Investigating Willingness to Conserve Energy and Perceived Ease of Communication about Energy Use at Workplace in Islamabad

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CERTIFICATE

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Dedication

This work is Dedicated to my beloved Parents

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ABSTRACT

Research on psychological factors related to employee's decision makings about energy conservation within organizations is limited. This study used attitudinal (internal) and external determinants by using quantitative analysis to better predict workers energy saving behavior at workplace. The goal of this research was to observe behavioral impact on office occupant's energy saving efforts and their ease of communication within office settings about energy use at workplace. We examined the individual and organization level factors related to energy conservation behavior at both government and private sector offices. We found that an employee having only Energy Saving Belief (ENSB) that does not leads to greater change in behavior. While office occupants who strongly believed that energy conservation is beneficial for environment (ECBE) have willingness to save energy at some cost of personal comfort and find it easy to communicate with colleagues about energy use pattern. Participants of the survey who actually think comfort is tied to their productivity at work reported less willingness to conserve energy in summers but in winters have shown positive relationship with (1) Willingness to save energy; (2) willingness to save energy in winters (3) Perceived ease to

communicate. Group norms and organizational support predicted no influence on energy saving behavior. The study demonstrates a path for future research to consider psychological factors having effect on energy saving behavior.

Chapter 1

INTRODUCTION

Globally rising demand for energy, fossil fuel dependency, increasing emission, efficient use of energy and energy conservation are becoming more and more important. Energy conservation is identified as the most important element of energy policies addressing the problem of growing energy consumption. This conservation basically refers to efforts made by individuals to save energy. It involves the reduction in energy consumption due to change in individual behavior and this reduction in energy consumption can be achieved in conjunction with the use of energy efficient appliances. At present, the renewed energy conservation research is motivated by the concerns about environmental problems such as climate change, and greenhouse gas emissions, which are becoming a threat to biodiversity. Energy crisis are experienced by a number of developing countries. These crises can be minimized with government regulations, technology improvements and increasing public awareness. By observing individual behavior is deriving a path to better deal with the ongoing energy issues and it can also lessen the global problems like climate change (Dietz, Gerald, Gardner, Stern, & Vandenbergh, 2009; Vandenbergh, Barkenbus, & Gilligan 2008). In recent research, scholars acknowledged that occupants energy use pattern is predicted through their energy use preferences, as well as the occupant's interaction with buildings (e.g., energy used for lightening systems, occupants adjusting the heating and cooling systems during both summer and winter seasons), significantly influence the energy consumption at offices and also help reducing the carbon emissions (Brown, Dowlatabadi, & Cole, 2009; Janda, 2011; Masoso & Grobler, 2010).

The current energy crisis is faced by several developing countries and this problem needs to be resolved quickly in coming years. Pakistan is also a developing country having a population around 201.5 million people (in year 2018) and is facing severe economic crisis.

The country is facing electricity shortfall. Therefore, serious attention is required to cover this gap. Pakistan is lagging far behind from developed countries in terms of electricity generation (Ahmed et al, 2016). Several measures are being under consideration to deal with this problem. The energy shortage can be lessened by constructing new dams, shifting to solar energy projects and making investments in coal projects. There are vast opportunities to tackle down the energy crisis in Pakistan. One way is to increase energy supply by making investment in energy sector. The construction of new dams requires financial cost and time to meet the current needs of energy demand.

Coal is one of the largest source of energy supply around the globe as well as anthropogenic source of carbon dioxide emissions. It is primarily used for electricity generation for utilization purpose in household and industrial sector. The investment in coal sector for electricity generation can release byproducts which include sulfur dioxide SO_2, nitrogen dioxide NOX, particulate matter and mercury. These byproducts are severely harmful for environment and thereby leading to climate change. In addition, it can have harmful health effects as well. Pakistan is also adding capacity to the grid by investing in coal sector. Investment in coal sector is biggest contributor of CO_2 emissions. Hence Pakistan should invest in green technology rather than coal to generate energy.

Hydroelectric power is another major source of generating electricity. The increase in electricity production through utilizing hydroelectric power requires new dams. Some of the ongoing mega projects are Neelum-Jehelum, Diamer Basha dam and Dasu dam. In developing dams for the hydro electrical power major issues are being faced. The construction of new dams requires great financial resources, because initial investment is very high, and it will take long time. Second major issue is the resettlement of inhabitants (Ahmed et al, 2016). These hydro projects can have both positive and negative environmental impacts. The investment in hydro power plants will contribute to global warming in coming years, because reservoirs accumulate

different plant material, which then decomposes and release methane in uneven bursts. The solutions discussed above are from supply side.

The second major source is to act from demand side. According to the International Energy Agency (IEA), if we improve energy efficiency in industrial processes, transportation and its wide utilization in residential sector/buildings, the energy demand will be reduced by one third and it will eventually decrease the greenhouse gas emissions. Increasing energy consumption and environmental problem, specifically the global problem of climate change problem is due to man-made green greenhouse gases (GHGS), is such a serious issue that needs to be deal through cumulative individual level efforts. It can be achieved through spreading the idea of efficient use of energy (energy conservation method) with the existing technologies can save up to 20% energy. This ultimately decreases the higher concentration of CO_2 emissions (Bose, B.K., 2010). In a previous study, Swedish joint policies for energy and climate asserted that through adopting the idea energy efficiency and energy conservation will help reduce 40% greenhouse gas emissions by 2020 (Martinsson, J. et al, 2011).

Moreover, structural and operational changes at organizational level are more effective in order to achieve long term impact. In long term energy conservation can only be possible through changing energy use behavior at organizational level. Employees reduced energy use after receiving energy consumption information of fellow employees that have been working in other unit (Siero, Bekker, Dekker & Van Den Burg, 1996). The commercial sector includes office buildings (government and private), where energy is consumed for the purpose of thermal and visual comfort. The office occupants contributing their services in both government and private sector use electricity for thermal and visual comfort. Researchers have now recognized that social and physical factors (aspects) play a crucial part to reveal complete knowledge about employee's behavior at offices and also benefits to improve energy efficiency among public at communal level (Sovacool et al, 2015; Steg, 2008).

The inter-governmental panel on climate change (IPCC) discusses that commercial sector signifies the largest potential to decrease the emissions by 2020. By emphasizing on psychological factors related to energy consumption, rather than the technological factors, can offer a valued understanding of energy saving efforts (e.g., Abrahamse and Steg, 2011; Gifford, 2014; Kazdin, 2009; Swim et al., 2009). Additionally, building structure behavioral modeling can benefit from considering occupant's decision making process (Wangner, et al, 2007). Earlier researchers have stated that various number of psychological determinants are connected to energy saving behavior of employees at individual and institutional level. One of the factors is workers feeling of responsibility to decrease electricity consumption at work. (Scherbaum, Popovich, and Finlinson, 2008). The internal and external factors of attitudes are strongest predictors to change individual behavior, which gradually leads to energy conservation at workplace. The increasing energy consumption damages the energy safety and also intensifies the emerging problems of third world (developing countries). Employees can contribute to energy conservation through initiating energy conservation process. The suggested solution to reduce energy consumption in organizations is to save energy consumption on continuous basis (Zhang. Y. et al, 2013).

