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İÇİNDEKİLER

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ANALYSIS OF LAKE WATER FOR AIR CONDITIONING: A CASE STUDY IN FACULTY OF ENGINEERING, UNIVERSITI PUTRA MALAYSIA

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Abstract

This report includes a detailed and simple explanation of the general introduction to Ground Sources Heat Pumps and several types of Ground Sources Heat Pump which is Surface Water Heat Pump as one of the parts of renewable energy technology. The surface Water Heat Pump focused on the deepest depth to get constant heat sources which can be used as chilled water supply to air conditioning for Auditorium Jurutera Building. The main purpose of this report is to analyze lake water for air conditioning: A case study in the Faculty of Engineering, UPM to obtain, a lake profile, the depth of the lake, and the deepest depth temperature in the lake. In achieving the objectives, there are some methods that need to be done which have been presented in the Methodology. All data resulting from the analysis of water lake depth temperature had shown some factors that can be considered as the influence to use available ground sources heat. The lake area and distance of the deepest point have also been calculated and provided information in this report. In conclusion and recommendation, even the water's deepest temperature cannot be used to supply chilled water to the cooling coil inside the Auditorium Jurutera building. The recommendation is also provided for the improvement of this project. In addition, this report also contains other types of Ground Sources Heat Pump with different applications that have been used nowadays. This report also will help anyone seeking to know the profile of the Lake Faculty of Engineering and intends to study the surface water source heat pump as the cooling system.

Keywords: Renewable Technology, Ground Sources Heat Pump, Cooling load
JEL Classification: Q42, Q56, O30

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1. INTRODUCTION

Nowadays, all building applications have been using conventional air conditioning to provide a cooling comfort zone. Year by year the temperature on the surrounding area increasing due to one of the several factor with use non-friendly refrigerants, which affected to ozone depletion. Conventional air conditioning also is a part of the main contribution electricity cost in the building operation. To use of renewable energy sources is the fundamental of the improvement energy efficiency and the reduction of the demand. Ground source heat pump (GSHP) is one of great importance due to less seasonal temperature changes with respect to the supply air and the possibility to achieve high energy efficiency. GSHPs are mainly divided into three categories with ASHRAE based on the use of groundwater from wells, surface or ground water directly coupled to the heat exchanger, as a heat source or sink. Water consumption generally allows advantages such as low initial cost and no surface area is required. Surface water heat pump (SWHP) can be valid as alternative for the building sited important proximity of surface water bodies such as rivers, lakes or the ocean. The SWHP is very popular in coastal cities which the temperature sea water was influences by outdoor air and by sea current sometime unfavorable. For this project, the consideration of use Surface water heat pump as a renewable energy technology will apply for Auditorium Jurutera building.

Surface Water Heat Pump (SWHPs) has been included in the subset of Ground Sources Heat Pump (GSHP) because of the more likely in application and installation methods. This method also can be either closed loop which similar to GCHPs or open loop systems similar to GWHPs. However, the thermal characteristics of surface water bodies are different than those of the ground or groundwater. SWHPs consist of water to air or water to water heat pump connected to the piping network, which placed in a lake, river, or other place touched with open water. A pump circulates water or a secondary fluid (antifreeze solution) through to heat pump water to refrigerant shell and tube heat exchange which to transfer heat from a body of water. The piping material suggested to be used is thermally fused high-density PE tubing with Ultraviolet (UV) radiation protection to ensure heat can be transferred as well. The advantages of SWHPs are relatively low cost compared to GCHPs due to reduced excavation costs, low pumping energy requirement, low maintenance requirement and low operating cost. Beside the advantages SWHPs, there also have the disadvantages which are the possibility the coil damage in public lakes and wide vibration water temperature with an outdoor condition if a lake is small and shallow. Faculty of Engineering, UPM has built by architecture cooling structure concept which evaporates / reduce heat from the floor / earth surface with water. Theoretically, if deeper a lake, more cooling can achieve because of low pressure and not exposed to the atmosphere. In this project, the main concern is to analyze sources of water lake depth, temperature whether suitable for use as cooling/chilled water for uses Auditorium Jurutera building.

Mainly air conditioning systems work at their design loads for only a small part of their life and it follows, therefore, that the designer should be concerned not only with the highest temperature gains and cooling loads but also with the means these changes during the day and over the year. Establishing the mock-up of such variations will be of help in choosing the right system and in selecting the greatest form of regular control. Applications recline in the marketable, industrial, institutional and domestic sectors for the climates of over the world. It must, thus, be estimated that the size of the input made by each of the key elements in the temperature gain will not be constant but, nevertheless, the come within reach of to the calculation will be basically the same in all instances while the same importance will not be attached to each constituent. The conventional air conditioning system consists of four main components to provide cooling solution inside the room or building, which is the compressor, condenser,

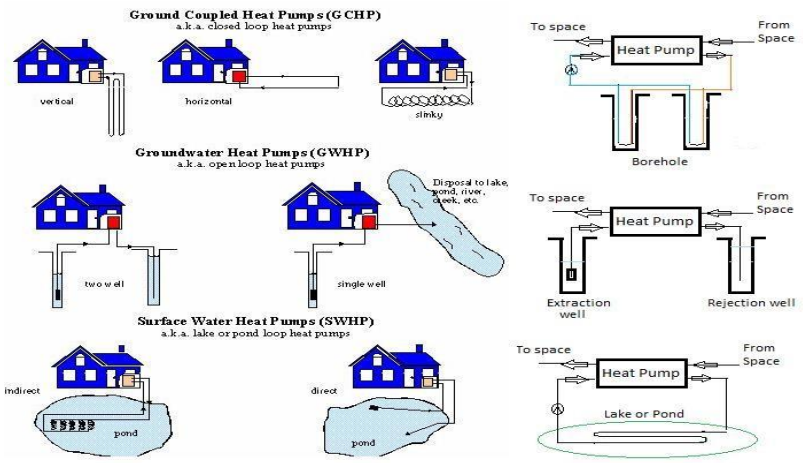
expansion valve, and evaporator. All components have their own function to transfer heat in one refrigeration circuit such the compressor, to compress gas from low pressure and low temperature to high pressure and high temperature.

All the main components must be installed to follow the sequence and functioning of the component. The first component is the compressor which we call a heart of refrigeration cycle. The compressor pumps the refrigerant and distributes it to the second component which is the condenser. The condenser will reject heat inside the condenser coil with helping motor and direct flow fan to surface fins and condenser coil before distributing liquid high temperature to the expansion valve. The expansion valve will expand the high-temperature liquid refrigerant to low temperature liquid depend on the demand of evaporator. The evaporator structure design almost same with the condensing coil which has coil and fins to increase heat exchange, but evaporator will absorb heat from surrounding room and provide comfort zone with helping blower fan to distribute and suck air the room. Each component requires electric power to make it function in the system application, and the higher uses electric power is compressor which needs to run the motor compressor and followed by the motor fan and blower fan. The objectives for the paper are to review building criteria and cooling load selection, to measure lake water profile and depth for air conditioning data requirement, and to analyses the data of lake water for use as Ground Sources Heat Pump (GSHP).

2.LITERATURE REVIEW

Figure 1 shows the Ground Water Heat Pump, which utilizes ground water as heat sources or heat sink, has some marked advantages including low initial cost and minimal requirement for the ground surface area over the Ground Source Heat Pump systems.

Figure 1. Schematic of different ground sources heat pumps



Source: A Ground Coupled Heat Pump system (Ball, 1983).

However, several factors seriously control the wide application of the Ground Water Heat Pump system, such as the limited availability of ground water and the high maintenance cost due to fouling corrosion in pipelines and equipment. In addition, many legal issues have arisen over ground water withdrawal and reinjection in some regions, which also restrict the Ground Water Heat Pump applications to a large

extent. In an SWHP system, heat rejection extraction is accomplished by the circulating working fluid through high-density polyethylene (HDPE) pipes positioned at an adequate depth within a lake, pond, reservoir, or other suitable open channels. Natural convection becomes the primary role in the heat exchangers of the Surface Water Heat Pump (SWHP) system rather than heat transfer process in a Ground Coupled Heat Pump (GCHP) system, which tends to have higher heat exchange capability than a Ground Coupled Heat Pump system (D.A. Ball, 1983).

3.METHODOLOGY

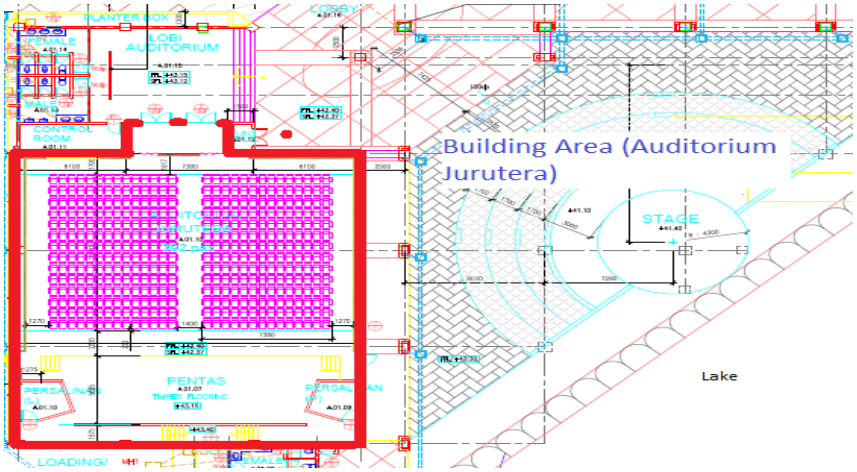
3.1. Decide Location for the Project

A location for the project must be selected based on a few criteria such as space availability, the size of project plans, ease of project developments and the building for the project itself. Auditorium faculty of engineering building as shown in Figure 2 has been selected as it has suitable for as a reference for this project. Figure 3 shows the location and picture of Auditorium Jurutera and Water Lake in Faculty of Engineering, Universiti Putra Malaysia in several zone views.

Figure 2. Location Auditorium Jurutera and Water Lake from top view

Figure 3. Auditorium Faculty of Engineering UPM

Figure 4. Auditorium Jurutera Building As-Built Drawing.



3.2. Proposed Type of Ground Sources Heat Pump

GSHPs has several types and operation strategies, depending on the design and applications for the building. The types are Ground Water Heat Pump, Surface Water Heat Pump, and Ground Coupled Heat Pump. For this project, the type of Ground Source Heat Pump will be used is Surface Water Heat Pump. The factors of selected that type / method is because of building location near with a lake, low initial cost, less public activity in the lake, and natural convection in primary role heat exchangers.

3.3. Data Collection

Some data are required before conducting this project. The data includes building structure / plan and characteristic, and sources of Water Lake profile data or geographic information system (GIS) from civil engineering. Building structure or architecture need to have for calculating heat load. Heat load are a concern of wall surface, window, door, floor, roof, and etc which is exposed to the sun. The operation inside the building, people, and items which generate heat are also a part of heat load.

By using special tools or software to generate analysis building cooling or heating load, Carrier's Hourly Analysis Program (HAP) will be used. HAP is a computer tool which assists engineers in designing HVAC systems for commercial buildings. HAP is two tools in one. First it is a tool for estimating loads and designing systems. Second, it is a tool for simulating building energy use and calculating energy costs. HAP uses the ASHRAE endorsed transfer function method for load calculations and detailed 8,760 hour by hour simulation techniques for the energy analysis. Specifically, HAP performs the following tasks during an energy analysis:

-Simulates hour by hour operation of all heating and air conditioning systems in the building.

-Simulates hour by hour operation of all plant equipment in the building.

-Simulates hour by hour operation of non-HVAC systems including lighting and appliances.

-Uses results of the hour-by-hour simulations to calculate total annual energy use and energy costs.

-Costs are calculated using actual utility rate features such as stepped, time of day and demand charges

if specified.

-Generates tabular and graphical reports of hourly, daily, monthly, and annual data.

4.RESULTS AND DISCUSSION

4.1. Measurement Area Building Project.

Before commencing calculate building heat load calculation. The building's criteria or structure must be reviewed first to determine the structure's actual condition. A portion of the procedure must also specifically address room zoning. When calculating the refrigeration capacity requirement for a structure with multiple partitions, the calculations must be performed separately and added. After reviewing the area of the building that requires a comfort zone, it was discovered that the auditorium has only a single zone, resulting in a space area of 5,568 square feet and an average ceiling height of 19 feet.

4.2. Cooling Load.

Carrier's Hourly Analysis Programme (HAP) is utilised to generate analysis of building cooling or heating load by employing special tools or software. The HAP is a computer programme that aids engineers in the design of HVAC systems for commercial buildings. HAP is a two in one tool. It is first and foremost a tool for predicting loads and designing systems. Second, it is a tool for calculating energy expenses and simulating building energy use. HAP calculates load using the ASHRAE endorsed transfer function method and analyses energy using sophisticated 8,760 hour by hour simulation techniques. The focus of this work is on load estimation and system design. When data is entered into the E20 / HAP, the results show, among other things, air system sizing, air zone sizing, ventilation sizing, system load, zone load, space load, hourly air system, hourly zone, and system psychometrics.

Table 1. Table 1. Air System Sizing Summary for Cooling Ventilation

Description		Data	Unit
Air System Information	Air System Name	Cooling Ventilation	
	Equipment Class	UNDEF	
	Floor Area	5568	ft²
	Location	Kuala Lumpur, Malaysia	
Sizing Calculation Information	Zone CFM	Sum of space airflow rate	
	Space CFM	Individual peak space load	
Central Cooling Coil Sizing Data	Total coil load	27.1	Tons
	Sensible coil load	325.2	MBH
	Coil CFM	8704	CFM
	Sensible heat ratio	0.597	
	ft²/Ton	205.5	
	Water flow @ 10 °F	65.1	gpm

	rise		
	OA DB / WB	92.4 / 77.6	°F
	Entering DB / WB	80.6 / 70.3	°F
	Leaving DB / WB	59.8 / 58.9	°F
	Coil ADP	57.6	°F
	Resulting RH	54	%
	Design Supply Temperature	68	°F
Supply Fan Sizing Data	Actual max CFM	8704	CFM
	Standard CFM	8682	CFM
	Actual max CFM/ft²	1.58	CFM/ft²
Outdoor Ventilation Air Data	Design airflow CFM	2294	CFM
	CFM/ft²	0.41	CFM/ft²
	CFM/person	5.86	CFM/person

Table 1 shows the auditorium building required cooling capacity 27.1 Ton refrigerants, and entering air dry bulb, wet bulb respective 26.9 °C / 21.3 °C with relative humidity 64%. The data result much helpful for engineer to design air cooling ventilation system for this auditorium.

