.

The main conclusions of this research may be drawn as follows:

- consider the geometric order of the work shop, the appropriate design of space, design engineering of the work shop, lighting, insulation of the ceiling, insulation of the floor, visual factors, color and furniture and interior layout are found as crucial variables in achieving employees' satisfaction
- visual contrast of space and ventilation system, visual articulation of the workshop, graphic symbols and the status of workshop windows are recognized as central phenomenon of indicators
- physical and physical ergonomics, building placement, suitable facilities and services, maintaining the proper heat and cold and setting up the workshop are identified as background factors
- Job satisfaction and IEQ showed an accurate and linear correlation
- Industrial buildings need more architectural features which should be considered rather than other types of office buildings

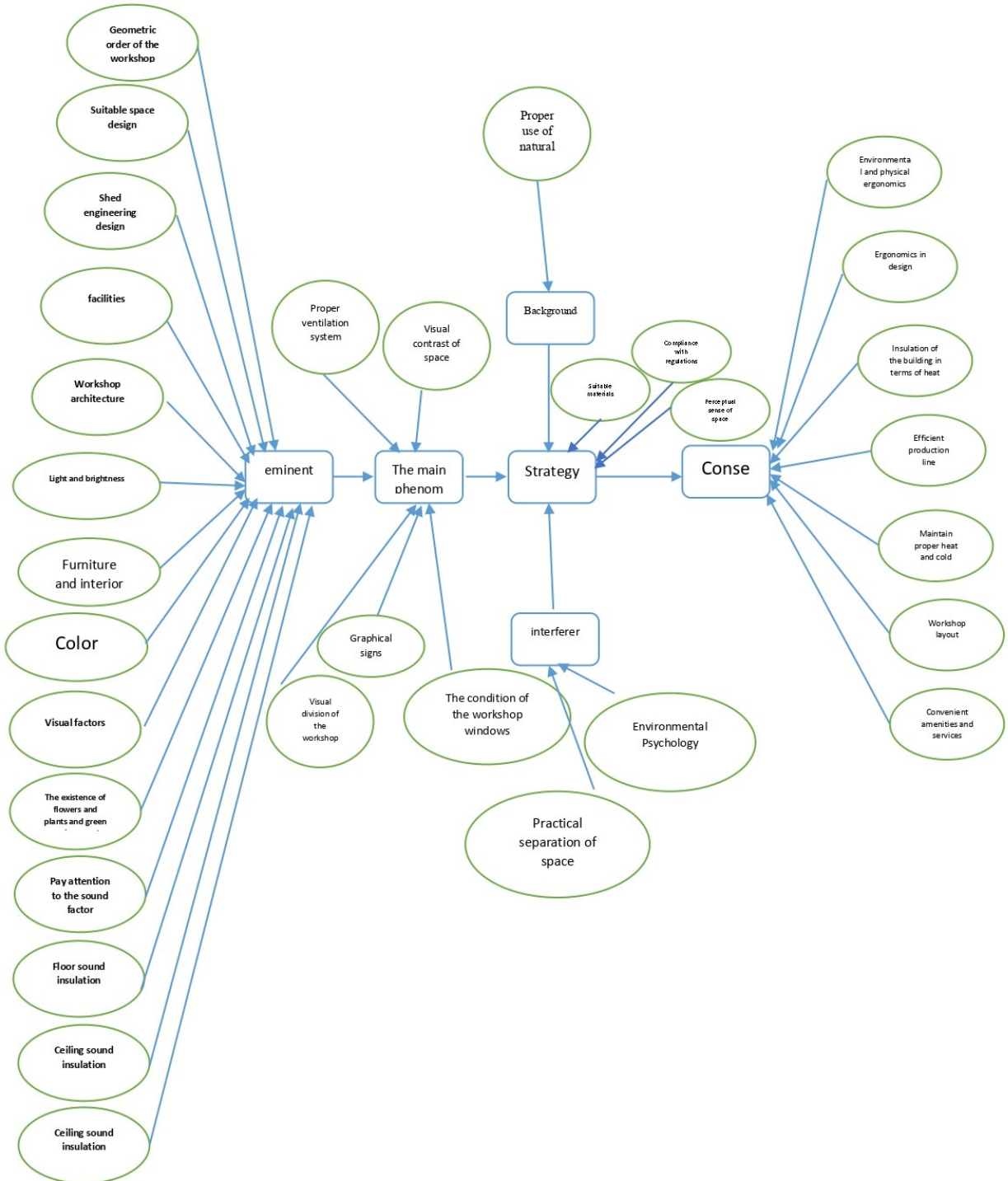


Figure 3: result of interview

Practical suggestions for improving the quality of the internal environment of work spaces include the use of communication with interventionists and background factors. Paying attention to the insulation of the building in terms of heat and cold, paying attention to the ergonomics of the physical environment, using suitable materials, and paying attention to the light and visual plant factors are highly recommended.

Therefore, this knowledge can facilitate designing better workspaces and providing comfort and satisfaction for employees. Any upcoming study should address the relationship between comfort and user satisfaction parameters from the perspectives of employees in the Iranian context and, additionally, the causes for their dissimilar perceptions should be discussed in detail.

6. Authors' Contributions

L.N., conceived and developed the idea for the article, designed the study, Formal analysis,

Investigation; Methodology; Writing original draft; Writing-review and Editing. A.S.H., and I.E., contributed to data collection and manuscript revision. All the authors approved the final manuscript.

7. Conflicts of Interest

The Authors declare that there is no conflict of interest.

8. Acknowledgements

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