The current research explains the workplace energy conservation dealing with attitudes, norms, energy saving beliefs and organizational support resulting into energy conservation situation. The organizational level energy conservation is beneficial when numbers of factors are being considered. These factors include environmental attitudes, which greatly impact the energy use behavior of employees at workplace.

1.1 PROBLEM STATEMENT

The supply side solutions suggested to deal with energy crisis are costly and time consuming. On the other hand, solutions on the demand sides are less costly and will be effective in less time period. The commercial sector is one of the major consumers of energy (consume8%, According to Pakistan Economic Survey 2016-2017) gradually contributing to rising level of greenhouse gas (GHG) emissions along with major sectors like industrial and residential sector (households). In these rapidly becoming energy efficient developed countries, other developing countries are facing energy crisis, and are attempting hard to meet the growing demand for energy. When assessing the energy crisis, the energy conservation solution will be effective in attaining the target of energy crisis. In fact, it may benefit the users by reducing energy bill. The socio-psychological factors could be major area through which the energy demand could be reduced.

1.2 RESEARCH QUESTION

Do the psychological factors like attitude, behavior and perceived control greatly influence the energy saving behavior thereby resulting in reduction of energy consumption in offices at some cost of thermal and visual comfort?

1.3 OBJECTIVES OF THE STUDY

1. The main objective of the study is to examine whether attitudinal factors play a significant role in shaping energy saving behavior in workers at the office buildings.
2. The second objective is to examine the change in energy saving behavior of individuals across seasons (summer & winters).

1.4 SIGNIFICANCE OF THE STUDY

As discussed earlier there are several solutions for the current energy crises in the country. These all are either costly or long-term solutions. More importantly even if the

solutions are achieved they would not overcome the crisis in the long term, if the behavior of the residents of the country is not energy saving. In this context, the current study will be an important step in examining the attitude towards energy use. This research adds to the literature as it is first of the kind in Pakistan. In addition, it will also help the policy makers to formulate policies to influence people behavior towards energy use. This can be done through various awareness creating campaigns for efficient utilization of energy. Since the share of commercial sector energy use is 8% in Pakistan, change in behavior for the efficient utilization of energy would constitute significantly in controlling the shortfall that the country is currently facing.

Chapter 2

REVIEW OF LITERATURE

The occupant's satisfaction parameters like thermal comfort and thermal satisfaction, indoor air quality and overall indoor climate are essential to measure the overall building energy performance. Self-productivity parameter also corresponds significantly, and to measure the overall building performance, there is need to assess both technical parameters and also the appropriate behavior of office occupants according to the specific building concept (A. Wagner et al, 2007). Moreover, the household sector is rapidly increasing the demand for electricity consumption and there is strong urge to increase energy conservation, the insufficient information and higher cost are the barriers against energy conservation, so informational strategies which will change individual behavior, knowledge, perception, cognitions, norms and motivations. Besides, informational strategies are important to implement structural strategies intended to force individuals to change behavior (L. Steg, 2008).

The households shown lower electricity consumption after installation of feedback monitors, which is used to measure overall consumption cents per hour. Energy use in certain homes decreased even in months of extreme weather L. McClelland and S.W. Cook, (1979). The change in household energy consumption (direct and indirect energy) is clearly influenced by psychological factors such as the change in individual behavior. To promote effective energy saving behavior, certain parameters can be captured like behavioral control, energy saving belief and other factors of norm activation model (Abrahamse & Steg, (2009). The energy conservation process can be enhanced, when we pledge it at individual level. This progress in energy saving efforts can be achieved by providing them information about their

Electricity consumption and making comparison with others will increase energy conservation without including the financial incentive. Response relapse behavior pattern is required to achieve more sustained energy conservation in future (Peschiera et al, 2010).

Researchers have identified that environmental attitudes and socio-economic factors have large impact on energy savings. Environmentally concerned people with higher income tend to save more energy than people with lower income and insufficient information. In relative terms the effect of environmental and economic factors is greater in apartment blocks than in detached housing and larger in higher income households than lower income groups (Martinsson et al, 2011).

However past patterns of energy use and shift to sustainable energy consumption can be drawn to meet the growing energy demand of both commercial and household sectors. Energy conservation is induced by indicating several components which are individual attitudes change in individual behavior, economic factors, improvement in energy efficiency and utilization of renewable energy sources (Douglas Jesse et al, 2013). The awareness factor similarly plays fundamental part in the light of certain events such as natural disasters (earth quake). The shortage of energy supplies motivated office occupants to reduce electricity consumption after an earthquake in japan. However self-estimated productivity was lower when reduction of 15% electricity was implemented through use of less lighting and higher thermostat settings among workers in Tokyo. About one third of workers reported no changes in productivity, while the remaining employees reported varying amount of productivity loss. There is need to implement strategies which do not effect workers' productivity because comfort and productivity is correlated with energy saving strategies. Awareness regarding electricity saving plays crucial role in changing occupant's behavior, the occupants having no

Prior awareness developed regarding energy saving attitude after electricity was reduced in offices (S. Tanabe et al, 2014). While in normal circumstances energy saving is greatly influenced by the subjective and injunctive norms, attitudes and behavioral intentions. To engage in energy conservation activities, another new factor sense of community is discovered having positive influence on behavior, which will practically transform behavior (Graham N. Dixon et al, 2015).

The measurement of buildings energy performance revealed uncertainty of occupant's behavior. This finding emphasizes to monitor occupants behavior and greater needs for developing efficient methodologies and implementation of occupant behavior models. Development of occupant behavior modeling involves leveraging the capability and resources of researchers and experts around the world to develop robust modeling of occupant behavior in buildings (Da Yan, William Obrien et al 2015). The recent study has reported strong connection between environmental worldviews, self-reported energy conservation behavior and behavioral intentions. Energy use behavior of individuals has become an interesting area of research for energy conservation purpose and the basic factors being addressed which is related to energy conservation behavior of individuals are imperative, if effective energy interventions are developed (Scherbaum et al, 2008). And in a recent study, people have shown stronger personal norms about buying organic food the less they perceive organic food is expensive. It will derive a path for deeper understanding of attitude-behavior-norm relationship which can be predicted by analyzing the relationship between attitudinal variables and behavior of interest (Thøgersen, J. & Ölander, F., 2006)

The home energy reports are providing feedback on past energy consumption of households, deliberately reduces the energy consumption among different household groups. And also delivering information about energy use of other household groups resulted in significant reduction of electricity consumption among different household groups. It will

indicate potential insights from behavioral sciences need to be taken for boosting energy conservation behavior (changing consumer behavior) (Alcott, H., 2011).

Abrahamse et al. (2005) demonstrated the relative importance of interventions that aimed to change the energy use. Another new determinant knowledge was considered, but it has only shown increase in information of an individual, which not necessarily leads to increase energy saving efforts. The researcher emphasized on providing comparative feedback to individuals relative to other individual performances can effectively encouraged energy savings. Moreover, less importance is given to environmental impacts of energy savings. Becker, L.J., (1978) examined the effects of motivational feedback on performances, which can be better achieved by setting some difficult goals. Energy reduction goals are given to households and in response feedback about their energy consumption reduction was provided to these families, which in turn boost the energy performances of families.