Table 2. Air zone sizing

Description		**Data**	**Unit**
Zone and Space Sizing Method	Zone CFM	Sum of space airflow rates	
	Space CFM	Individual peak space load	
	Calculation Months	Jan to Dec	
Zone Sizing	Zone	1	
	Max. Cooling Sensible	159.4	MBH
	Design Airflow	8704	CFM
	Min. air flow	8704	CFM
	Zone floor area	5568	ft²
	Zone CFM/ft²	1.56	CFM/ft²

Space Load and Airflow	Zone 1	AUDITORIUM JURUTERA	
	Mult.	1	
	Cooling sensible	159.4	MBH
	Airflow	8704	CFM
	Floor area	5568	ft²

Table 2 depicts the results of air zone sizing calculations for Auditorium Jurutera from January to December. If multiple zones require conformity, zone terminal sizing is required for this system in order to separate the ventilation and cooling requirements for each zone. For this project, only a single zone is required because no partitions or rooms necessitate a comfort zone within the building. Auditorium zone required designing airflow of 8704 cfm, Individual space airflow per area of 1.56 cfm/ft2, and cooling sensible energy is 159.4 MBH, according to the results data. The characteristics or operations of a building can refer to the actual construction site, how the building operates, and the energy consumed by the activities within the building. For the purposes of this paper, only the heating or cooling burden of the building is considered. As a result, the sensible capacity load for this building's cooling zone is 159.3 MBH and the latent capacity load is 803.6 MBH. The ventilation sizing data for the interior of the Auditorium Jurutera building is shown in Table 3. The method for calculating the required fresh air intake for ventilation is to determine the building's comfort level, the maximum number of occupants, the maximum supply air (CFM), and the required fresh air in the building space area. For this paper, the ventilation airflow rate specified for the Auditorium Jurutera building is 2,294.1 CFM.

Table 3. Ventilation Sizing

Description		**Data**	**Unit**
Summary	Ventilation sizing method	Sum of Space OA Airflow	
	Design Ventilation Airflow Rate	2294	CFM
Space Ventilation Analysis Table	Zone	AUDITORIUM JURUTERA	
	Mult.	1	MBH
	Floor area	5568	ft²
	Max. Occupants	392	person
	Max. Supply Air	8704.4	CFM
	Required Outdoor Air	5	CFM/person
	Required Outdoor Air	0.06	CFM/ft²
	Uncorrected Outdoor air	2294.4	CFM

Building characteristics or operation may refer to the actual job site, including how the building

functions and the energy consumed to support internal activities. Concern for this paper's aims is limited to the building heating and cooling loads. As a result, the sensible capacity load for this building's cooling zone is 159.3 MBH, while the latent capacity load is 803.6 MBH.

CONCLUSION

Based on the results of the many tasks that were carried out to achieve the goals, it was determined that the Auditorium Jurutera Building needed 27.1 Tonnes of cooling capacity to create a comfortable environment. Packaged chillers can be utilised as air conditioning systems when employing the traditional approach. Conventional air conditioning is now the main cause of a building's high electricity costs. To use less electricity and to safeguard the environment from pollution and the possible effects of global warming, several academics are working to create new designs or find new solutions that utilise natural heat and cooling. One of the approaches used for this project was to introduce SWHP to replace the traditional air conditioning system. But regrettably, in the Faculty of Engineering's lake, UPM can only be achieved with a water depth temperature of 30.2°C (86.4°F) and a minimum depth of 447 cm (14.66ft).

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İÇ MÜŞTERİ MEMNUNİYETİNİN ÖRGÜTSEL BAĞLILIK DÜZEYLERİNE ETKİSİ: BİR EĞİTİM KURUMU ÖRNEĞİ

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Atıf/©: Bakan, Z., Çelik Sütiçer, M. E., and Öztırak, M. (2023). The Impact of Internal Customer Satisfaction on Organizational Commitment Levels an Educational Institution Example. Scientific Journal of Space Management and Space Economy, 2(1):11-30.

Özet

Duygular, kişinin bir birey olarak kendini anlamlandırmasında etkin rol oynamaktadır. İnsanın sosyal bir varlık olması, kişilerarası ilişkilere mecbur olması duyguların paylaşılması, anlaşılması ve kontrol edilmesini gerekli kılmaktadır. Duyguların nasıl ifade edileceği toplumsal kabullere göre ve zamanın koşullarına göre değişebilmektedir. Kişi içinde yaşadığı sosyal ortama ve zamanın koşullarına göre duygularını düzenleyebilme ve kontrol edebilme becerileri sergilemelidir. Bu beceri kişinin sosyal yaşamındaki ilişkilerini yönetebilmesini sağlamaktadır. Erken yaşlardan itibaren sosyalleşme süreci ile duygu düzenleme becerileri gelişir ve yaşam boyunca devam eder. Kişi bazı durumlarda yaşadığı duyguyu farklı biçimlerde ifade ederek içinde bulunduğu durumun gereklerini yerine getirebilir. Küreselleşen dünyada yaşanan gelişmeler iş yaşamında zorlu bir rekabet sürecini başlatmıştır. İşletmeler varlıklarını devam ettirebilmek adına bu rekabet yarışında avantaj sağlamaya çalışmaktadır. İşletmelerin varlıklarını sürdürebilmek için ellerinde bulundurdukları en önemli kaynaklardan biri insan kaynaklarıdır. Bu nedenler çalışanların örgüte olan bağlılıklarını ifade eden örgütsel bağlılık kavramı son yıllarda daha fazla araştırılmaya başlanmıştır. İş doyumu kavramı ise kişinin iş ve özel yaşamında sahip oldukları ve sahip olmak istediklerine dair yaptığı karşılaştırma sonucunda hissettiği tatmin duygusudur. Tüm işletmelerde günümüzde önem kazanmaya başlayan bu kavramın, eğitim sektöründeki önemi de giderek artmaktadır. Bu çalışmada, Bağcılarda bulunan meslek liselerindeki öğretmenlerin iş doyumu ve örgütsel bağlılık düzeyleri incelenerek bu kavramlar arasındaki ilişki incelenmiştir.

Anahtar Kelimeler: İç Müşteri, İş Tatmini, Örgütsel Bağlılık

JEL Kodu: M10, M19

THE IMPACT OF INTERNAL CUSTOMER SATISFACTION ON ORGANIZATIONAL COMMITMENT LEVELS: AN EDUCATIONAL INSTITUTION EXAMPLE

Abstract

Emotions actively play a role in an individual's self-quest. Being a social being and being obliged to interpersonal relations necessitates sharing, understanding, and controlling emotions. Emotional expression depends on social acceptance and the conditions of the time, and the individual should exhibit his skills to regulate and control his emotions accordingly to manage his social relationships. Skills to regulate emotions develop at an early age and continue to develop throughout life. Depending on the circumstances, the individual might resort to different ways to express his emotions. As global developments have led to tough competition in business life, business enterprises have no choice but to attain a competitive edge to ensure their survival, making human resources vital in the competition. Due to all factors combined, employees' commitment to the organization has become a trending research topic. On the other hand, job satisfaction refers to how satisfied a person feels while comparing what he wants and what he has in his business and private life. As a trending topic in business, the notion has also gained importance in the education sector. This study focuses on job satisfaction and organizational commitment levels in teachers working at Bagcilar vocational high schools, in addition to the conceptual correlation.

Keywords: Internal Customer, Job Satisfaction, Organizational Commitment

JEL Code: M10, M19

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1. INTRODUCTION

In today's business, employees are the key to competitive advantage. Investments in human resources are thus necessary and valuable to capital development. Organizational commitment is a must-have factor since employees must embrace the company objectives and work with devotion to achieve the goals so that the business enterprise might thrive in the competition. Business enterprises are open systems and thus need to adapt to change while offering quality products and services. Particularly in the modern world, it is harder for business enterprises to survive as change constantly and swiftly happens (Sabuncuoğlu and Tüz, 2005: 207).

For the sake of efficiency, employees need to internalize the organizational goals and boost their organizational commitment. Under current competitive conditions, organizations must become more customer-oriented and learning-oriented and thus manage synergy and teamwork properly. Such processes require human resources with a more substantial organizational commitment to bring emotional and physical energy together and produce targeted organizational data.

Moreover, organizational performance has been changing since the labor force was considered secondary. Researchers and managements determine that human resource is the most critical factor for organizational performance according to employers' modern management approach (Bakan and Büyükbeşe, 2006:121).

Job satisfaction and motivation are less costly than hiring and training a new employee and are needed to ensure the employees' organizational existence and thus boost productivity. It has become a severe matter for every organization and manager to enhance employees' organizational commitment, care for their needs, boost their interest in their duties, and make them proud of their work and organization. Man has always been trying to figure out external objects and phenomena. However, his efforts to attribute meanings to his emotions and behaviors have been recent and thus revealed uncharted territories.

Emotions are variables impacting a person's behavior and, thus, social relationships. Emotions' effect on behaviors proves that it is a situation that directs social relations. Emotions that a person feels affect his behavior, and behaviors affect social relations. In other words, emotions affect behaviors, and behaviors affect social relations.

The first chapter of the research focuses on job satisfaction, and the second on organizational commitment. The third chapter focuses on field study, including the findings, results, and analysis. Therefore, chapter 3 constitutes the main framework of the research.

2.CONCEPTUAL FRAMEWORK

2.1. Internal Customer Satisfaction

Business is an essential artificial product that benefits the economy and assigns a role to the individual. In other words, the business can be defined as a planned organization of someone's physical and mental resources for a specific purpose (Serinkan ve Bardakçı, 2009: 112, Öztırak, M., & Barış, O., 2022). It

can be defined as works attributing respect and financial freedom to the individual, depending on the circumstances. Considering that working is a significant part of people's lives, attitude towards work and occupational satisfaction profoundly impact the life quality (Çalışır, 2012: 5).

Therefore, job satisfaction - the pleasure the employee gets from work - is significant for both physical and mental health. Satisfaction increases if a job is satisfactory, meaningful, and prestigious. Job satisfaction positively influences organizational efficiency; thus, it is unsurprisingly an essential notion for organizations, which is why it is indispensable for managers to boost employee satisfaction (Pekdemir et al., 2006: 16).

2.2. Organizational Commitment

Whyte discussed organizational commitment in 1956, and later on Becker in 1960, Kanter in 1968, Mowday and his colleagues in 1982, Allen and Meyer in 1990, and many more (Kılıç, 2008: 57). Organizational commitment endeavors to express the relationship between the individual and the organization, formed by the internalization of the organization and the benefits it offers. Due to its positive outcome on the relationship between the individual and the organization, organizational commitment has been frequently expressed in scientific studies and considered vital to today's companies. The concept of organizational commitment that will add value to the company also introduces other concepts such as productivity, low staff turnover rate, and other notions that might be useful for organizational performance.

Since organizational commitment affects the morale and motivation of individuals, it also affects the performance and success of its employees. Overall, it is the psychological commitment of employees toward the institution they work. This commitment is expressed as the individual's desire to continue in the organization and their commitment to the goals and values of the organization. Their sense of organizational commitment derives from their interest in their job, loyalty, and belief in the business's values (Çekmecelioğlu, 2006: 155).

The literature suggests a myriad of research on organizational commitment; however, three key features stand out (Hoş and Oksay, 2015:17):

- Adopting the belief in organizational values and goals,
- Desire to exert genuine effort within the scope of organizational objectives,
- A strong desire to remain a permanent employee of the organization.

It is stated that the employees committed to the organization are more productive and have a higher level of loyalty and responsibility. In the organization, the fact that employees are not understood as an essential production factor, and it is seen that the quick dismissal of employees in short periods causes harm to the organization in various aspects, and at the same time, the effort to survive in the process with qualified employees in order to cope with the conditions of the increasing competition recently, the level of commitment of the employees to their organizations. showed the necessity of increasing (Sarıdede and Doyuran, 2004:5, Bayram, V., & Öztırak, M., 2023). It is understood that organization is harmed when employees are not considered as a vital production factor and discarded quickly within short periods. Employers have also realized that sustaining the organization's survival with qualified

employees is necessary. All combined points to the necessity for boosting employees' organizational commitment levels (Saridede and Doyuran, 2004:5).

In an organization where employees merely perform their duties, employees' attitude towards their duty is not considered an organizational commitment. Instead, it is the employees' positive attitude towards the organization and organizational goals developed by his emotions and behaviors (Tınaz, 2009:29).

3.METHODOLOGY

3.1. Objective, Study Group, Limitations

This study examines the presumed effect of job satisfaction on organizational commitment. It aims to determine whether there is a relationship between the socio-demographic variables and such research variables as job satisfaction and organizational commitment.

The study data were limited to the answers given to the scales by the teachers working in the vocational high schools in the Bağcılar district of Istanbul. The main reason for conducting the research in the education sector is that literature analysis suggests a lack of study on the impact of job satisfaction and organizational commitment in the education industry.

Below is a list of vocational high schools that participated in the research:

1. Bağcılar Aydın Doğan Vocational and Technical Anatolian High School,
2. Hikmet Nazif Kurşunoğlu Vocational and Technical Anatolian High School,
3. Bağcılar Vocational and Technical Anatolian High School,
4. Bağcılar Edip İplik Vocational and Technical Anatolian High School,
5. Alattin-Nilüfer Kadayıfçıoğlu Vocational and Technical Anatolian High School
6.

The research is limited to the answers from the teachers in the high schools above. Our research body comprises teachers from vocational high schools in the Bağcılar district of Istanbul province. Accordingly, judgment sampling was selected from vocational high schools in different fields under time and financial restrictions. In this context, to collect data faster, one sample from vocational high schools, where communication is strong for administrators or teachers and more straightforward in terms of accessibility, was selected by the judgment sampling method. Thus, individuals who volunteered to participate in the research formed the study sample, and 170 teachers participated.

3.2. Research Scales

For the preparation process, a literature study has been carried out and a methodology has been designed using national and international periodicals, scientific books, and internet documents. As for the research method and type, descriptive research has been selected to test the sample variables such as seniority, education level, and marital status. After completing the first two chapters of the theoretical part, a survey is used to get the necessary data for field research. Data have been analyzed with the SPSS program. The research model is a 2-variable model designed after observations on literature and

samples, as well as variables to be analyzed. The dependent variable is organizational dependency, and job satisfaction is the independent one. Later, the model will be tested by analyzing the data obtained from the sample through the relationship and interaction.

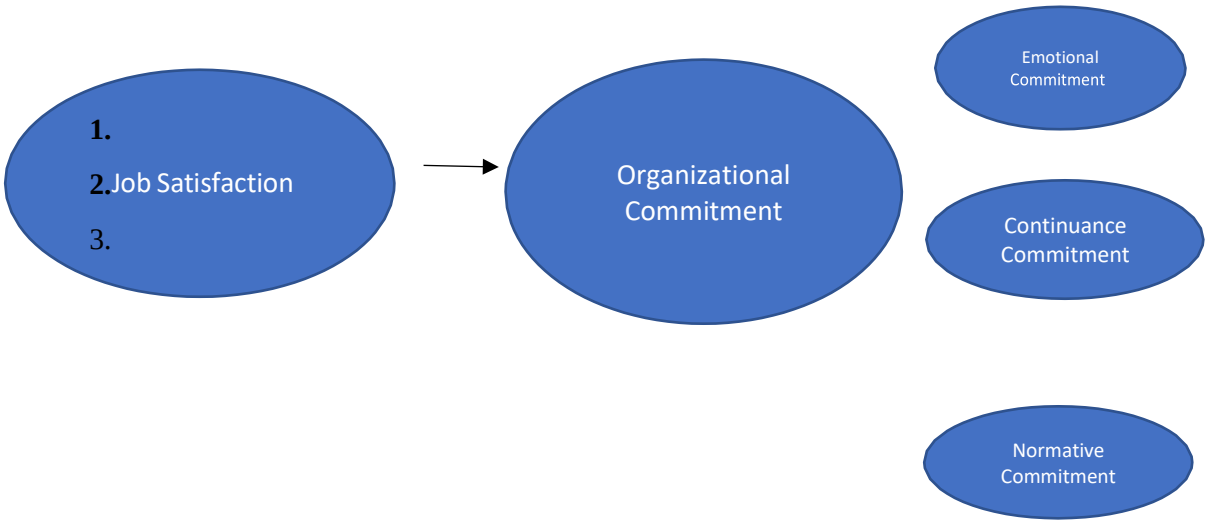

Figure 1. Research Model

H1: Job satisfaction has a statistically significant effect on organizational Commitment

H1a: Job satisfaction has a statistically significant effect on emotional commitment

H1b: Job satisfaction has a statistically significant impact on the continuance commitment

H1c: Job satisfaction has a statistically significant impact on normative commitment

3.3. Data Collection Tools Used in the Research

The research was carried out by questionnaire, and relevant data were collected online. Job Satisfaction Inventory, Organizational Commitment Inventory, and Demographic Information Form were given together to collect data in the study.

3.3.1. Job satisfaction scale

The Minnesota Job Satisfaction Scale, adapted to Turkish by Deniz and Güliz Göçkora and analyzed for validity and reliability, developed by Davis, Weiss, England, and Lofquist in 1967, was used in the job satisfaction scale. This scale consists of 18 questions in total. The questions in the job satisfaction scale were interpreted according to the Likert scale. According to this scale, it means "(1) Strongly Disagree, (2) Disagree, (3) Undecided, (4) Disagree, (5) Strongly Agree". Participants were asked to mark the answer close to them. The fact that the answers were given on a scale from 1 to 5 shows the degree of participation in the options. The higher the rank, the higher the participation.

3.3.2. Organizational commitment scale

The third chapter includes the organizational Commitment scale developed by Cook and Wall in 1974 and translated into Turkish by Vedat Erol in 1998 to measure the organizational commitment of the

teachers participating in the survey. The scale's factor structure is Emotional commitment, Continuance commitment, and Normative commitment. The scale consists of 11 items and three sub-dimensions (Özhan Çetin, 2009: 79).

There are 11 items in the Organizational Commitment inventory showing the participants' commitment degree to the group within the system they belong. Items are graded on a 5-point Likert scale and are ranked according to the level of participation (Strongly Disagree-Agree). Participants were asked to mark the answer they felt closest to them. The fact that the answers were given on a scale from 1 to 5 shows the degree of participation in the options. The higher the rank, the higher the participation.

3.3.3. Demographic variables

The researcher developed demographic variables to access the personal information of the participants. In this form, there are descriptive items about gender, education level, seniority, marital status, and departments worked.

3.4. Research Universe and Sample

The research body comprises teachers from vocational high schools in the Bağcılar district of Istanbul province. Accordingly, judgment sampling was used under time and financial restrictions, and a sample was selected from vocational high schools in different fields. In this context, to collect data faster, a sample from vocational high schools, where communication is strong for administrators or teachers and more straightforward in terms of accessibility, was selected by judgment sampling method. Thus, individuals who volunteered in the research formed the study sample, and a questionnaire form was sent to a total of 170 teachers, and all sent their feedback.

3.5. Reliability of Data Collection Tool

The internal consistency (Cronbach's Alpha) coefficient was checked to determine whether the inventories applied within the scope of the research were reliable. According to international standards, scales used in research must be above the .70 significance level to have an acceptable level of reliability (Saruhan & Özdemirci, 2011: 140). In this context, the reliability values of the inventories included in the study are shown in Table 1.

Table 1. Reliability of Scales in the Study

	Cronbach's Alpha
Job satisfaction	**0,947**
Organizational Commitment	**0,881**

Table 1 illustrates the distribution of the scales included in the research regarding the reliability values. It is seen that the scales used are above .70, as accepted by international standards. Thus, it is assumed that the analyses will be based on reliable results while examining the significant values in the related analyses.

3.6. Analysis of Data

The analysis of the effect of vocational high school teachers' job satisfaction on organizational commitment relies on the participants' opinions. In this context, the collected data were analyzed with SPSS 24.0 computer-based statistical program. Reliability analysis was performed to determine whether the collected data were reliable, and normality analysis was performed to determine whether the data had a normal distribution. It was seen that the collected data showed a normal distribution, and parametric test criteria such as correlation, regression, and t-test were used in the analysis. Inferential methods were used to analyze the data.

3.6.1. Demographic data of participants

The personal characteristics of the participant group consisting of 170 people within the scope of the research are shown in Table 2. Frequency, percentage, and cumulative values were calculated in the interpretation of the data.

Table 2. Demographic Data of Participants

	Frequency	**Percentage**	**Cumulative Percentage**
Gender			
Female	97	57,0	57,0
Male	73	43,0	100
Marital Status			
Married	118	69,4	69,4
Single	52	30,6	100
Education			
Graduate	123	72,4	72,4
Postgraduate	47	27,6	100
Seniority			
1-5 years	43	25,2	25,2
6-10 years	43	25,2	50,4
11-15 years	7	4,1	54,5
16-20 years	20	11,7	66,2
20 years and more	57	33,8	100
Branch			
Cultural	89	52,3	52,3
Vocational	81	47,7	100

The marital status variable in Table 2 suggests that the number of married participants is more than single ones. It is also seen that more women participated in the survey than men and the education level is mainly a bachelor's degree. An analysis of the years of seniority shows that most teachers (33.8%) have been working for 20 years, followed by an equally distributed 25.2% in 6-10 years and 1-5 years. 11.7% of the participants worked for 16 to 20 years, and 4.1% for 11 to 15. Branches are equally distributed. Saruhan and Özdemirci (2011) stated that a minimum of ten observations are required for paramedic tests (Saruhan and Özdemirci, 2011:174). Since the number of observations is 7 in the 11-15 years option, which is less than 10, this criterion will not be considered when evaluating the results in further analysis.

3.6.2. Factor and Reliability Analysis

3.6.2.1. Factor and reliability analysis of job satisfaction scale

In order to measure the validity and reliability of the job satisfaction scale, factor and reliability analysis were performed on the statements in the scale, respectively.

Table 3. Job Satisfaction Scale Factor and Reliability Analysis Results

	F.L.	**Cronbach's Alpha**
- keeping me busy all the time		
- having the opportunity to work alone		
- having the chance to do different things from time to time		
- giving me a chance to be a "respectable" person in society		
- my administrator's skills in managing teachers, civil servants, and other staff members		
- having a chance to do things that are not against my conscience		
- giving me a steady job		
- having the opportunity to do things for others		
- having the chance to do something using my own abilities	*	0,947
- the implementation of the decisions taken about the school		
- my job and salary		
- having the opportunity to be promoted within the school (or district, il mem.)		
- giving me the liberty to implement my own decisions		
- giving me the chance to use my own methods while doing my duty		
- working conditions		
- the agreement of my teachers and administrators with each other		
- being appreciated for a good job I've done		
- the sense of achievement I feel from job		

F.L.: Factor Load

*No factor load available as it is a single factor.

3.6.2.2. Factor Analysis and Reliability Analysis of the Organizational Commitment Scale

The factor analysis results constitute a single dimension and are shown in Table 4. According to the results, 11 questions about the perceived organizational commitment scale were collected under one dimension. However, since these questions were collected under three dimensions in the original and the only dimension obtained was not significant, it was decided to use the original structure of this scale. The dimensions of organizational commitment rely on adherence to the original scale, the emotional, continuance, and normative commitment. The scale's factor structure is Emotional commitment, Continuance commitment, and Normative commitment (K. Özhan Çetin, 2009:79). At the same time, since the factors in the original scales were used, exploratory factor analysis was performed, and confirmatory factor analysis was not needed. In the Cook and Wall Organizational Commitment survey, Questions 1,4,5,10 are grouped under Emotional commitment, questions 2,3,7 and 9 are the Continuance commitment, and Questions 6,8 and 11 are under the Normative commitment factors (K. Özhan Çetin, 2009:79).

Table 4. Organizational Commitment Scale Factor and Reliability Analysis Results

	F.L.	**Reliability**
- I am proud to tell others about my school as it is a respected and trusted institution.		
- If I find a better institution, I would like to leave this school.		
- I don't want to consume myself just for the benefit of my school.		
- I am proud to tell others about my school as it supports and satisfies my personal development.		
- I feel like a part of my school.		
- I do not want to endanger my acquired rights by leaving the institution I work for.	*	0,881
- I would not recommend a close friend to work at our school.		
- I am pleased to know that I contribute to the organization I work for.		
- Even if there is a better salary offer from another institution, I do not want to leave my job at my school.		
- I am willing to go beyond what is expected of me in the challenges my school faces.		
- As long as it satisfies me, I don't want to leave my school.		

F.L.: Factor Load

*No factor load available as it is a single factor.

It is seen that the model from the factor analysis result is significant.

3.7. Research Findings

There are many alternative tests for testing the normality of the distribution. Among these alternative tests are Kolkomogorov Smirnov (if the sample size is large) and the Shapiro-wilk test (if the sample number is less than 50). However, since Likert-type scales are used in research in the field of social sciences, it is unlikely that these two tests will pass. Therefore, skewness (kurtosis) and kurtosis (skewness) values and average Q-Q graphs can be examined. It is acceptable for the skewness and kurtosis values to be in the range of +2 and -2. In this regard, as a result of the tests performed, it was observed that the data were normally distributed.

Table 5. T-Test Results on Organizational Commitment Dimensions by Participants' Gender

	Gender	**Number of Participants**	**Average.**	**Std. Deviation**	**t Value**	**p Value**
Emotional Commitment	**Female**	97	**3,21**	1,12	-2,657	**0,009**
	Male	73	**3,62**	1,10		
Continuance Commitment	**Female**	97	3,04	1,01	-0,369	0,713
	Male	73	3,09	0,97		
Normative Commitment	**Female**	97	3,09	1,21	-0,523	0,598
	Male	73	3,18	1,27		

Table 5 suggests that the teachers participating in the survey differ in their emotional commitment level by gender. (p value=0.009; $p<0.05$). Male respondents had a higher emotional commitment level than female respondents. According to these results, male participants' emotional commitment toward the institution they work for is higher than female participants.

Table 6. T-Test Results on Job Satisfaction by Gender of the Participants

	Gender	**Number of Participants**	**Average.**	**Std. Deviation**	**t Value**	**p Value**
Job Satisfaction	**Female**	97	4,12	0,90	-0,279	0,780
	Male	73	4,16	0,90		

Data in Table 6 reveals that the participant teachers did not vary significantly in gender-based Job satisfaction levels (p values=0.780 and 0.291; $p>0.05$).

Table 7. T-Test Results on Organizational Commitment Dimensions by Participants' Marital Status

	Marital Status	Number of Participants	Average.	Std. Deviation	t Value	p Value
Emotional Commitment	**Married**	118	3,47	1,19	1,157	0,249
	Single	52	3,29	1,05		
Continuance Commitment	**Married**	118	3,14	1,01	1,165	0,245
	Single	52	2,98	0,98		
Normative Commitment	**Married**	118	3,26	1,30	1,589	0,114
	Single	52	2,99	1,14		

Table 7 points to no significant difference in the organizational commitment levels of the teachers participating in the survey according to their marital status.

Table 8. T-Test Results on Job Satisfaction by Participants' Marital Status

	Marital Status	Number of Participants	Average.	Std. Deviation	t Value	p Value
Job Satisfaction	**Married**	118	4,21	0,88	1,127	0,261
	Single	52	4,07	0,91		

Table 8 points to no significant difference in Job satisfaction levels according to the marital status of the teachers who participated in the survey.

Table 9. T-Test Results on Organizational Commitment Dimensions by Participants' Educational Status

	Education	**Number of Participants**	**Average.**	**Std. Deviation**	**t**	**p**
Emotional Commitment	**Graduate**	120	3,42	1,13	2,245	0,109
	Postgraduate	37	3,04	0,89		
Continuance Commitment	**Graduate**	120	3,00	0,97	1,398	0,250
	Postgraduate	37	3,00	0,96		
Normative Commitment	**Graduate**	120	3,22	1,21	-2,731	**0,016**
	Postgraduate	37	2,70	0,88		

Since the normative commitment p value is less than 0.05 (0.016), a significant difference is observed.

Table 10. T-Test Results on Job Satisfaction by Participants' Educational Level

	Education	**Number of Participants**	**Average.**	**Std. Deviation**	**t**	**p**
Job Satisfaction	**Graduate**	123	3,36	1,10	1,093	0,337
	Postgraduate	47	3,57	1,23		

Table 10 shows that there was no significant difference in Job satisfaction levels of the teachers participating in the survey according to their educational status. (p values=0.337 and 0.568; p>0.05).

Table 11. T-Test Results on Organizational Commitment Dimensions Based on Participants' Years of Seniority

	Seniority	Number of Participants	Average.	Std. Deviation	t Value	p Value
Emotional commitment	**1-10 years**	86	4,01	0,641	0,176	0,937
	11 years and more	84	4,13	0,579		
Continuance commitment	**1 -10 years**	86	3,86	0,646	0,371	0,511
	11 years and more	84	3,95	0,598		
Normative commitment	**1 -10 years**	86	4,14	0,631	0,49	0,365
	11 years and more	84	4,09	0,651		

Table 11 indicates no significant difference in the organizational commitment levels of the teachers participating in the survey based on their years of seniority. (p values=0.937; 0.511 and 0.365; p>0.05).