Sardianou, E., (2007) investigated the energy conservation determinants in Greek households and found that socio-demographic factors and economic variables strongly motivate consumers to adopt energy conservation measures. However environmental attitudes, personal beliefs and norms information must be delivered at primary level, because these attitudes beliefs and norms of younger generations are more receptive to changes. Xu, X., Maki, et al, (2016) investigated the internal and contextual factors related to energy savings at workplace and also employee's communication about energy use with their co-workers. That clearly elaborated the social-psychological factors which determine energy conservation behavior of employees.

2.1 ATTITUDE-BEHAVIOR-CONTEXT MODEL

The Attitude-Behavior-Context Model (ABC) will better predict the link between attitudinal and external factors, which determine worker's willingness to conserve energy and ease of communicating with co-workers about energy use. Conservative modeling indicated that city wide modeling implementation of device could yield or save 3% or 2.4% total savings of water and energy consumption. In this study, non-monetary benefits were identified including different level of water and energy supply, infrastructure and climatic change mitigations. Resource consumption awareness devices evaluated in this research strongly assist resource consumers to take ownership of usage or individually tackle individualistic and society driven conservation (water and energy conservation) goals. This ultimately helps reducing the ecological footprint of built environment. The energy conservation can be achieved through reduction in hot water usage for showering purpose ultimately conserves both water and energy (Willis, R.M., et al, (2010).

The Attitude-Behavior-Context (ABC) Model emphasizes the connection between Attitude and Behavior that certainly depends upon definite conditions (C, known as the context). The attitudinal and external factors collectively work together that influence individual behavior. When a behavior of an individual is not appropriate than his attitude cannot derive a path for positive energy saving behavior (Guagnano et al, 1995). The ABC Model was established particularly for understanding of pro-environmental behaviors and has confirmed beneficial for reviewing behaviors of individuals at public and home surroundings. It can be confirmed from the research established by (Guagnano et al, (1995) tested an experiment, when individuals have both positive attitude and recycling bin is easily available, revealed recycling behaviors. It also revealed that attitude is a strong forecaster of individual behavior, when a reprocessing basket was not simply reachable.

The study conducted in UK concerning psychological aspects like environmental attitudes, beliefs, energy use behavior, ownership levels for certain appliances and their utilization patterns in households indicated that public is interested in modifying their behavior about energy use. And environmental damage based on the information provided about household energy consumption associated with environmental impact will also leads to behavioral change of individuals. Therefore, there is an urgent need to provide information to individuals about their accurate energy consumption and environmental impact information which will stimulate energy rational and environmentally suitable behavior among users (Mansouri, I., et al, (1996). When assessing the energy saving habits from various organizations, various factors are considered like employment level, personal norms, image modeling and perceived harm that affects worker's energy saving behavior. While extrinsic benefits and perceived benefits do not clearly affect the energy saving habits. Some other derived factors are enjoyment and image is quite effective in determining the usefulness of energy saving behavior (Zhang, Y., et al, 2013).

2.2 CONCLUSION

The recent studies strongly emphasized on promoting energy saving behavior at both household and workplace level. The results of previous studies have shown significant effect/influence of various factors linked to human behavior. Individual's energy consumption/use is changed in certain environmental conditions by various determinants. These determinants are environmental attitudes, personal beliefs and norms. Implementing informational strategies are helpful in changing individual behavior at certain primary (initial) level because attitudes, beliefs and norms of younger generation are more receptive to changes. These informational strategies can modify individual behavior, knowledge, perceptions, norms and cognitions. At workplace energy consumption is affected by psychological determinants like subjective, injunctive norms, attitudes and behavioral intentions. The studies done in

previous years established the fact that psychological factors are related to individual behaviors either at workplace or at household level. The past finding emphasizes to monitor office occupants behavior and strong needs to develop efficient methodologies that capture the psychological factors. These determinants modify office occupants' behavior resulting in boosting energy savings at workplace in near future.

Chapter 3

THEORATICAL UNDERPININGS

3.1 ATTITUDINAL FACTORS

3.1.1 Energy Saving Belief:

The employees having positive attitude towards pro environmental behavior at work place will be beneficial. This relationship between attitude and behavior will leads to positive environmental concerns. Individuals having stronger energy saving belief will derive a path for reducing energy used at work. Abrahamse and Steg (2011) found that energy saving attitudes remained a forecaster of domestic energy saving purposes and subordinate quantities of energy consumption. In the interim, researchers have revealed that individuals having constructive ecological approach are more engaged in conservational behaviors at offices (Norton et al., 2015), The evidence is clearer when people are having stronger belief to preserve energy, they are more concerned to reduce energy consumption for multiple purpose.

3.1.2 Comfort Productivity Belief

The employee's belief about connection between comfort conditions (thermal and visual comfort) and workers' productivity is less frequently discovered factor. Moreover, it is reasonable because individual's productivity always depends upon the physical comfort they are attaining at workplace. In a slightly extreme circumstance, when a decrease of 15% energy usage was mandatory through use of a reduced amount of lights and cooling systems amongst employees in japan (Tokyo), the ratio of one-third of the participants have confirmed no loss in output, although the remaining revealed loss in output (Tanabe, et al, 2013). The comfort productivity link is evident because individual's productivity at workplace depends upon thermal and visual comfort. The employees having negative belief in comfort productivity link

are less interested in conserving energy during working hours and perceived it more difficult to convince their workers about saving energy.

3.2 EXTERNAL FACTORS

3.2.1 Group Norms

Norms are known as traditionally collective principles about how individuals behave in various conditions or how they should behave according to their environmental conditions (Cialdini & Trost, 1998). These external determinants focus on the descriptive and injunctive norms also known as perceived norms. The widely held of proceeding readings on the association among group norms and worker electricity consumption have solely worked on either descriptive norm which shows how individuals behave or they just tested the injunctive norms which shows how employees should behave according to their environmental circumstances.