Table 12. Job Satisfaction T-Test Results According to Participants' Years of Seniority

	Seniority	Number of Participants	Average.	Std. Deviation	t Value	p Value
Job satisfaction	**1-10 years**	86	3,91	0,655	0,438	0,765
	11 years and more	84	3,99	0,664		

Table 12 shows that there was no significant difference in Job satisfaction levels depending on the years of seniority of the participant teachers. (p value= 0.765; p>0.05).

Table 13. T-Test Results on Organizational Commitment Dimensions According to Participants' Branches

	Branch	Number of Participants	Average.	Std. Deviation	t Value	p Value
Emotional Commitment	**Cultural**	89	3,61	1,05	1231	0,198
	Vocational	81	3,42	1,12		
Continuance Commitment	**Cultural**	89	3,28	1,12	1,127	0,142
	Vocational	81	3,52	1,04		
Normative Commitment	**Cultural**	89	3,08	1,21	1,436	0,127
	Vocational	81	3,19	1,07		

Table 13 shows no significant difference in the organizational commitment levels of the teachers participating in the survey according to their branches.

Table 14. T-Test Results on Job Satisfaction According to Participants' Branches

	Branch	**Number of Participants**	**Average.**	**Std. Deviation**	**t Value**	**p Value**
Job Satisfaction	**Cultural**	89	3,98	0,92	1,176	0,347
	Vocational	81	4,11	0,86		

Table 14 points out that the teachers who participated in the survey did not show a significant difference in Job satisfaction levels according to their branches. (p values=0.347 and 0.631; p>0.05).

Table 15. Correlation Analysis between Job Satisfaction and Organizational Commitment

		Job satisfaction	**Organizational Commitment**
Job satisfaction	(r)	1	0,641**
	(P)		
Organizational Commitment	(r)	0,641**	
	(P)	,000	1

There is a significant relationship between job satisfaction and organizational commitment (P<0.05). As shown in Table 15, there is a moderate positive relationship between job satisfaction and organizational commitment (r=0,641).

3.8. Regression Analysis

Regression analysis investigates the effect of one or more independent variables on a dependent variable. In case of more than one independent variable, "Multiple Regression" analysis is used (Saruhan and Özdemirci, 2011:190). Multiple regression analysis was not used because it was the only independent variable (Job satisfaction). The dependent variable of the research is organizational commitment, and the independent variable is Job satisfaction. First, the relationship between Job satisfaction and organizational commitment will be examined with regression analysis, then the data obtained will be analyzed after performing a simple linear regression analysis for the three sub-dimensions of the dependent variable.

Table 16. Results of Regression Analysis Between Job Satisfaction and Organizational Commitment

Model	**r**	**r^2**	**F**	**P**	**Beta**
1	0,641	0,411	117,293	,000	0,521

In the regression analysis, job satisfaction was taken into the equation as an independent variable and

Organizational Commitment as the dependent variable. According to the analysis result in Table 16, the relationship between organizational Commitment and Job satisfaction is significant (P<0.05). There is a moderately positive relationship between the variables (r=0.641). The coefficient of determination (r^2=0.411) was calculated. The Organizational Commitment is explained by Job satisfaction with a variance rate of 41%. It is seen that a one-unit increase in Organizational Commitment causes an increase of 0.521 units in Job satisfaction.

Table 17. Anova Analysis Between Job Satisfaction and Organizational Commitment

Model 1	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	19,917	1	19,917	117,293	0,000
Residual	28,528	168	0,170		
Total	48,445	169			

Table 18. Table of Regression Coefficients Between Job Satisfaction and Organizational Commitment

Model		**Unstandardized B**	**Coefficients Std. Error**	**Standardized Coefficients Beta**	**t**	**sig**
1	Constant	1,971	,193		10,224	,000
	Job satisfaction	,521	,048	,641	10,830	,000

Organizational Commitment=1,971+0,521*(Job satisfaction)

Table 19. Results of Regression Analysis Between Job Satisfaction and Emotional Commitment

Model	**r**	**r^2**	**F**	**P**	**Beta**
2	0,655	0,428	125,957	,000	0,609

In the regression analysis, Job satisfaction was taken into the equation as the independent variable and emotional commitment as the dependent variable. According to the analysis result in Table 19, the relationship between emotional commitment and Job satisfaction is significant (P<0.05). There is a moderately positive relationship between the variables (r=0.655). The coefficient of determination (r^2=0.428) was calculated. A one-unit increase in emotional commitment appears to result in a 0.609-unit increase in Job satisfaction

Table 20. Anova Analysis Between Job Satisfaction and Emotional Commitment

Model 2	Sum of Squares	df	Mean Square	F	Sig.
Regression	27,199	1	27,199	125,957	0,000
Residual	36,278	168	0,216		
Total	63,477	169			

Table 21. Table of Regression Coefficients Between Job Satisfaction and Emotional Commitment

Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	sig
2	Constant	1,663	,217		7,652	,000
	Job satisfaction	,609	,054	,655	11,223	,000

Emotional commitment=1,663+0,609*(Job satisfaction)

Table 22. Table of Regression Coefficients Between Job Satisfaction and Continuance Commitment

Model	r	r^2	F	P	Beta
3	0,597	0,357	93,160	,000	0,564

In the regression analysis, job satisfaction was taken into the equation as the independent variable, and continuance commitment as a dependent variable. According to the analysis result in Table 22, the relationship between continuance commitment and Job satisfaction is significant ($P<0.05$). There is a moderately positive relationship between the variables ($r=0.597$). The coefficient of determination ($r^2=0.357$) was calculated. A one-unit increase in Continuance commitment appears to result in a 0.564-unit increase in Job satisfaction.

Table 23. Anova Analysis Between Job Satisfaction and Continuance commitment

Model 3	Sum of Squares	df	Mean Square	F	Sig.
Regression	23,341	1	23,341	93,160	0,000
Residual	42,091	168	0,251		
Total	65,432	169			

Table 24. Table of Regression Coefficients between Job Satisfaction and Continuance commitment

Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	sig
3	Constant	1,676	,234		7,157	,000
	Job satisfaction	,564	,058	,597	9,652	,000

Continuance commitment=1,676+0,564*(Job satisfaction)

Table 25. Results of Regression Analysis Between Job Satisfaction and Normative Commitment

Model	r	r^2	F	P	Beta
4	0,402	0,162	32,377	,000	0,390

In regression analysis, Job satisfaction was taken into the equation as the independent variable and normative commitment as the dependent variable. According to the analysis result in Table 25, the relationship between normative commitment and job satisfaction is significant (P<0.05). There is a weak positive correlation between the variables (r=0.402). The coefficient of determination (r^2=0.162) was calculated. A one-unit increase in normative commitment appears to result in a 0.39-unit increase in Job satisfaction.

Table 26. Anova Analysis Between Job Satisfaction and Normative Commitment

Model 4	Sum of Squares	df	Mean Square	F	Sig.
Regression	11,169	1	11,169	32,377	0,000
Residual	57,956	168	0,345		
Total	69,126	169			

Table 27. Table of Regression Coefficients Between Job Satisfaction and Normative Commitment

Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	sig
4	Constant	2,574	,275		9,366	,000
	Job satisfaction	,390	,069	,402	5,690	,000

Normative commitment=2,574+0,390*(Job satisfaction)

CONCLUSION

Changing living conditions and globalization forced employers and employees to develop various attitudes and behaviors. They aim to improve their sector by boosting productivity and customer and service area satisfaction. Organizations set codes of conduct to ensure their preferability and success; thus, employees are expected to follow them. Today's competitive working conditions eventually led people to work harder to ensure job security.

This study examines the impact of job satisfaction on organizational commitment behavior. The study focuses on an analysis of job satisfaction on organizational commitment. It differs from other studies in determining whether job satisfaction affects organizational commitment behaviors in vocational high school teachers in Bagcilar, Istanbul.

Today, the terms of competition are different, and employees have different expectations from the institutions. Employees' expectations are rather financial, varying from wages to job security. They need to feel supported by business organizations to achieve their career objectives. As a result, career management activities are considered more important for business organizations than ever.

Simply, *organizational commitment* can be defined as an individual's psychological commitment to the organization. The employee's commitment to the organization refers to the desire to internalize the organizational values and objectives and to sustain their career and success in line with the organizational objectives. When individuals' organizational commitment levels are high, they invest in self-improvement in line with the company values and increase their performance and productivity. High levels of organizational commitment also result in such citizenship behaviors as self-sacrifice and honesty, in addition to a reluctance to leave. As a result, organizational commitment is needed more than ever to preserve qualified employees in competitive industries.

Job satisfaction is considered the product of a comparison between what the individual achieves and wants to achieve in his business, social and private life. Upon assuming that the codes of emotional behavior can be a variable for organizational commitment behaviors, analysis results show that job satisfaction accounts for 41% variance for organizational commitment behaviors. (See Table 16)

Regression Analysis examined the statistical relationship between job satisfaction and organizational commitment. A moderate positive correlation was found between the variables ($r=0.641$). The coefficient of determination ($r^2=0.411$) was calculated. It is seen that a one-unit increase in Organizational Commitment causes an increase of 0.521 units in Job satisfaction. (See Table 16). At the same time, the relationship between emotional commitment and job satisfaction is significant ($P<0.05$). There is a moderately positive relationship between the variables ($r=0.655$). The relationship between continuance commitment and job satisfaction is significant ($P<0.05$), and there is a moderate positive correlation between the variables ($r=0.597$). The relationship between normative commitment and job satisfaction is significant ($P<0.05$), and there is a weak positive correlation between the variables (See Table 17-18-19)

The study was carried out with the participation of individuals working as vocational high school teachers in Bağcılar Istanbul, and the study results are as follows:

An analysis of socio-demographic characteristics shows that most participants (57%) are women (See Table 2). An analysis of marital status shows that the majority of the participants (69.4%) are married (See Table 2). An analysis of educational status reveals that the majority (72.4%) of the participants with a graduate diploma (See Table 2). An analysis of seniority criteria reveals that the majority (33.8%) of the participants with a seniority of 20 years or more (See Table 2). An analysis of the branch variable indicates that culture teachers (52.3%) are slightly more than vocational teachers (47.7) (See Table 2).

The study used an independent sample t-test to determine whether the participants' organizational commitment differed in gender. As a result of the t-test analysis, a gender-related difference was found in the organizational commitment scores of the participants (See Table 5-6). Research by Podsakoff, Mackenzie, Paine, and Bachrach in 2000 shows no relationship between organizational citizenship behavior and gender. However, some studies suggest a relationship between organizational citizenship behavior and gender. A study by Lovell, Kahn, Anton, Davidson, Dowling, Post and Mason in 1999 shows that women exhibit more organizational citizenship behavior than men.

An Independent sample t-test was used to determine whether the participants' job satisfaction differed in terms of marital status variable. As a result of the t-test analysis, no difference was found in the job satisfaction scores of the participants in marital status (See Table 7-8).

Analysis results indicate a difference in organizational commitment scores for educational background (See Table 9). Therefore, it can be concluded that the higher the educational level, the higher the organizational commitment. Apart from this, education has no other effect on job satisfaction (See Table 10).

Analysis results show no difference in the job satisfaction scores of the participants for seniority (See Table 11-12). Correlation analysis was used to determine the relationship between the frequency of exhibiting job satisfaction and organizational commitment. It has been determined that there is a positive, moderate relationship between exhibiting job satisfaction and organizational commitment (See Table 15). Research by Erdiş in 2013 suggests a positive low-level relationship between organizational citizenship behavior and organizational commitment. Another research by Arın in 2016 concludes a positive, moderate relationship between organizational citizenship behavior and organizational commitment.

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FABRICATION OF MOTOR-LESS BEACH-SAND CLEANING MACHINE FOR BEACH RESORT OWNERS

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Abstract

Modern technologies related to beach cleaning activities remain a niche and unpopular industry even in the 21st Century. Until now, beach cleaning activity is an exhausting and time-consuming process. Most of the time, the rubbish collector will need to bend down or stretch their body to pick up rubbish which may cause injury. Furthermore, they may have to carry the rubbish bag or bin as they move from one location to another. This project aims to fabricate a motor-less beach sand cleaning machine that reduces the time taken needed to collect rubbish by 50% and eliminates the need for the rubbish collector to bend their body in an unnatural way to pick up rubbish. This project also eliminates the need for the rubbish collector to carry the rubbish bin or bag as the machine has a built-in rubbish collection compartment. The motorless beach-sand cleaning machine works by a self-fabricated rake with protruding prongs that is lifted by a lever located above the pushing handle. When the lever is pushed forward, the rake is lifted into the mesh where the solid litter will be stored. The mechanism to actuate the lifting of therake is connected by a pair of pulley systems on both sides of the machine. For the post-testing, it is found that this machine reduced the rubbish collecting time by half as compared to conventional manual rubbish picking using hands. It is also noted that the rubbish collection compartment of the machine has a bigger capacity than the standard rubbish bin and offers various advantages too. In the end, the objectives of fabricating a motor-less beach-sand cleaning machine are achieved and can be utilized by the beach resort owners to clean beaches towards a more sustainable environment for marine life.

Keywords: motor-less, sand-cleaning machine, beach resort, clean beach

Jel Codes: Q01, Q56, O31

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1. INTRODUCTION

Beaches are recreational areas and attract many local and international visitors. Recreational activities such as swimming, walking, sunbathing, and surfing are some of the most common activities carried out by visitors. Furthermore, coastal tourism activities contribute to a large facet of our economy (Loomis & Santiago, 2013). As tourism is one of the main revenues in Malaysia, with over 57.1 milliondomestic tourists alone generated RM 37.4 billion in tourist receipts in 2014 (Tourism Malaysia, 2021).Therefore, a polluted beach or coastline may significantly impact Malaysia's tourism industry negatively. The polluted beach has always been an international dilemma since the age of industrialization (Bergmann et al., 2015, Wyles et al., 2016 & Shim & Thomposon, 2015). Lately, thereis an increasing trend and abundance of beach littering that bring a negative impact on marine and landlife.

The Sustainable Development Goals (SDG) is a collection of 17 global goals designed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) to be a blueprint to achieve a better and more sustainable future for humankind. Among the two of the 17 goals are life below water and life on land (United Nations, 2015). According to a UNESCO report (United Nation, 2015), approximately three billion people depend on marine and coastal biodiversity for their income and are estimated to generate up to 5 percent of global GDP. On the other hand, our earth's ecosystem for humanity such as oxygen, drinking water, weather, food, rainwater, and others are provided and regulated by the ocean itself. Due to its significant impacts on mother earth, careful management and preservation are imperative to ensure a sustainable future. Hence, it is the responsibility of everyone to keep the earth whether on land or underwater clear of any pollution.

Beach cleaning is among the activity to support and achieve the SDG. Most beach cleaning activities still use the conventional ways that have been used since the existence of civilizations. The most typical method is picking up rubbish using hands and discarding the rubbish into rubbish bins or throwing the rubbish into large bags temporarily and to be disposed of into the proper rubbish bins once the temporary rubbish bag is full. Therefore, the drawback of such a method is it requires a lot of manpower and time as can be seen in Figure 1 where volunteers carried out beach cleaning activities (Zielinski et al., 2019).

Figure 1. Beach Cleaning Manually

A better alternative to the hand collection method is using tools that can be found in the market such as rakes or customized hand tools similar to rakes (Figure 2) to escalate the sand cleaning process. These tools separate debris or rubbish from sand by having the user pull the tools across the sand surface. Despite it being relatively cheap products, the beach cleaning process still can be daunting and inefficient as only a short distance of single rake or hand tool pulling can be done. One must stop very

frequently to dispose of the collected rubbish when using such tools as the user keeps moving from one place to another until the whole process is completed.

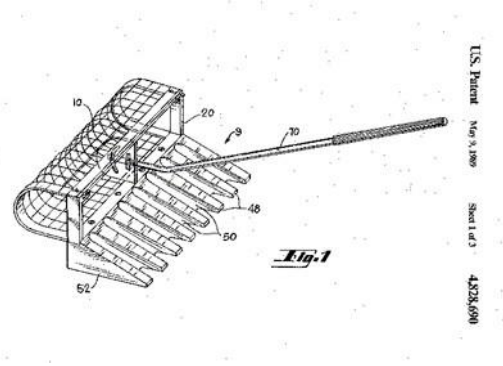

Figure 2. Hand Tool (Montez, 1988)

The evolution of the beach cleaning process has been modernized with some semi-automated or fully automated machines available in the market. Among the popular ones is the motorized beach cleaning machine (Figure3). The machine uses a front spinning cylinder that has flaps to "sweep" the sand that is mixed with solid litter. The sand mixture is swept into a vibrating screen to sift solid debris from the sand. There is a 20-liter collector located at the end of the vibrating screen where only solid litter is kept, and sand has been sifted out in the vibrating screen. The machine can be operated from the back of the machine which is equipped with the throttle, brake, and steering capability. The machine is powered by a 5.5-horsepower air-cooled 4-stroke gasoline engine. With a travel speed between 1.8 to 5.5 km/h, the machine can clean an area between 1400 to 3200 square meters per hour (Barber, 2022).

Figure 3. Motorized Beach Cleaning Machine

Meanwhile, mega machines for large-scale beach cleaning are also available and ready in the market such as hydraulic-operated beach cleaning machines in figure 4. The systems work by conveyor belt system that is mounted with individual stainless steel tine whose role is to rake towards the moldboard deflector plate, removing surface and submerged debris. The conveyor is spun by the hydraulic drive and solid litter that is picked up is then carried upwards on the inclined conveyor belt section which leads to the drop into the hopper which serves as the rubbish collector (Barber & Barber, 2009). The drawback to this method is it would require a 4-wheel drive agricultural-type tractor with 76cm wheels and a minimum of 60 PTO horsepower to tow the beach cleaning machines as shown in figure 4. Besides that, all modern machines require burning fuel to turn chemical energy into mechanical energy for the

operation and processes. The effects of burning fuels, especially carbon dioxide, are having bad effects on the climate and ecosystems themselves

Figure 4. Hydraulic-Operated Beach Cleaning Machine

Despite several machines available on the market that can clean the beach in more effective ways, most of the people in Kuching, Sarawak is still using the conventional method to collect solid litter. Though using the conventional method can be tiring and take very long, it is the only method that requires little to no budget to carry out such activity. Since the establishment of the business, workers of Dynawood Beach Stay at Trombol beach, Kuching still cleans the beach manually. Their activities involved manually picking up the rubbish piece by piece using either their hands. The types and sizes of rubbish commonly found on the beach range from the small plastic bottle cap to regular-sized rubbish like plastic bags and water bottles. Some of these rubbishes are buried under a thin layer of sand which may usually be overlooked by the worker causing some buried rubbish to stay on the beach after the cleaning process. Moreover, with a large area of beach that needs to be covered and rubbish located on feet height, the worker often complains of frequent lower back pains and sore muscles due to excessive bending down movement. Therefore, this project intends to solve the aforementioned problems for the beach cleaning process. The objectives of this applied research aim to fabricate a motorless beach-sand beach cleaning machine for resort owners. A pre-testing of conventional methods used to collect rubbish will be conducted and post-testing to evaluate the performance in comparison to the duration taken will also be executed upon the completion of the machine.

2.METHODOLOGY

The development of the beach cleaning machine is based on the flow chart in Figure 5.

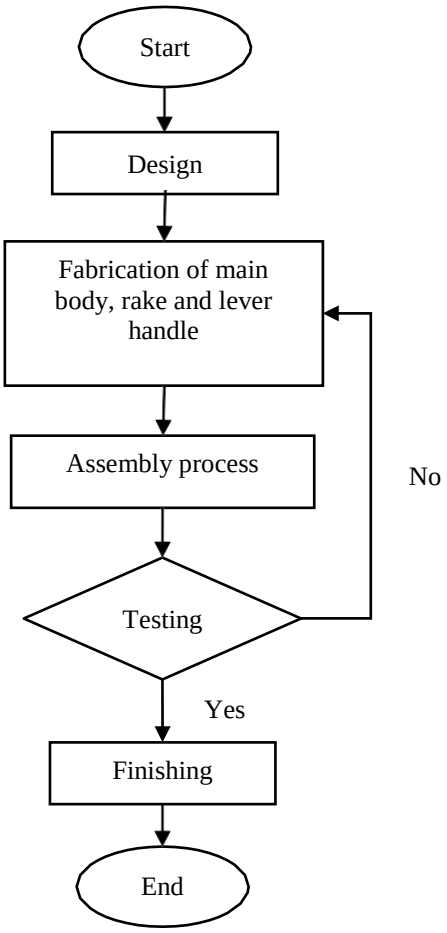

Figure 5. Flow Chart of Beach Cleaning Machine

The first process is the design process using Autodesk Inventor. Figure 6 shows the final design of the machine. Various sketches have been developed during the design process referring to several designs available during the literature review conducted and selection of the final design is selected based on the morphology chart taking into consideration elements such as mobility, effectiveness, cost, and technical aspect.

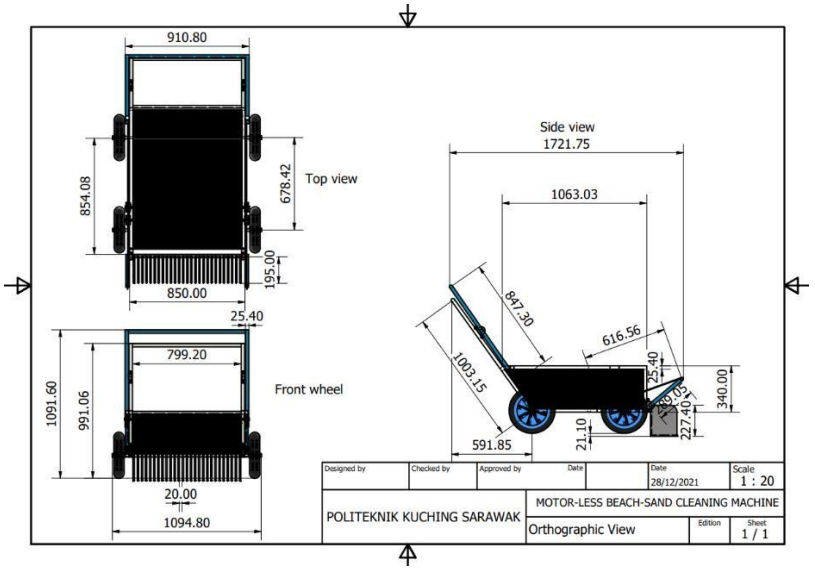

Figure 6. Orthographic View of Beach Cleaning Machine Using Autodesk Inventor

Next, the fabrication process started with the cutting process of 1 x 1-inch square mild steel tubes using a miter saw, and all edges are deburred using a power grinder and angle grinder. Then, these tubes are attached as the main body using arc welding. The weldment of the main body is imperative as it will sustain the rubbish load and facilitate the smooth movement of the machine. The completed main body is shown in figure 7.

Figure 7. Main Body of The Machine

Subsequently, a threaded round bar with a diameter of 16mm is cut into four parts with a length of 6.5inch and welded to the edges of the main body. The four parts are the shaft to attach the wheel with the washers and nuts. Later, the wheels are fitted to the shaft on the main body as shown in figure 8.

Figure 8. Wheels Attached to Main Body

Then, the fabrication of the rake part began and rods of 5mm diameter with a length of 40mm each are utilized to act as the "teeth" and a 1x1-inch square tube as the holder. The process involved MIG welding of the 5mm diameter mild steel rod to the square tube holder one at a time with a gap of 15mm between each rod (Figure 9).

Figure 9. Weldment Process of Rake

Once the steel rods are attached to the holder, the crucial step is to bend the steel rod to 90 degrees. This is achieved by heating the rods using an oxy-acetylene torch and slowly bending them using a brick edge as the guide. Later braces are added to the rake so that it can be properly aligned and act as the reinforcement.

Then, the shafts are attached on either end of the rake to prepare it for pillow block bearings insertion (Figure 10). Later, two steel plates are welded to both sides of the rake for a better rubbish collection process.

Figure 10. Rake

The final fabrication work of the parts involved a level handle (Figure 11) which this part acts to lift the rake for the rubbish collection process. The previous items of hollow mild steel tubes are used, cut, and assembled in accordance with the main body specification.

Figure 11. Level Handle

Eventually, the rake and level handle parts are attached using the cables to work as the control mechanism for rubbish collection. A pair of pulley systems are welded to both sides of the machine to actuate the lifting mechanism of the rake. Additionally. the torsion springs are welded behind the rake to return the rake to the initial position after each cycle of the lifting process. The finishing process involved removing the rust using sand papers and applying an undercoat before spraying the machine. Finally, the 6mm PVC mesh is cut accordingly and fitted around the main body excluded the front side to act as the rubbish storage tank.

As for the pre-testing process, a person is assigned to collect rubbish manually using hand in an area of 8x2meter with rubbish randomly scattered within the test area. A digital stopwatch is used to record the duration of the rubbish-collecting process and the procedure is repeated three times before the average time is taken as the final result. Subsequently, for the post-testing, a similar site is chosen and the machine is operated by a single user only. The time needed to pick up the rubbish using the machine is recorded and considered as the final data for the post-testing. A simple post-testing survey is also conducted using questionnaire distribution to six samples which consist of beach resort owners and Non-Governmental Organizations (NGOs) in Kuching, Sarawak.

RESULT AND DISCUSSION

The completed beach cleaning machine is shown in figure 12. The machine is motor-less and therefore the machine is environmentally friendly as compared to modern and large-scale machines which are available in the market. On the other hand, the design is relatively simple for the replication by the community and industry to achieve clean beaches and life on land to support the SDG activities.

Figure 12. Completed Beach Cleaning Machine

The operation of the beach cleaning machine is easy and simple. First, a single user is adequate to operate the machine and the user needs to push the machine forward toward the direction of the rubbish on the beach. Once the quantity of rubbish accumulated at the rake is sufficient, the user is required to push the lever handle to lift the rubbish to the storage compartment as shown in figure 13. The volume of rubbish that can be collected at the storage compartment is approximately 0.50m3 or 500 liters. The PVC mesh selection as the storage compartment wall then allows the sand to drop back to the beach and therefore able to filter the sand.

(a) (b)

Figure 13. Operation of The Machine ;(a) User Pushes the Machine (b) User Pushes the Lever to Lift the Rubbish to The Storage Compartment

Subsequently, the pre-testing and post-testing data are obtained and the comparison is recorded in table 1. Figure 14 shows the photo taken during pre and post-testing respectively. It is obvious from table 1 that the current machine can trim the duration of the rubbish collection process by almost half as the machine only recorded a mean time of one minute. Therefore, this machine is clearly the best method to clean up the beach and the impact can be significant when it involves a large beach area and the duration taken will be substantially reduced when using the machine as compared to traditionally manually picking by hand. During the post-testing also, it is found that the motor-less beach-sand cleaning machine performs smoothly on dry and flat sand surfaces. Meanwhile, the user felt a higher resistance in pushing the machine on moist and uneven sand surfaces and the condition led to difficultyin picking long and stiff rubbish such as long tree branches.

Table 1. Duration for Pre And Post Testing

Method	Time taken
Manually by hands	2 minutes 17 seconds
Machine	1 minutes 0 seconds

(a) (b)

Figure 14. Pre And Post Testing ;(a) Pre-Testing Using Manually by Hand (b) Post-Testing Using Machine

As for the quantitative post-testing survey, it is found that samples which consist of beach resort owners and NGOs agreed the machine is a better method and offers a competitive alternative when compared to the machines that are available in the market. The main advantages of the current machine are it does not require any fuel or electric power to operate, has minimal maintenance, easy control system and has a small dimension that enables easy storage, and can be fitted nicely into a pick-up vehicle for transportation. Lastly, the cost of this machine is approximately RM 543.00 (Table 2) which is a relatively cheaper option when compared to the machines sold in the market and offers good durability and a single-user operating system. Hence this machine is very affordable and recommended for small and medium beach resort owners.