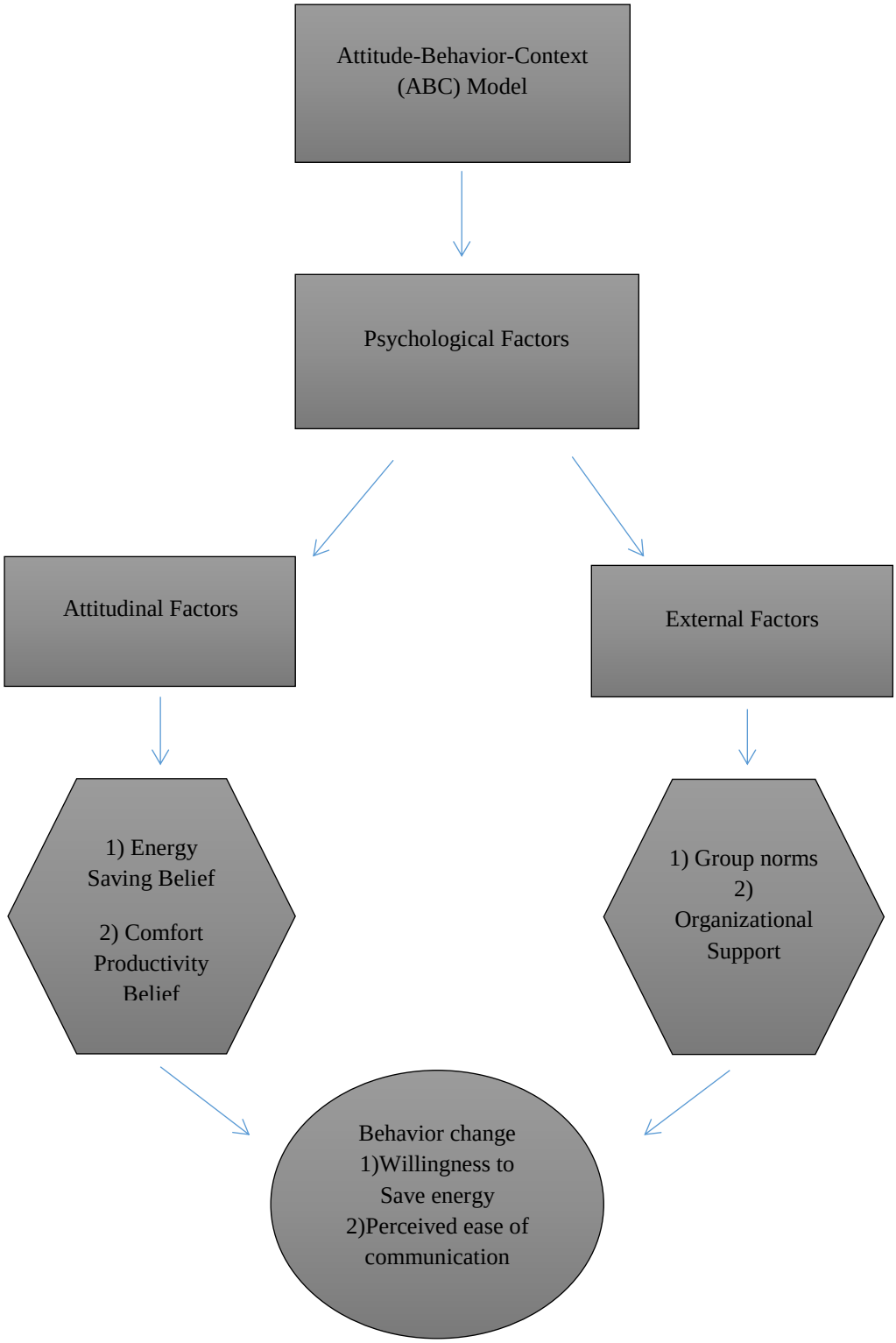
The combination of injunctive and descriptive norms will tend to motivate employee's energy saving behavior. In the previous research study done by Fishbein and Ajzen (2010) considered that perceived norms (group norms) are essential in order to predict and modify human behavior. The influence of these norms indicates that people who believe there are supportive group norms at offices were supposed to be keener to save energy during their working hours and also perceived it better to talk about energy use with their co-workers.

3.2.2 Organizational Support

The more pronounced external determining factor is organizational support that possibly will also contribute in augmenting energy use behavior at organizations. In broad-spectrum employees need to diminish subjective uncertainty and they need to regulate their behavior according to environmental conditions (Weick, 1995).

By proposing unambiguous organizational support is an approach to decrease vagueness and has been interconnected to upsurge worker's pro ecofriendly purposes and behaviors. The encouraging organizational and supervisory policies were more profound to affect employee's behaviors. These policy implementations clearly motivate workers to implement ideas that positively affect natural environment. It is shown in a research study that sound transferred organizational policy was positively linked with worker's willingness to promote eco- initiatives (Ramus & Steger, 2000). individuals who know their institute is compassionate in reducing energy use through promoting energy conservations policies in company meetings, implementing regulations about excess energy use during working hours, announcing financial incentives are more likely to reduce energy consumption and find it at ease to connect with colleagues regarding energy consumption.

Figure 3.1 Conceptual Framework



Chapter 4

DATA AND METHODOLOGY

The emphasis of the study is to observe the impact of psychological factors on employee's willingness to save energy and perceived ease of communicating about energy use at workplace.

4.1 DATA

We have collected the data from various organizations i.e. educational institutions (PIDE and Quaid-i-Azam University Islamabad), banking sector (UBL), ministries (Ministry of Climate Change Islamabad, Ministry of Commerce and Ministry of Forestry and Institute of Strategic Studies Islamabad), private companies (Bestway cements Islamabad, Siemens Islamabad, PRIME and SDPI) and OGDCL. The sample size is consisting of 200employees, who are contributing their services in various professions. The study area covered Islamabad based on primary survey, convenient sampling technique was used to collect the sample. The questionnaire was designed according to the objectives of the study which covered attitudinal factors, external factors along with demographic factors that have a large impact on workers energy saving behavior. The current study applied quantitative to examine the attitudinal and external determinants to scrutinize the employee's will to reduce energy use at some cost of comfort and ones perceived ease of communicating with co-workers.

The data of attitudinal factors like energy saving belief, comfort productivity belief and external correlates that include group norms and organizational support was collected. These attitudinal and external factors together influence the willingness to save energy (WTSE) and perceived ease of communicating about energy use (PEC). The relationship between attitudinal and external factors was inspected; moreover their impact on willingness to save energy and perceived ease of communicating about energy use was estimated in this research study.

4.2 VARIABLES OF INTEREST

1) Willingness to Save Energy

The question for the dependent variable which is willingness to save energy (WTSE) is asked from the respondents; “would you be willing to save energy at work if you feel bit less comfortable”? Respondents have rated single option between yes or no. Yes, is coded as 1 while response chosen as no is be coded as 0.

2) Willingness to Save Energy in Summers

We have separately estimated office occupants’ willingness to save energy in summers (ESS).the question is being asked from the respondents; “Are you willing to sacrifice your comfort in summers by reducing the energy used for cooling system”? Participants have rated on a single option between yes or no. Yes is coded as one while response no is coded as 0.

3) Willingness to Save Energy in Winters

The question that was the willingness to save energy in winters is being asked from the employees; “Would it be easy for you to reduce the energy used in winters for heating system”?. Employees have rated on a single option between yes or no. yes is coded as 1 while response no is coded as 0.

4) Perceived Ease of Communicating

Employees have reported their response either yes or no to the question; “do you think it would be easy for you to communicate about adjusting thermostat settings or the other things for the purpose of saving energy”? Employees response for this question is also coded as yes =1 and No=0.

5) Energy Saving Belief

Workers have shown their energy saving belief at workplace by responding to the following question; “to what extent do you believe it’s a good thing to reduce energy usage at workplace”? Employees reported on a five point likert scale by reporting 0=not all and 4=very much. The higher point on likert scale is indicating positive attitude towards energy conservation.

6) Energy Conservation Beneficial for Environment

We have asked the following question from the employees about their energy savings is beneficial for environment; “To what extents do you belief that energy conservation is beneficial for environment”? Participants have rated on five point likert scale by reporting 0=not at all to 4=very Effective. The employees who strongly believed that their energy conservation will surely benefits environment indicated positive attitude.

7) Comfort Productivity Belief

Participants of the survey also responded to the following question; “To what extent do you believe that your thermal comfort is tied to your productivity at work”? Participants rated on 5 point likert scale like 0=not at all and 4=very much. Higher points on likert scale are indicating less willingness to sacrifice of comfort during their working hour and lower point will be indicating their positive attitude towards sacrificing comfort during their working hours.

8) Group Norms

Employees reported their concerns about group norms by responding to two questions “do you think majority of your colleagues generally support the idea of improving energy efficiency (and energy conservation) at workplace”? And “do you think majority of your colleagues actively save energy at work”? Workers reported their option on the likert scale -2=definitely

not and 2=definitely yes. The higher scores are indicating more positive group norms towards energy saving at workplace.

9) Organizational Support

Workers responded to the perception of organizational support towards energy conservation at workplace by responding to questions, “Have you ever heard of save energy or improve energy efficiency in any of your team\organization meetings, or read so in your company newsletters”? “Have you ever heard to save energy or improve energy efficiency from your boss/supervisor or from your colleagues”? “Have you ever noticed any sign for saving energy or improving energy efficiency in your office buildings”? And “Does your employer incentivize energy efficiency or energy saving behavior”?, Workers responded to the 4 questions where yes is coded as 1 and no coded as 0, all these 4 responses are summed up to form a single response with higher scores indicating more positive (stronger) organizational support towards energy conservation.

10) Open Ended Question

At the end of questions being asked from employees about attitudinal and contextual variables, the participants mentioned the purpose, that why they are keen to save energy (In case of the response yes). Similarly, respondents who stated difficulty to interact with colleagues about energy use were asked to choose an option from the given four options.

4.3 DEMOGRAPHIC VARIABLES

The current study will include various socio-economic profiles of employees consisting of demographic variables like age, gender, organization type, working experience, educational years and occupation.

1) Organization Type

The participants of the survey revealed about their organization type, where public organization is coded as 1 and private organization is coded as 0. Public organizations are somehow regulated in terms of energy saving. Hence their behavior is to be determined by empirical analysis.

2) Age

Employees of the organization have mentioned their age specified in years. Age is expected to be linked positively with willingness to save energy. It is because old people are more mature and are expected to conserve energy.

3) Gender

Participants have specified their gender. Male is coded as 1 whereas female is coded as 0. Gender sign could go either way and is therefore is left to be empirically decided.

4) Educational Years

Workers of the survey have mentioned their education in years. Education is expected to be positively linked with willingness to save energy and perceived ease of communication about energy use.

5) Working Experience

Participants of the survey working in certain profession have mentioned their working experience in years. The expected sign for working experience would be positive because as years of experience increases, employees gain more knowledge (specifically about environmental conditions) tend to save energy and to talk about energy consumption patterns with their colleagues.

4.4 EMPIRICAL SPECIFICATION

The previous discussion on sample size, study area and variables channel has derived path for the following equation to be estimated. We have applied linear probability model to examine the interaction of attitudinal, external factors along with demographic factor on employee's energy saving behavior (Willingness to conserve energy) and communication with coworkers about energy issues. Furthermore, impact on employee's behavior about saving energy in both summer and winter season was separately estimated. The estimation resulted in variation of individual behavior across seasons.

At last we have estimated the effect of attitudinal (internal) and external variables on office occupant's behavior in both seasons (ESS= energy saving in summer, ESW= energy saving in winter) about ease of communication with their colleagues at workplace.

1) $$\mathbf{WTSE = \beta_0 + \beta_1 ENSB + \beta_2 ECBE + \beta_3 CPB + \beta_4 GN + \beta_5 OS + \beta_6 AGE + \beta_7 GNDR + \beta_8 EY + \beta OT + \beta_{10} WE + \varepsilon}$$

2) $$\mathbf{PEC = \beta_0 + \beta_1 ENSB + \beta_2 ECBE + \beta_3 CPB + \beta_4 GN + \beta_5 OS + \beta_6 AGE + \beta_7 GNDR + \beta_8 EY + \beta_9 OT + \beta_{10} WE + \varepsilon}$$

Where,

Dependent variables

i. **WTSE**= Willingness to save energy

ii. **PEC**= Perceived ease of communicating about energy use.

Independent variables

i. **ENSB**= energy saving belief.

ii. **ECBE=** Energy conservation beneficial for environment.

iii. **CPB**= Comfort productivity belief.

iv. **GN**= Group norms.

v. **OS**= Organizational support.

vi. **AGE**= Age of the employees.

vii. **GNDR**=Gender

viii. **EY**= Years of education

ix. **OT**= Organization type

x. **WE=** Working experience.

Chapter 5

RESULTS AND DISCUSSION

5.1 DESCRIPTIVE STATISTICS

In this chapter we will briefly explain the results of regression models. These findings include the impact of Attitudinal and External factors on office workers Willingness to Save Energy (WTSE) and their Perceived Ease of Communication (PEC) about energy use. Moreover, we will separately discuss the workers Willingness to Save Energy in summers and their Willingness to Save Energy in winters. The psychological factors play a significant role in determining their Willingness to save energy in summers (ESS) and willingness to save energy in winters (ESW).

In Table 5.1, we observe the mean and standard deviation of variables. This table also includes control variables, which are Year of Education (YE), Organization Type (OT) and Working Experience (WE), age, and gender of the respondents.

Table 5.1: Descriptive Statistics of Dependent and Independent variables

VARIABLES	N	Mean	SD	Min	Max
Willing to Save Energy	200	0.705	0.457	0	1
PEC	200	0.725	0.448	0	1
ESS	200	0.560	0.498	0	1
ESW	200	0.705	0.479	-1	1
Age of Respondents	200	34.63	9.214	20	59
Gender	200	0.760	0.428	0	1
Years of Education	199	16.91	2.294	12	22
Organization Type	200	0.710	0.455	0	1
Working Experience	200	10.24	7.723	1	34
Energy Saving Belief	200	1.54e-08	1.000	-2.953	1.065
ZECBE	200	1.64e-09	1.000	-3.182	0.891
ZCPB	200	3.43e-09	1.000	-2.683	1.184
Group Norms	200	3.87e-09	1.000	-2.607	1.972
Organizational Support	200	2.56e-08	1.000	-1.481	1.573

Table 5.1 shows the results of dependent and independent variables from the model. The table shows that 70% employees working in both government and private sector from the sample of 200 are willing to Save Energy at their cost of comfort during their working hours with the standard deviation of 0.45. The value of second dependent variable is higher than the first variable, where about 72 % workers generally find it more comfortable to communicate with their coworkers about energy consumption at workplace with the standard deviation of 0.45. The results further show that approximately 56 % office occupants agreed to reduce their energy utilization in summers with the standard deviation of 0.49. While the other dependent variable which is ESW has shown greater value because about 70% workers responded positively which indicates that they are more willing to decrease electricity use in winters with the standard deviation is 0.479. This shows that people behavior about energy conservation varies with seasons.