Table 2. Cost of The Machine

No.	Material	Quantity	Price Per Unit (RM)	Total Cost (RM)
1	1 × 1-inch square mild steel	2	40	80
2	5mm diameter mild steel round bar	1	25	25
3	10mm diameter mild steel round bar	1	30	30
4	16mm diameter threaded round bar	1	40	40
5	6mm PVC mesh	1	28	28
6	Spray paint	3	11	33
7	Mild steel plate	1	25	25
8	Flat mount pulley block	4	15	60
9	Pillow block bearings	4	12	48
10	Rubber insulated steel cable	2	37	74
11	Wheelbarrow wheel	4	25	100
				543

CONCLUSION

The objective of this project is successfully achieved as the beach cleaning machine is produced. Then, post-testing also is conducted to ensure its operation. The control system using the level handle to lift the rubbish collected to the storage compartment functions well and the machine is able to move smoothly in a dry and flat beach. The post-testing results also produced positive outcomes when the duration of the rubbish collection is shorter by almost 50% when compared to the traditional way. A qualitative survey also obtained positive feedback from the beach resort owners and NGO. Lastly, the cost of this machine is RM543.00 and this makes it very affordable in the market when compared to modern motorized machines. In the end, the aforementioned features and benefits of this machine can be utilized in activities to achieve a better ocean and land life for the sustainability of the earth in long-term prospects. As for the suggestion or recommendations to improve the current design, the post-testing observation shows the specific sand type of wheel can enable the machine to maneuver better without getting stuck when it is under the full capacity of rubbish. In addition, a fabrication of a trap door mechanism can help user to discharge the rubbish from the machine effectively. Lastly, the replacement of the torsion spring with a more reliable and effective mechanism can aid the rake to return to its collecting position after it is lifted.

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DİJİTALLEŞME VE DİJİTAL EŞİTSİZLİK

Nurdan Kalaycı [1]

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Özet

Teknolojik gelişmeler küresel ekonomilerin odak noktası olarak bir nirengi taşıdır. Dijitalleşme süreci teknolojik gelişmelerle birlikte gelişen bir olgudur. Her yenilik gibi dijitalleşme de süreç içinde işletmeleri etkileyen ve değişime zorlayan bir gerekliliktir. Dijitalleşmek ne kadar normal bir geçiş ise dijitalleşememe ve bunun neticesinde ortaya çıkan dijital eşitsizlik kavramı da normal bir durumda ortaya çıkan sonuçlardan bazılarıdır. Çalışmanın amacı işletmeler neden dijitalleşemez ve dijital eşitsizlik kavramı nedir, işletmeleri nasıl etkiler ya da bu durumun esas nedenleri nelerdir, bilişim teknolojilerinin kullanımı dijitalleşememeyi nasıl ortaya çıkarır gibi soruların cevapları analiz edilerek sonuçlar ortaya konmuştur. En önemlisi de dijitalleşememenin ve dijital eşitsizliğin ardında nelerin olduğunun bilinmesi adına kapsamlı bir analizle bu soruna çözüm bulmak adına problemin gerekçelendirilmesi amaçlanmaktadır. Bu kapsamda teknolojik gelişme hızı, ülkenin sosyo-ekonomik ve kültürel alt yapısı da ele alınmıştır. Sonuç olarak neden dijitalleşemiyoruz sorusunun cevabı genel bir çerçeve ile açıklanmaktadır.

Anahtar Kelimeler: *Dijitalleşme, Dijitalleşememe, Eşitsizlik, Bilişim Teknolojileri.*

Jel Kodu: *M0, M1*

NON-DIGITALIZATION AND DIGITAL INEQUALITY

Abstract

Technological developments are a landmark as the focal point of global economies. The digitalization process is a phenomenon that develops with technological developments. Like every innovation, digitalization is a necessity that affects businesses and forces change in the process. As digitalization is a normal transition, non-digitalization and the resulting concept of digital inequality are some of the results that emerge in a normal situation. The aim of the study is to analyze the answers to questions such as why businesses cannot go digital and what is the concept of digital inequality, how does it affect businesses or what are the main reasons for this situation, how the use of information technologies reveals non-digitalization, and the results are revealed. Most importantly, it is aimed to justify the problem in order to find a solution to this problem with a comprehensive analysis in order to know what is behind the non-digitalization and digital inequality. In this context, the pace of technological development, the socio-economic and cultural infrastructure of the country are also discussed. As a result, the answer to the question of why we cannot go digital is explained with a general framework.

Key Words: *Digitization, Non-digitalization, Inequality, Information Technologies.*

Jel Code: *M0, M1*

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1. GİRİŞ

Dijital teknolojilerin ortaya çıkmasıyla endüstrilerin çalışma şekiller değişmeye başlamıştır. İşlerin ve işletmelerin dijitalleşmesi geleneksel stratejileri ve yapıları dönüştürerek yeni iş yapış modelleri ve tekniklerinin uygulanmasına yol açmıştır. Teknolojide yaşanan bu büyük değişim ve gelişmeler dijitalleşmeyi pek çok alanda zorunlu kılmaktadır. Geleneksel yapıdaki birçok işletme dijital işletmeye, mal ve hizmetlerin üretim ve sunuluş şekilleri de dijitale dönüşümle evrilmektedir. Ancak bazı faktörler işletmelerin dijitalleşmesine ve dönüşmesine engel olmaktadır. Birçok işletme dijitalleşirken bazı işletmeler ve işletmelerin süreçleri buna ayak uyduramamaktadır. Bu geri kalma ve ayak uyduramama durumu dijitalleşen dünyada dijitalleşememeye ve dijital eşitsizliğe neden olmaktadır. Dijitalleşememek bir işletme politikası olabileceği gibi işletmenin yapısından veya geleneksel yapısından da kaynaklanabilmektedir. Dijital dönüşümle beraber dijitalleşememe ve dijital eşitsizlik-dijital körlük gibi kavramların da ele alınması gerekir.

Dijital teknolojiler, işletmelerin iş yapış ve süreçlerini dönüştürerek inovasyon ve yenilik anlamında büyük katkılar sağlamaktadır. Rekabet edebilmenin şartlarından biri işletmelerin varlığını sürdürmek adına mevut konumlarını korumaktır. Bu nedenle tarihte değişime direnen ve yok olan işletmelere bakıldığında dijitalleşmenin kaçınılmaz olduğu görülmektedir. Ancak bazı işletme yapılarında çeşitli nedenlerle dijitalleşememe sorunu gündeme gelmektedir. İşletmelerin ya da iş süreçlerinin neden dijitalleşemediği ise araştırılması gereken önemli bir sorunsaldır. Bu nedenle detayları ile ele alınması gerekir.

2.DİJİTAL DÖNÜŞÜM

Teknik açıdan ele alındığında dijitalleşme "rakamlarla temsil etmek" anlamında kullanılır. Basit yapısal formunda olması sebebiyle bilgisayar dili sıfırlar ve birlerden oluşan ikili kod sistemi ile çalışan bir sistemdir. Analog verilerin dijital verilere dönüştürülmesi, bunlara ek olarak ses ve video gibi materyallerle dijital ürünler oluşturulması, işlenmesi ve iletimi ve kullanılması bu dijital sürece dahildir. Bu yollarla oluşturulan veriler terimsel anlamlarıyla ilişkilendirilerek kullanılabilir hake dönüştürülür. İşletmeler için bu tür işlenmiş veriler kullanılabilir halde fiziksel veri halinden dijital formata dönüştürüldüğünde bilgisayar tarafından işlenmiş olarak ilişki kurulabilir olmaktadır (Gemi, 2016: 5). Kısacası bilgisayar bilimlerinin alanı dünyadaki mevcut veri kaynaklarını dijital ortama çevirmekle ilgilenmektedir.

İşletmeler bağlamında dijitalleşme, veri kaynaklarının ya da verilerin dijitalleştirilmesinden ziyade bir süreç olarak yönetimin ve algıda dijitalleştirme şeklinde bir dönüşümdür. Yani bir işletmenin dijitalleşmesi demek eskiden var olan analog verilerin ya da el ile yönetilen süreçlerin dijital ortama aktarılması ile sınırlı kalmayıp bu ortamların sunduğu iş zenginliklerinin de verimli ve efektif olarak kullanılması ve süreçlerde problemlerin çözümüne uyarlanması ve yönetilmesi demektir (Fichman, 2014: 330).

Dijital dönüşüm son yıllarda işletmelerin iş yürütme biçimlerinde bir devrim oluşturmakla beraber iş modellerinde yenilikler ve uluslararasılaşma süreçlerinde teşvikleri artıran etkiye sahiptir. Ayrıca dijitalleşme ile tüketici-işletme arasındaki geleneksel etkileşim de yeniden şekillenmektedir (Matarazzo vd., 2020:61-62). Dijitalleşme artık işletmeler için teknik bir gereklilik olmaktan çıkmış ve stratejik yönetimin temel konularından biri haline gelmiştir. Bu doğrultuda dijitalleşme ve dijital dönüşümün

odağı güncel çalışmalarla bilgi teknolojileri, bilgi sistemleri, ticari ekonomik ve sosyal bilimlerin alanların yönelik işlemektedir (Wang vd., 2020: 442). Dijital faaliyetlerin büyü çoğunluğu ise inovasyon ve süreçlerde uyum sağlamayla ilgilidir. Artık dijital yenilikler bilgi ve iletişim sektöründeki işletmelerin değil makine, otomotiv, üretim ve lojistik gibi geleneksel alanlarda da geçerlidir (Lichtenthaler, 2018:499).

Dijital dönüşüm, dijitalleşmenin gelişimine katkı sağlayarak uyumlaştırır. İşletmeler bu nedenle yeni teknolojileri en verimli şekilde kullanarak iş uygulamalarında çeviklikle operasyonel süreçler ve modellerinde bütünüyle dönüşüm sağlamaları gereklidir. Dijital dönüşümle üretim süreçlerinde çevreye odaklanmayı ve bu çevre biriminin desteklenmesinin gerekli olduğu veri işleme merkezlerinde esnekliğin artırılması gereklidir. Bu süreç aynı zamanda işletmeler için eski teknolojilerin de kademeli bir şekilde dijital dönüşümle terk edilerek yeni süreçlere hızla geçilmesi de bu bağlamda değişiklik yapılması demektir (Sotnyk vd., 2020:98). Dijital çağın önemli gerekliliklerinden biri ise bu teknoloji ve dönüşümlerden geri kalmadan ayak uydurabilme çevikliğiyle işlerin yürütülmesidir. Teknoloji dijital dönüşümde eylem alanında odak noktası niteliğindedir (Stepantseva, 2020:15).

3.DİJİTAL UÇURUM

Bilgi iletişim teknolojileri (BİT); "bilginin, elektronik ortamda üretilmesi, dağıtılması ve gösterilmesi işlemlerinin bir bütünü" olarak tanımlanabilmektedir. Dijital uçurum "farklı sosyo-ekonomik düzeydeki bireylerin, firmaların veya ülkelerin BİT'ne erişimde ve kullanımında yaşadığı eşitsizlik" olarak ifade edilmektedir (OECD, 2001: 5). Bu terimin ilk kullanımı 1980'li yıllarda Amerika Birleşik Devletleri (ABD) tarafından BİT'ne sahiplik doğrultusunda yaşanan eşitsizliklere dikkat çekmek amacıyla kullanılmaya başlamış ancak bu terime Türkçe 'de karşılık bulmak adına yaygın kullanılan bir sözcük yer almadığı bilinmektedir. Bu bağlamda "Sayısal Uçurum", "Sayısal Bölünme", "Sayısal Ayrım" ve "Sayısal Kopma" gibi kelimeler bu terime karşılık olarak kullanılabilir (Özcivelek vd., 2000: 1).

Genel olarak ifade edildiğinde bilgi iletişim teknolojileri ve eşitsizlikler arasında yer alan ilişkinin mantığına göre kaynakların ya da fırsatların kıt olduğu ve buna yönelik bu kaynak ve fırsatların eşit dağılmadığı (asimetrik dağılım) yerlerde yeni teknolojinin girişi dijital uçurum kavramıyla ilişkilidir. Buna bağlı olarak büyük ihtimalle bilgi iletişim teknolojileri dahil dijitalleşmenin getirdiği yeni oluşumların faydaları da eşit dağılmayacaktır. BİT bireysel uzmanlık ve beceri gerektirdiğinden önemli ölçüde farklılıklardan dolayı mevcut eşitsizlikler de durumu destekleyen bir nitelikte olacağı vurgulanmaktadır (Freire, 1999: 3). Beşerî sermaye için daha düşük yatırımların yapıldığı gelişmekte olan ülkelerde bu bakımdan az sayıda işletme ve bireyler bazında bu teknolojik imkanlara erişim sağlayabilecek konumda olacaktır (Rodrigez and Wilson, 2000: 33). Ülkemiz de bu asimetrik dağılımın var olduğu bilinmektedir. Dolayısıyla temel eğitimde bile yeterli düzeyde imkanların sunulmadığı büyük bir çoğunluk dijital uçumun bir ucunda yer alacaktır. Bu durum ise başta eğitim olmak üzere birçok alanda geride kalmayı ya da yeni teknoloji ve süreçlere ayak uyduramamayı beraberinde getirecektir.

Dijital Uçurumun başka bir eşitsizlik boyutu ise ücretlerin dağılımı bakımından ele alındığında, BİT'nin bireyler arasında eşitsizlikleri artıran ikinci ve önemli bir etkisi olmasıdır (Rodrigez and Wilson, 2000: 33). Bu etkilere bakıldığında ilk olarak yüksek eğitim düzeyinde eğitim alan kişilerin genellikle bu teknolojileri çok iyi kullanabilme imkân ve önceliğine sahip olmasıdır. "Diğer bir açıdan da ekonomik

yaşamda bu teknolojilerin yaygınlaşması bu konuda bilgili insanların ücretlerini yükseltirken niteliksiz işgücüne olan talebi azaltarak bu konuda bilgisi olmayanların ücretlerini düşürebilir. "İkinci bir etki olarak, BİT çeşitli alanlarda firmalara işgücü yerine makine ikame etme olanağı sağlayabilmektedir." Makinelerin insan iş gücü yerine geçmesiyle yeni işsizlikler ortaya çıkarken mevcut ücret sistemlerinde de düşüşler olması yönünde sektörel bazda baskılar ortaya çıkmaktadır. Bundan dolayı son yıllarda bilgi iletişim teknolojileri ücretlerde yaşanan asimetrik dağılımın nedeni olarak gösterilmektedir (Arias, 2000: 7).

4.DİJİTAL EŞİTSİZLİK

Küresel bir sistemde toplumların gelişmişlikleri her tolumda farklılık göstermektedir. Bu farklılıklar Sanayi devrimiyle ilk olarak ortaya çıkmış olsa da bilgi toplumlarıyla birlikte toplumlar arasındaki farklılıklar ve eşitsizlikler daha keskin bir biçimde ortaya çıkmaya başlamıştır. Bilgi toplumları geliştikçe de eşitsizlikler arasındaki uçurum daha da büyümekte ve yeni eşitsizlik türleri ortaya çıkmaktadır (Robinson, Cotten, Ono, Haase, Mesch, Chen, Schulz, Hale ve Stern, 2015:2). Sosyo-ekonomik şartların ve dijital deneyimlerin farklı olduğu bireyler arasında bilgi iletişim teknolojilerine erişim olanakları da farklılık göstermektedir. Bu nedenle dijital eşitsizlik kavramı yakın geleceğin başta gelen önemli sorunlarından biri haline gelecektir. Eşitsizlikler artık ırk ve cinsiyet üzerinden değil gelişmiş teknolojilere erişim ve sahiplik bağlamında ele alınmaya başlanmıştır. Dijital eşitsizlik kavramının çıkış noktası da gelişen bilgi toplumlarında zamanla ortaya çıkan dijital uçurumun neden olduğu eşitsizliklerdir.