On the average, age is 34.6 years with the standard deviation of 9.21 from the population of 200 participants. The ratio of male participants of the survey is greater than female participants. About 76% participants are male and the value of standard deviation is 0.42. The mean value of education variable is 16 with a standard deviation of 2.29. Around 71 % of survey participants are working in the public sector while the remaining are from the private sector. On average, the working experience of employees (WE) is 10.2 years with the standard deviation of 7.72.

The mean values of attitudinal variables like energy saving belief(ZENSB), energy conservation beneficial for environment(ZECBE) and comfort productivity belief is(ZCPB) 0 and containing standard deviation equals to 1. This is due to the fact that converted these ordered variables into continuous variables by first taking total sum of energy saving belief (ENSB), energy conservation beneficial for environment (ECBE) and comfort productivity

belief (CPB). Then we standardized these variables with the mean value 0 and standard deviation of 1.

5.2 WILLINGNESS TO SAVE ENERGY

In this section, we observe the impact of attitudinal and external variables on employees overall Willingness to Save Energy (WTSE). These attitudinal and external variables include Energy saving belief (ENSB), Energy conservation beneficial for environment (ECBE), Comfort productivity belief (CPB), Group norms (GN) and Organizational support (OS). In addition, we are controlling for other variables such as Age of respondents (AGE), Years of education (YE), Organization type (OT) and Working experience (WE). We then also separately check the impact of attitudinal and external variables in summers (ESS) and winters (ESW). The behavior of employees towards energy use is different in both (summer and winter) seasons.

In this section we separately analyze the influence of ENSB, energy conservation beneficial for environment, comfort productivity belief, GN and OS along with control variables on employee's willingness to save energy. We have applied 5models to elaborate the relationship among these variables.

Table 5.2 shows the positive and significant impact of the first two attitudinal factors i.e. energy saving belief and energy conservation beneficial for environment. It indicates that employees having stronger belief that implementation of energy conservation strategies/measures is beneficial for environment tend to have more positive behavior towards energy saving. Similarly people who consider saving electricity is worthy mechanism at workplace have higher willingness to save energy. The value of ENSB is 0.073 and value of ECBE is 0.082 in the fifth model. It indicates that, if energy saving belief increases by 1 standard deviation, it will lead to an increase in office occupant's willingness to save energy by

7.3%. Similarly, if ECBE (energy conservation beneficial for environment) increases by 1 standard deviation, the workers willingness to save energy rises by 8.3%.

The values of CPB (comfort productivity belief) sign is negative but shows insignificant effect which clearly indicate the contribution of variable is not enough to capture the effect of comfort productivity belief on willingness to save energy. The result of external variables is insignificant as shown in Table 5.2 where values of group norms and organizational support shows insignificant effect on willingness to save energy. The value of group norms in fifth model is 0.043, which is not showing the clear impact on employee's willingness to save energy. People are more interested in supporting or talking about the energy conservation idea but actually do not save energy at workplace. The magnitude of second correlate in is -0.003 in fifth model and does not depicts the significant effect of organizational support. Both variables of external correlates are insignificant. In developed countries, such group norms are established at workplace and organization sets different rules and regulations to promote energy conservation at workplace.

While in developing countries, group norms are not efficiently established. At workplace (government and private), we merely observe these type of external factors and if there is lack of group norms at workplace, individuals find it more difficult to initiate energy conservation process during their working hours. Similarly if organizations do not support the idea of energy conservation in their meetings, and newsletters, and if other rules and regulations are not implemented at workplace, we hardly experience an environment where individuals are more willing to save energy by reducing electricity consumption. Next we analyzed the nonlinear relationship of Age and Age^2. The impact of Age and Age2 is insignificant as shown in below table 5. In case of gender, males are 12% more willing to save energy than females, but the ratio of male participants was higher than the female participants. As years of education increase, office occupants tends to save less energy or their willingness to save energy declines.

This result also reveals the accurate depiction of the quality of our educational institutions. The educational system of our country does not promote such norms that will lead to change in individual behavior.

The impact of organizational type is not clear because more participants reported working in government sector. The last controlled variable has shown significant effect on workers energy saving behavior (shown by WTSE). The more working experience an employee avail, the more he become used to facilities and it strongly increases his or her belief in CPB. Then employees will be less willing to save energy or their willingness to save energy decreases. All the results described above are robust errors, all the five models in terms of magnitude, sign, and significance.

5.3 Willing to Save Energy in summers

In Tables 5.3, we analyze the influence of attitudinal and external correlates on ESS (energy saving in summer). Now we are separately observing the impact of these determinants on employee's behavior. The magnitude of energy saving belief is 0.015, which is statistically insignificant. This indicates that although workers belief that it's a decent act to decrease electricity consumption at offices but it does not increase their willingness to save energy in summer season by reducing the energy used for cooling system.

On the other hand, the coefficient of ECBE is positive and insignificant. The CPB magnitude is -0.093 which shows comfort productivity belief is higher in summers. Because workers believe that comfort is extremely related to productivity, they are less willing to save energy in summers. The next independent variables GN and OS are statistically insignificant containing value of 0.046 and 0.054 in fifth model. About 14% males are more willing to save energy in summers than females as shown in by the magnitude of gender in above table.

Table 5.2: Willing to Save Energy

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Energy Saving Belief	0.118***	0.079**	0.084**	0.073**	0.073**
	(0.030)	(0.033)	(0.034)	(0.036)	(0.036)
ECBE		0.086***	0.083**	0.082**	0.082**
		(0.033)	(0.033)	(0.033)	(0.033)
Comfort-Productivity Belief			-0.025	-0.018	-0.018
			(0.035)	(0.036)	(0.036)
Group Norms				0.042	0.043
				(0.033)	(0.038)
Organizational Support					-0.003
					(0.042)
Age of Respondents	0.008	0.008	0.007	0.004	0.004
	(0.012)	(0.012)	(0.012)	(0.011)	(0.012)
AGE2	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	0.141*	0.130*	0.124	0.126*	0.127*
	(0.076)	(0.075)	(0.076)	(0.075)	(0.074)
Years of Education	-0.021	-0.027**	-0.026**	-0.022*	-0.022*
	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
Organization Type	0.096	0.092	0.084	0.081	0.080
	(0.070)	(0.068)	(0.068)	(0.069)	(0.070)
Working Experience	-0.012	-0.013*	-0.013*	-0.013*	-0.013*
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Constant	0.592*	0.680**	0.691**	0.673**	0.675**
	(0.335)	(0.332)	(0.335)	(0.321)	(0.330)
Observations	200	200	200	200	200
R-squared	0.161	0.188	0.190	0.197	0.197
Controls	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. ECBE = Energy Conservation Beneficial for Environment.

The employees of public sector are more willing to conserve energy in summer season because the ratio of participants from public sector is high as compare to private sector. Overall the OT is significant while other controlled variables i.e. WE and YE are insignificant in this model. The CPB has shown insignificant effect on over all willingness to save energy, while it has shown significant impact on workers willingness to save energy in summers as depicted in table 5.3.

Table 5.3: Willing to Save Energy in summer

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Energy Saving Belief	0.076**	0.014	0.034	0.015	0.015
	(0.033)	(0.037)	(0.037)	(0.040)	(0.040)
ECBE		0.138***	0.129***	0.127***	0.124***
		(0.035)	(0.035)	(0.035)	(0.036)
Comfort-Productivity Belief			-0.105***	-0.094**	-0.093***
			(0.035)	(0.036)	(0.035)
Group Norms				0.072**	0.046
				(0.036)	(0.044)
Organizational Support					0.054
					(0.044)
Age of Respondents	0.001	0.000	-0.002	-0.007	-0.004
	(0.012)	(0.011)	(0.011)	(0.010)	(0.010)
AGE2	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	0.194**	0.176**	0.153*	0.155*	0.143*
	(0.089)	(0.087)	(0.082)	(0.081)	(0.081)
Years of Education	-0.006	-0.015	-0.011	-0.004	-0.003
	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)
Organization Type	0.234***	0.226***	0.195***	0.188**	0.196***
	(0.077)	(0.074)	(0.074)	(0.074)	(0.074)
Working Experience	-0.006	-0.009	-0.008	-0.008	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Constant	0.220	0.362	0.408	0.378	0.330
	(0.357)	(0.352)	(0.339)	(0.326)	(0.330)
Observations	200	200	200	200	200
R-squared	0.127	0.186	0.228	0.245	0.253
Controls	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. ECBE = Energy Conservation Beneficial for Environment.

The negative coefficient of CPB suggests that, in summers respondents are less willing to save energy.

5.4 Willing to Save Energy in winters

In Table 5.4, we observe the impact of variables of our interest along with control variables on workers willingness to save energy in winters. The impact of ENSB is negative while ECBE has positive and statistically significant effect on office occupant's willingness

to save energy during winter season. This shows that 1 SD increase in belief that energy conservation is beneficial for environment will leads to an increase in workers willingness to save energy by 16%. In this season, approximately 12% people are willing to conserve energy in winters. This ratio is higher as compare to summer season. Individuals are more likely to reduce energy consumption in winters as compare to summers. The reason behind behavioral change according to seasons could depend on durational intensity of seasons. Employees' behavior towards saving energy is high in winters because winter seasons are too short and in summers employees comfort productivity link becomes stronger due to extreme long duration of season.

The value of group norms and organizational support in fifth model (0.056, 0.019) are again not significant to capture the strong impact on willingness to save energy in winter season. We need to promote norms in our education system that will encourage individuals to take initiatives in specifically environmental conditions. Age is showing negative relationship with individuals' energy saving behavior (shown by ESW) in winter season. The willingness to reduce electricity consumption used for heating systems in winter season of males is higher than females. Male employees are 13% more willing to reduce their energy use in winters. A year of education of employees is statistically insignificant as shown in fifth model. In Table 5.4, the value of organization type is representing that government sector employees are more willing to cut electricity consumption in winters.

In case of working experience, as experience increases with each year the willingness to save energy declines. However, the variable is statistically insignificant in these specifications.

Table 5.4: Willing to Save Energy in winter

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Energy Saving Belief	0.090**	0.017	-0.004	-0.016	-0.017
	(0.037)	(0.037)	(0.033)	(0.035)	(0.034)
ECBE		0.162***	0.171***	0.169***	0.166***
		(0.035)	(0.033)	(0.033)	(0.032)
Comfort-Productivity Belief			0.110***	0.118***	0.118***
			(0.039)	(0.039)	(0.038)
Group Norms				0.046	0.019
				(0.032)	(0.043)
Organizational Support					0.056
					(0.043)
Age of Respondents	-0.006	-0.007	-0.004	-0.007	-0.005
	(0.016)	(0.013)	(0.013)	(0.013)	(0.013)
AGE2	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	0.144*	0.123	0.147**	0.149**	0.137*
	(0.084)	(0.075)	(0.074)	(0.073)	(0.074)
Years of Education	-0.000	-0.011	-0.015	-0.011	-0.009
	(0.017)	(0.016)	(0.015)	(0.015)	(0.015)
Organization Type	0.200**	0.191**	0.224***	0.220***	0.228***
	(0.082)	(0.077)	(0.076)	(0.077)	(0.078)
Working Experience	-0.005	-0.008	-0.009	-0.009	-0.010
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)
Constant	0.597	0.763**	0.714*	0.695**	0.645*
	(0.403)	(0.362)	(0.363)	(0.349)	(0.355)
Observations	200	200	200	200	200
R-squared	0.087	0.174	0.223	0.231	0.240
Controls	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. ECBE = Energy Conservation Beneficial for Environment.

5.5 Perceived Ease of Communication

In Table 5.5, we examine whether attitudinal and external determinants that are related to individual behavior in specific conditions can be associated with perceived ease of communication about energy use (PEC). Energy saving belief (ENSB) has insignificant effect on employee's perceived ease of communication (PEC).

Table 5.5: Perceived Ease of Communication

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
Energy Saving Belief	0.056*	0.019	0.021	0.008	0.007
	(0.032)	(0.034)	(0.035)	(0.037)	(0.037)
ECBE		0.083**	0.083**	0.081**	0.075**
		(0.035)	(0.035)	(0.034)	(0.034)
Comfort-Productivity Belief			-0.010	-0.002	-0.002
			(0.037)	(0.037)	(0.035)
Group Norms				0.047	-0.010
				(0.034)	(0.040)
Organizational Support					0.118***
					(0.039)
Age of Respondents	0.016	0.016	0.016	0.013	0.018
	(0.015)	(0.014)	(0.014)	(0.013)	(0.012)
AGE2	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	0.016	0.005	0.003	0.005	-0.021
	(0.077)	(0.075)	(0.074)	(0.073)	(0.072)
Years of Education	-0.033**	-0.039***	-0.039***	-0.034**	-0.031**
	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)
Organization Type	0.101	0.097	0.094	0.090	0.106
	(0.070)	(0.069)	(0.070)	(0.070)	(0.069)
Working Experience	0.006	0.004	0.004	0.004	0.002
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Constant	0.987***	1.073***	1.077***	1.057***	0.953***
	(0.372)	(0.345)	(0.347)	(0.328)	(0.321)
Observations	200	200	200	200	200
R-squared	0.065	0.092	0.092	0.101	0.149
Controls	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. ECBE = Energy Conservation Beneficial for Environment.

A person having strong energy saving belief may not find it easy or comfortable to communicate about energy use at workplace in such environmental conditions. The second independent variable ECBE (energy conservation beneficial for environment) has shown throughout significant effect in all five tables.

The individual's belief about benefits of energy conservation specifically about environment leads to increase in his ease to communicate with colleagues about energy use at workplace. One percent increase in ECBE will lead to an increase in employee's comfort by

75% to communicate with his coworkers about energy utilization. The comfort productivity belief has shown insignificant effect on their ease to communicate with the coworker's about energy consumption during their working hours. If a workers belief about comfort productivity link rises by 1 SD then it will decline his ease to communicate by 0.2% with his coworkers. However, their effect is insignificant.