Dijital eşitsizlik kavramı iki bağlamda ele alınmaktadır. Birincisi erişim ve sahiplik konusudur. Bireylerin teknolojik imkanlara erişimleri farklı nedenlerle değişiklik göstermektedir (Van Deursen ve Van Dijk, 2015:379). Örneğin kent merkezinde yaşayan birey ile kırsalda yaşayan bireyin internete erişimlerinde farklılıklar olmaktadır. Bu durumun temel nedeni aslında sosyal eşitsizliklerden kaynaklansa da "temel düşünce internete erişimin yararlı olduğu erişim eksikliğinin olumsuz sonuçları olduğu fikrine dayanmaktadır (Van Deursen, Helsper, Eynon ve Van Dıjk,2017:452)." Dijital eşitsizlik olgusunun kapsamı çok boyutludur. Küreselleşen ve gelişmekte olan ülkelerin gelişmişliklerindeki farklılıklar internet erişimlerinde de farklıdır. Çünkü ülkelerin zengin-fakir toplumlar arasındaki boşluk sosyal olarak ve küresel çapta bilgi ve zenginlik açısından farklılıklar ayrıma yol açmaktadır (Sassi, 2005:685-686).

Dijital bölünme kavramıyla ilişkilendirilen internete bağlı olma/ma arasındaki farkların odak noktası bilgiye sahip olup olmamakla yakından ilgilidir (Steyaert, 2002). Dijital bölünme dört başlıkta açıklanmıştır. Bunlar: "Teknokratik yaklaşım, Sosyal yapı yaklaşımı Bilgi yapısı ve dışlama yaklaşımı, Modernleşme ve kapitalizm."

Teknokratik yaklaşım, "dijital bölünme tartışmasının popüler bir biçimi, genellikle sosyal deneylere ve projelere dahil olan yaklaşımdır." Bu projeler genellikle sanal dünyaya yeni kullanıcı gruplarını dahil etmek amacıyla internet erişimini ve kullanımını genişletmeyi amaçlar. Temel fikir, internetin gündelik yaşamın önemli bir aracı haline gelmesidir. İş imkanları sunar, toplulukları güçlendirir ve eğitime yardımcı olur. Esasında teknokratik yaklaşım, bilgi toplumu projesinin bir sonucu olarak ortaya çıkmıştır ve buna göre onu onaylamaktadır. Bu yüzden önerilen çözümlerin geçici olması amaçlanmış ve özellikle cihazlara, ilgili eğitimlere ve anlamlı içeriğe erişimi artırmayı amaçlamaktadır. Teknokratik

yaklaşım kısaca; ilk olarak en gelişmiş ülkelerde bile internet kullanımında hala önemli farklılıkların olduğunu genel olarak kabul eder. İkincisi, kamu sektörünün sosyal, eğitimsel veya ekonomik geçmişlerindeki farklılıklara bakılmaksızın herkese fırsatlar sunarak farklılıkları dengelemesi gerektiğini savunmaktadır. Üçüncüsü önemli olgu ise yeni teknolojinin sosyal eşitsizliğin üstesinden gelme yeteneğine olan güvenini ifade eder."

*Sosyal Yapı Yaklaşımı'*nın çıkış noktası, "mevcut sosyal yapılar ve internet kullanımının eşitsizliğidir. Teknolojik yayılma ilk evrede, genellikle yeni bir ortam radikal olarak kabul edilir ve temel yapılarıyla birlikte tüm toplumu dönüştürebilir. Dünyadaki temel dijital bölünme zamanla azalma eğiliminde olsa bile sosyal tabakadaki temel eşitsizlikler tamamen ortadan kalkmayacaktır. Dijital erişim ve eşitsizlikler bu noktada yapısal ve temel sosyal farklılıklara bağlıdır. Dijital eşitsizlikler ise toplumsal farklılıkların ortadan kaldırılmasıyla kalkacaktır."

Bilgi yapısı ve dışlama yaklaşımı, bilgi teknolojisi ile artan sosyal eşitsizlikler arasında güçlü bir ilişki olduğunu savunur. "Bu yaklaşımın başlangıç noktası sosyal eşitsizliklerle başlayıp sosyal ayrışma ve marjinalleşme süreciyle devam eder. Bilgi iletişim teknolojilerinin rolü bu yaklaşım çerçevesinde coğrafi bir bağlamda incelenir ve perspektif kentsel alanlar arasındaki farklılaşmayı da kapsar. Sosyolojik boyutuyla yoksulluk ve alt sınıfa odaklanma eğilimi göstermektedir ve genellikle bilgi teknolojisinin rolü burada dikkate alınmaz. Mevcut sosyal dışlanma kavramı yalnızca yoksulluğa değil, aynı zamanda istihdam piyasasına, demokratik faaliyetlere, sosyal refah sistemine ve aile ve sosyal ilişkilere ve çeşitli diğer alanlardaki sorunlara da atıfta bulunmaktadır (Aktaş, 2021)."

Modernleşme ve kapitalizm, üçüncü yaklaşımın devamı niteliğindedir. Modernleşme ve kapitalizm yaklaşımı, modern toplumun temel eğilimlerinin daha derinlerine iner. Bilgi teknolojisi ile ilgili eşitsizlikler, oldukça yapısal olarak anlaşılmakta ve teknoloji, yalnızca mevcut eşitsizlikleri güçlendirmekle kalmayıp yenilerini yaratmaktan sorumlu tutulmaktadır. Dijital bölünme sadece bireysel, kurumsal, ulusal ya da uluslararası bir sorun olmayıp yeni medya alanındaki hızlı değişim ve gelişmelerin kuşaklar arasında da farklılaşmaya yol açtığı bir olgudur. Bu durumda dijital bölünme nesiller/kuşaklar arasında da kendisini gösterir ve bu teknoloji kullanımındaki farklılık "dijital yerli" ve "dijital göçmen" kavramlarıyla ifade edilmektedir (Kurt, Günüç ve Ersoy, 2013:6). "Prensky (2001:45-51)'e göre, dijital göçmenler; "dijital dünyanın içinde doğmamış olan ama hayatlarının sonraki bir noktasında yeni teknolojinin birçok yönünden etkilenmiş ve benimsemiş olan bireyler" olarak tanımlanır. Dijital göçmenler bilgiye ulaşmak amacıyla öncelikle interneti tercih etmezler ve internet gibi bağlantıları kullanırken yardım isterler. Dijital yerlilerde bu durum tam tersine işler ve kullanıcılar dijital bir dünyanın içerisine doğmuşlardır (Prensky, 2001:45-51). Bu dijital yerliler günlük yaşantılarının çoğunu çevrimiçi oyunlar, uygulamalar ve yeni iletişim teknolojileri içerisinde harcamakla meşgul olurlar. Dijital yerlilerin genel özellikleri ise, çoklu görevlere, anlık mesajlaşmalara, online oyunlara alışkın olmalarıdır ve bilgiye ulaşma, bilgiyi alma istekleri daha hızlıdır. Dijital bölünme, geleneksel eşitsizlik kaynaklarına erişmede eşitsizliğe maruz kalınmasının yanında aynı zamanda bir toplumsal eşitsizlik faktörüdür. İnternete erişimin eşit olmaması; cinsiyet ve yaş, gelir ve eğitim, ırk ve etnik köken, yerleşim yeri ve türü gibi demografik ve sosyo-ekonomik farklılıklara bağlıdır" (Rykov, Nagornyy ve Koltsova, 2017:71).

Dijital eşitsizlik teorisi, "insanların çevrimiçi olduklarında bile aralarındaki farklılıklardan dolayı

çevrimiçi becerileri gibi birçok faktör açısından önemli şekillerde devam eden asimetrik bir dağılımı savunmaktadır (Hargittai, Piper ve Morris, 2019). Dijital eşitsizlik kavramı internete erişimde insanların eşit olanaklara sahip olması ya da interneti eşdeğer şekilde kullanabilmesi demek değildir. İki kullanıcı internete eşit düzeyde erişse bile rağmen, biri yalnızca eğlence ve haber amaçlı kullanıyorken diğer kullanıcı çevrimiçi bankacılık, finans işlemleri, eğitim gibi faaliyetler amacıyla kullanır." Daha geniş anlamda tanımlamak gerekirse "daha verimli, daha hızlı teknolojiye erişimi olanlar ile farklı beceri seviyelerine sahip olanlar arasındaki farklılıklar" olarak ifade edilmektedir (Stern, Adams ve Elsasser, 2009:392).

İşletmeler açısından dijital eşitsizlikler bireyler bağlamında ele alınanla benzerlik gösterse de daha geniş kapsamda gerekçelerden dolayı yaşanmaktadır. Bunların en temelinde işletmenin dijitalleşmeye olan yaklaşımı gelmektedir. Dijital olanaklara sahip olmak ayrı bir olgu iken bu imkanları doğru ve yerli yerinde efektif olarak kullanamamak da bu eşitsizliğin bir sebebidir. Ayrıca işletmelerin yönetim politikaları da bu durumda önemli bir gösterge olmaktadır. İşletmelerin de bireyler gibi farklı imkanlara sahip olması, bulunduğu bölge, iş kolu ve sektörel durumu gibi göstergeler de bu eşitsizliklere dahildir.

5.DİJİTALLEŞEMEME

Dijitalleşememe, terimsel olarak alan yazında tam olarak tanımlanmamış olsa da genel olarak dijitalleşmeye bir veya birden fazla gerekçe ile karşı durmak anlamı taşımaktadır. Bu bağlamda bireysellikten işletme süreçlerine kadar pek çok gerekçesi veya sebebi olan bu dijitalleşememe durumu temelinde belirli uyumsuzluklardan kaynaklanmaktadır. Çünkü dijitalleşmek bir süreç ister. Bu süreçte işletmenin yapısal uygunluğu, yönetim politikaları, sahip olduğu olanaklar, işletme yapısı olarak dijitalleşmeye uygun olup olmaması gibi sebeplerin ışığında engellerle karşılaşılmaktadır. Dijitalleşmek istemek çalışanlarla birlikte işletme yöneticilerinin de dahil olduğu bütünsel bir oluşum demektir. Bu nedenle öncelikle verilmesi gereken karar işletmenin dijitalleşmeye olan istekliliğidir. Dijitalleşememek de politik olarak karşı durulan ve istenmeyen bir durum olarak algılanabilmektedir. Çünkü yeni teknolojiler her zaman kolay kabullenilmez ve süreçlere bu sistemlerin uyarlanması zaman almaktadır. İşletmenin hazır olmaması zaman, mekân, maliyetler ve sosyo-kültürel açıdan dijitalleşmeye bakış açısı bir karar mekanizmasının sonucunda ortaya çıkmaktadır. İşletme ya dijitalleşerek dijital dönüşümü yaşayacak ya da belirli gerekçelerle dijitalleşemeyerek geride kalacaktır.

6.DİJİTALLEŞEMEMENİN ÖNÜNDEKİ ENGELLER

İşletmelerin dijitalleşmesi için her zaman uygun şartlar olmaz. Bazı işletmeler için dijitalleşmeye engel durumlar vardır. "Bu engeller öncelikle eski işletmenin alt yapısının uyumsuzluğu ile başlamaktadır. Özellikle dijitalleşmenin riskli alt yapısı işletmelerin dijitalleşmesindeki önemli engellerden biridir. İşletmeler yeni kuruluşlarla birlikte çalışmaya başladıklarında uyumsuzluklar ya da bağlantı sorunları yaşayabilirler. Bu süreç hem yavaş hem de zahmetli bir süreç olarak işletme modellerinin yeni sisteme uyum sağlayabilmeleri adına zorlu olabilmekte ve dijitalleşmeye engel olarak görülmektedir" (O'Reilly ve Tushman, 2016).

"Büyük işletmelerde yapısal olarak çoğunlukla pazara entegre olmada farklılaşma problemleri ile karşılaşılmaktadır. Bu anlamda farklılaşma söz konusu olmaktadır. Bunlar işlevsel ya da bölgesel-bilimsel farklılaşma olarak ortaya çıkmaktadır (Deiser, 2018). İşletmeler özellikle de geleneksel yapıda olanlar hem anlaşma hem de farklılaşma konusunda stratejik bir yapıda olmaktadırlar. Bu durum dijital

bir sürece geçişte işleyiş yapısında bir değişikliğe ve statik yapılarda dirence yol açmaktadır. Bu durumda yöneticilerin esnek ve daha uyumlu bir örgütsel yapı oluşturmaları gerekmektedir (Parker vd., 2016). Özellikle geleneksel yapıda olan işletmeler hem anlaşma hem de farklılaşma açısından stratejik bir yapıya sahiptirler. İşletmelerin bu durumu, dijital bir sürece geçişte işleyiş yapısında bir değişikliğe ve statik yapılarda dirence neden olmaktadır. Bu durumda yöneticilerin esnek ve daha uyumlu bir örgütsel yapı oluşturmaları gerekmektedir (Parker vd., 2016).”

Bilişim teknolojileri dijital dünyanın değer yaratan en önemli yapı taşlarından biri haline gelmiştir. “Ancak gerçekte orta düzeyde bir yönetim kurulu üyesinin teknolojiyi işletme dışındaki herhangi bir kişiden daha fazla anlamadığı durumudur. Bu açıdan bakıldığında bilişim teknolojileri departmanları işletmeler için önemli hale gelmiş ve kuruluş için etkin, verimli ve güvenli bir donanımla birlikte yazılım altyapısı sağlama, geleneksel görevlerinin yanı sıra iş zekâsı ve müşterilerle etkileşim gerektiren yeni dijital veya dijital olarak geliştirilmiş ürün ve hizmetlerin geliştirilmesinde önemli konumda paydaşlar haline gelmişlerdir. Bu doğrultuda işletmeler açısından bilişim teknolojileri departman yöneticileri bir yönetim kurulu üyesi kadar stratejik bir noktadadırlar (Deiser, 2018). Bundan dolayı insan kaynakları departmanlarına da önemli roller düşmektedir.”

Dijitalleşme ile mevcut işlerin eski hale gelmesinden kaynaklı olarak yeni beceriler gerektirdiğinden işlerin yapısında büyük bir değişim anlamına gelmektedir. “Bu yüzden eski çalışanlar yeni teknolojiler ile uyum sağlayamamakta ve bu durum işletmeler için bir sorun haline gelmektedir (Parker vd., 2016). Yeni ve nitelikli çalışanlar bulmak da zor olduğundan dolayı personel bu teknolojilerle birlikte insan kaynağı da hızla yenilenmek ve gelişmek zorundadır. Güncel iş yasaları ise bu hızlı gelişmelere ayak uydurmak için yeterli olmamaktadır. Gerçekten de günümüz iş yasaları bir şirketin işgücünün bileşimini işe alma ve işten çıkarma yoluyla hızlı bir şekilde değiştirme esnekliğini sınırlamaktadır. Bu nedenle eski ve teknolojiden uzak çalışanlar şirketlerde çalışmaya devam etmekte ancak teknoloji de gelişmeye ve yeni yetenekli personele ihtiyaç duymaktadır (Deiser, 2018).”

Genel olarak ele alındığında temelde işletmeler için dijitalleşmek bir çözüm iken dijitalleşememenin önündeki engelleri sıralamak gerekirse şu şekildedir: “

- Eski İşletme altyapısından kaynaklanan uyumsuzluklar
- İşletmede çeviklik sorunu
- Dijitalleşmenin riskli alt yapısı
- Yeni kuruluşlarla birlikte çalışma
- Bağlantı problemleri
- Yönetişim sorunu
- Yönetim kimliği sorunu
- Yetkin çalışan sorunu”

SONUÇ

Teknolojik gelişmelere bağlı olarak hızla gelişmekteyken mevcut iş olanakları bu hızlı gelişim ve değişimler karşısında yetersiz kalabilmektedir. Bu nedenle iş yaşamı ve yaşam tarzları da değişime uğramaktadır. Dolayısıyla bireylerin sahip olduğu roller ve bu roller gereği gerekli sorumlulukların da değişim göstermesi olasıdır. Geleceğin iş ve çalışma dünyasında bugünden daha çok sanal dünyanın varlığı hüküm sürecektir. Ayrıca işletmelerin rolleri ve iş süreçleri de buna bağlı olarak yeniden şekillenecektir. İşletmelerin stratejileri de yeniden gözden geçirilerek dijitalleşmeye ayak uydurmak için yeniden dizayn edilecektir.

Dijitalleşememe sorununun çözümü için dijitalleşmenin önündeki engellerin tek tek ele alınarak stratejik kararlar alınmalı ve süreçler bütüncül olarak yürütülmelidir. İşletme yönetimi dijitalleşememe sorunsalının kökenine indiği zaman problemin çözümü konusunda kararlılıkla adım atarak değişim ve gelişimlere açık olmalıdır. Çünkü dijitalleşememenin önündeki en büyük engel dijitalleşmeyi kabul etmemektir. İlk olarak yapılacak iş dijitalleşmeye yönelik alınacak karardır ve bu karar yönetimin inisiyatifinde olmalıdır. Bu nedenle işletmelerin her açıdan ele alınması gereklidir. Sosyo-kültürel yapıdan başlayarak ekonomik süreçlere ve işletmenin faaliyet alanına ilişkin iş süreçlerine kadar bütüncül bir boyutta düşünülmelidir. "İşletmelerin dönüşüm süreci öncelikle üst yönetim tarafından sahiplenilmelidir. Buna bağlı olarak organizasyon yapısı da dijital dönüşümün gerçekleştirilmesine imkân sağlayacak şekilde gözden geçirilmelidir." Ayrıca değişime karşı ortaya çıkması muhtemel dirence yönelik olarak işletmeler yenilikçilik kültürü geliştirmeli ve hâkim kılmalıdırlar. "Elbette bu süreçte devletlere de büyük görevler düşmektedir. Bu bağlamda devletler, finans kuruluşlarının ve yatırımcıların, dijitalleşme yatırımlarına kaynak aktarmalarını sağlayacak mekanizmalar, destek programları, eğitim altyapısının uygun şekilde dönüştürülmesi gibi bu ekosisteme dâhil olan alanlarda üstüne düşen görevleri yerine getirmekle yükümlüdür. Bilhassa okullar ve üniversiteler, dijitalleşme ile beraber yeniden şekillenen iş yapış biçimlerine uygun iş gücü yetiştirebilmek için bu dönüşüme uyumlu nitelikli eğitimi ve ortamını tasarlamalıdırlar (T.C. BSTB, 2023:161-162)."

İşletmelerin üzerine düşen dijitalleşme bağlamında önemli görevler vardır. Değişime açık olmakla başlayan fikirsel uyum süreciyle birlikte eski işletme alt yapısının uyumsuzluğu sorununun çözülmesi, işletmenin çeviklik kazanması, dijitalleşmenin planlanması ve stratejik boyutlarının belirlenerek yürütülmesi gerekmektedir. Ayrıca alt yapı sorunun ortadan kaldırılması, bağlantı süreçlerinin sağlanması ve en önemlisi de nitelikli insan kaynağı konusunda işlerlik kazanılmasıdır.

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RENEWABLE ENERGY: A HOBSON'S CHOICE FOR SUSTAINABLE DEVELOPMENT

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Abstract

On account of indiscriminate uses, the conventional sources of energy or fossil fuels are on the verge of depletion. Even if it remains available with us we cannot afford to use them further as they are solely responsible for bringing out abrupt climate change, global warming and hazardous pollution. Such sudden changes in the environment have started to adversely affect human beings and all kinds of species. They are honest and sincere enough to treat the haves and have-nots alike. We have started to face its disastrous and dire consequences and it is the right time to look for alternative and renewable sources of energy before the crisis for us further deepens. It is true that we have taken a long stride in all walks of life but at the same time we cannot ignore the fact that we achieved them at the cost of compromising with sustainability. It is such a burning issue which demands attention of every individual and we need to exert a concerted effort to combat this ecological terror all set to ambush us. For sustainable development, the world has remained with no option other than seeking the shelter of renewable energy. As a responsible citizen of this world, every one of us needs to ensure a clean environment and hand over the same thing to our posterity. The present article shall discuss how renewable energy has become indispensable for sustainable development. In the course of debate and discussion, we shall focus on various sources of renewable energy and various advantages and disadvantages pertaining to its production and optimum utilization.

Keywords: Alternative and Renewable Energy, Fossil Fuels, Climate Change, Global Wwarming, Sustainable Development.

Jel Codes: Q0, Q3, Q4, Q5

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1. INTRODUCTION

Human lives now have totally been based on science and technology and thus we become synonymous with electricity and without its availability our survival remains at stake. Gone are the days when its presence was deemed as a sign of luxury and aristocracy, now it is everything to us – part and parcel of our day to day lives. We can't afford to spend a single day without it. Our dependence on its availability is to such a great extent that sometimes it seems we become slaves to our own inventions.

The uses of coal, oil and gas are called fossil fuels. They are known as non-renewable resources of energy because they cannot be reutilized and recycled. It requires a thousand years to form. Moreover, when fossil fuels are used to produce electricity and other kinds of various energies, they emit a huge amount of harmful greenhouse gases, such as carbon dioxide, methane and nitrous oxide. These harmful and toxic greenhouse gases are responsible for bringing out phenomenal change and deterioration in environment and ecology. Consequently we face the predicaments arising out of climate change and global warming. To get a sigh of relief from the tyranny of global warming we are bound to look for some alternative sources of energy which may be capable of keeping equilibrium between development and environment. Such urgent requirements justify the well said proverb, "Necessity is the mother of invention." Thus the need for some sorts of renewable energy is felt. The energy based on the bountiful blessings bestowed by nature and that too without her own chastity being compromised. Renewable energy is nothing but the energy that is achieved through the use of natural resources. In all this process the natural resources play the same role as catalysts play in the chemical reactions. It facilitates production of energy and in this production process, itself remains undiminished and non-depleted.

2. SOURCES OF RENEWABLE ENERGY

There are several sources of renewable energy. Here we shall discuss six major and popular sources for generating renewable energy. They are solar energy, wind energy, biomass energy, geothermal energy, hydropower energy and hydrogen. Now we shall debate them one by one:

2.1. Solar Energy: This is the most popular form of renewable energy. As the name implies, this energy is directly achieved from the sun. To generate this energy solar panels are brought into application. These panels remain coated with semiconductor material named silicon. Solar panels are also known as photovoltaic or PV panels and they are made to last for more than twenty five years. It works on the principle of photovoltaic effect which asserts that some specific materials generate a voltage or electricity when they are exposed to radiant energy or light. Solar energy has multiple uses but the commonest use is to generate electricity. It is one of the cheapest and easily available sources of renewable energy.

2.2. Wind Energy: It is another cheapest form of renewable energy. Wind is readily available in the environment in the free and clean form. Wind energy is created through wind turbines which rotate under the influence of wind, thus wind as energy is first converted into mechanical energy and this mechanical energy is finally converted into electrical energy.

2.3. Biomass Energy: It is another source of renewable energy as it uses various kinds of wastes to convert them into energy. Solid waste, landfill gas, alcohol fuels, wood and agricultural products are

some of the ingredients used as raw materials for producing biomass energy. Biomass is burnt in a boiler which produces steam of high-pressure. This high-pressure steam flows over turbine blades which in turn rotate and create mechanical energy. Again this mechanical energy is further converted into electrical energy.

2.4. Geothermal Energy: Heat continuously keeps on generating inside the core of the earth. This feature of nature is utilized to generate heat and electrical energy. The steam collected in this process is used to drive the turbine blades of geothermal power plants. Thus steam energy is converted into mechanical energy which is ultimately converted into electrical energy.

2.5. Hydropower Energy: It is one of the largest and oldest sources of renewable energy. The natural flow and force of a fast running and free falling stream is used to produce electrical energy. Reservoirs and dams of different capacities are built to control the momentum of the stream in the required amount and to cater the needs of generating the desired electrical energy. Again this force of stream is used to run the turbines which become potent enough to produce electrical energy.

2.6. Hydrogen: The most abundant element available on our planet is hydrogen and its two-thirds are found in the form of water. It can be preferred because if we separate hydrogen from water, it can be used as a fuel free from carbon. This separation can be achieved through electrolysis - the process in which electricity is used to split water into hydrogen and oxygen.

3. RENEWABLE ENERGY: ADVANTAGES

The most significant advantage of renewable energy is that it is congenial for both living beings and the environment. Non-renewable energy, which is predominantly fossil fuels, poses a threat of unbearable pollution and environmental hazards like acid rain, climate change, global warming, etc. Main feature of renewable energy is that it is produced from natural sources. Therefore, it is a greener and cleaner form of energy. It generates a minimum quantity of secondary waste. Unlike non-renewable sources of energy there is hardly any carbon emission in its generation. Thus it poses hardly any harm to the environment. Moreover it reduces dependency on importing of high priced fuels.

It is found in unlimited quantities on the earth. It is relatively more reliable and easily available than other forms of energy. It is produced through the use of such natural resources like sun, wind, water etc. which replenish and restore at higher speed than they are consumed.

The building of new nuclear and coal power plants requires more investment of money and resources than that of renewable energy installations. Consequently electricity through renewable sources is relatively cheaper. Once electricity is available at cheaper rates it ultimately reduces production cost of several products and thus profit margins are significantly improved.

It can reduce dependency on the power grid or any third party. Using natural sources like the sun we can install our own solar panels within our own premises and thereby we can meet our own energy

demands and sell the extra unit of energy to the grid as well. We can achieve such a great feat with one time and little investment.

4. RENEWABLE ENERGY: DISADVANTAGES

Before we should look for disadvantages, here it would be very pertinent to cite a quotation from Laurell K. Hamilton's novel, "Incubus Dreams (2004)": "They say there is no light without dark, no good without evil, no male without female, no right without wrong. That nothing can exist if it's direct opposite does not also exist." It is true that several benefits and advantages are linked with alternative energy sources but at the same time we cannot ignore the disadvantages associated with renewable energy. Let us have a look at them:

For generation of renewable energy we need a choosy and peculiar location. For example, solar energy cannot be harnessed in the locations dominated by cold, rain and snow.

It is not feasible to ensure renewable energy round the clock. Its generation strictly depends on the existing weather conditions. For example in case of bad weather conditions, rainy seasons and in the absence of the sun, generation of solar energy will be affected.

The efficiency of renewable energy with respect to traditional or conventional sources is relatively low. The efficiency of renewable energy is almost fifty percent lower than that of non-renewable energy. Moreover we have more sources of renewable energy than that of conventional sources of energy. As a result, for every source we need to apply a peculiar device and technology for its production.

The requirement of huge space for production of renewable energy is another matter of great concern. It demands more spaces with respect to the space required for the installation of non-renewable sources of energy.

Though generation of renewable energy is based on the natural resources but their storing, transmitting and application requires such auxiliary devices which may defunct after some use and becomes a permanent waste whose disposal and recycling may emit pollution.

When we consider the quantum of renewable energy generated and the cost involved in it, it brings about big disappointment in terms of budget. The initial cost required for production of renewable energy is certainly high and matters of great concern for any form of firm and establishment.

5. RENEWABLE ENERGY: PRESENT & FUTURE

Fossil fuels are available with us in limited quantities. With the passing of everyday, we are running through a risk of its shortage and utter depletion. Because of high demands and poor availability, their prices keep on soaring every now and then. Moreover, by now, in this article itself we are well aware of

the various climatic and environmental threat uses of non-renewable sources of energy pose to us. These threats themselves are capable enough to raise a sign of caution against continuous and further uses of fossil fuels. So we are in the dire need of promoting renewable energy not only at the present but also for the future uses. The data revealed by the website of the United Nations can certainly provide some solace and a glimpse of optimism: “Cheap electricity from renewable sources could provide 65 percent of the world's total electricity supply by 2030. It could decarbonize 90 percent of the power sector by 2050, massively cutting carbon emissions and helping to mitigate climate change.” Thus we can safely promulgate that renewable energy has a future and the future is going to be of renewable energy.

CONCLUSION

Life without electricity is blank and bald. The population of the world is not only increasing, rather we can say it is exploding. The requirement of energy is proportionately galloping. We need to have a fine balance between nature and sustainable development. We need to think not only for ourselves but also for the well being of our offspring and succeeding generations. Seeing the ongoing global warming and climate change we cannot afford to continue with fossil fuels. The impending predicaments do not permit complacency of any kind or degree. We need to take a pledge of promoting and adopting renewable energy which has multi fold benefits. In this era of population explosion and unemployment crisis, it can open a fresh opportunity for employment also. Renewable energy has become indispensable not only for sustainable development but also for our sound health and survival.

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