The group norms are again negatively correlated with employee's perceived ease of communication, while organizational support has shown statistically significant impact. If organization supports the idea of energy conservation then it eventually raises employee's ease of communication with colleagues by 11.8%. Age of the respondents has shown significant effect in this case. Gender has shown negative effect on Perceived ease of communication. Years of education has shown insignificant effect, as years of education increases employee's perceived ease of communication reduces by 3.1%.

The office occupants reported working in government offices feel easier to converse about energy use during their working hours. But we cannot rely on this result because ratio of participants from government sector was higher than private employees. The relationship of working experience (WE) is insignificant throughout the model.it shows that the ease of communication does not depends on the seniority level in the office.

The open ended question from the survey helped to understand employees' reason for saving energy at the expense of their comfort. Majority of the respondents reported reasons for energy saving were (1 they are willing to save energy at workplace because country is facing energy crisis and sustainable energy use can reduce energy bill and it will be conserve for other people. Other participants reported (2 reducing energy use will be beneficial for environment (it will contribute to mitigate the problem of climate change by reducing greenhouse gas emissions).

Chapter 6

CONCLUSION

We have used A-B-C Model to scrutinize how internal and external correlates associated with workers energy saving behavior at the cost of some personal comfort and their perceived ease of communication about energy use with coworkers at office settings. The study focused on individual energy saving efforts and also factors facilitating communication about energy use with colleagues by using quantitative analysis. The communication factor is always helpful to solve energy related issues at offices where no external barriers were found.

We found that employees, who believed that it is a decent act to decrease electricity consumption during their working hours, were merely interested in initiating energy saving efforts. The impact of energy saving belief was not enough to modify office occupant's behavior towards energy saving at workplace. While employees who agreed that energy conservation is valuable for environment were more interested in saving energy at their cost of personal comfort and it eventually led to increase in their ease to communicate with colleague at organizational level.

Our findings indicate that individuals who believed that comfort is strongly linked to their productivity were not engaged in pro conservational activities (i.e. energy saving efforts). More individuals reported great connection among comfort and productivity which reduced their willingness to save energy and also their easiness to converse with colleagues about initiating energy saving efforts during working hours. The comfort productivity link was found weak when individuals were asked to report their willingness to save energy and perceived ease of communication. The relationship was quite positive because employees who were not willing to sacrifice energy in summers as it may result in their productivity loss. While in winters they were more willing to sacrifice electricity consumed in winter season at workplace.

We also found that group norms and perceived organizational support were not positively related to willingness to save energy and perceived ease of communication. These results are not encouraging to change individual behavior (i.e. in the context of environmental conditions). Our findings about external variables may vary across countries, because in developing countries there is lack of such group norms. At offices we find people who merely converse about energy related issues or engaged in initiating energy saving efforts at office buildings.

Similarly, perceived organizational support is not evident in both government and private sector. These organizations hardly initiate rules and regulations which support/encourage people to change their behavior towards energy consumption. If certain rules and regulation were implemented, employees (more specifically from government sector) hardly follow these rules and regulations. Additionally, we observed the environment and behavior of office occupants during survey of government sector offices i.e. ministries, educational institutions. We found that people behavior in such conditions predicted they were less concerned about their energy consumption pattern. But in Ministry of climate change and Ministry of Forestry, the impact of organizational support was observable; due to fact that all the staff in there ministries were aware of the environmental threats and excessive energy use. While in private sector minimal actions were taken in these environmental conditions to implement rules about excessive energy use during working hours.

We have controlled for working experience (WE), which was negatively linked to energy saving behavior. People behavior was not supportive of engaging in energy saving efforts as their working experience increase and become more accustomed to use facilities (appliances used for thermal and visual comfort). The reason behind this is our educational system does not promote such norms which are known as collective ethics and beliefs that how individuals react in such conditions (environmental conditions).

On the basis of findings, we can conclude that organizational support and group norms do not capture true effect on energy saving behavior. There is lack of such norms, rules and regulations which are valuable to deal with energy issues. To develop positive energy saving attitudes that gradually leads to change in individual behavior, we need to promote such norms in our educational system. We need to support group norms (subjective and injunctive norms collectively known as descriptive norms) at primary level because our younger generation easily accepts and modify their behavior according to the environmental conditions. Additionally, government need to start awareness campaigns and set rules and regulations which offer guidance for organizations to promote energy conservation at offices to take into account the energy crisis.

The following effective measures should be taken in order to stimulate energy saving behavior at organizational level in Pakistan. It could be done by organizing lectures most often about the threats (Global warming and climate change) we are facing due to the excess use of energy despite of the energy crises. This will derive path by modifying employees' behavior at organizational level and the output will be the reduction in energy consumption. The informational strategy would be operational in order to promote energy conservation behavior at workplace. Through sharing information among employees regarding their energy consumption can create awareness factor which eventually lead to energy savings. The signs indicating energy conservation in organizations (turning off excess lights, adjusting the other thermostat settings regarding cooling and heating system) can better pay off by boosting workers willingness to conserve energy.

This is the first study in the context of a developing country (Pakistan). It is different from the earlier literature which was done for developing countries. Since the behavioral aspect could be different in developed and developing countries, this is due to different cultures and

norms shared by people across the world. This makes a significant difference in terms of behavior of residents of developing countries.

Several limitations should be acknowledged. The distribution of sample was not equal in both government and private sector. We were not able to represent the true picture that employees' energy saving behavior as it varies by the type of employing organization. Future research should add more professions that better predict office occupant's behavior and also adopt such measures to capture indication of association between attitudinal variables, social aspects and energy consumption in organizations.

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ANNEXURE-I

Investigating Willingness to Conserve Energy and Perceived Ease of Communication about Energy Use at Workplace in Islamabad

Note for respondents:

I am undertaking a research study for the completion of my MPhil at Department of Environmental Economics at PIDE, Islamabad. The study is targeted on **"Investigating Willingness to Conserve Energy and Perceived Ease of Communication about Energy Use at Workplace in Islamabad".** I would like to assure you that the information given by you will be kept strictly confidential and will be used for research purpose only.
The purpose of this study is to investigate workers willingness to conserve energy during their working hours and their ease of communication with their coworkers about energy consumption at offices. The influence of psychological factors will be beneficial in modifying office occupant's behavior about energy conservation.

I am hopeful to receive your co-operation.

Ishrat Fatima

Name of Organization ← *To be given by research coordinator*

Date ← *To be provided by Enumerator*

DD MM YYYY

Appendix

Questionnaire

A) Socio-Economic Profile of the Employee

This part contains some information about you. Please select the answer closely applies to you.

1. Name of the Respondent: _____

2. Age: Please specify (in years) _____

4. Years of Education: _____

7. Organization type: a) Public ☐ b) private ☐

8. Working experience: _____

Please select the answer closely applies to you put mark (√) ☐ on the appropriate category.

B) Willingness to Save Energy

9. Would you be willing to save energy at work if it means you would feel a little bit less comfortable?

a) Yes ☐ b) No ☐

C) Perceived Ease of Communication

10. Do you think it was easy or it would be easy to communicate with your colleagues about adjusting thermostat settings or the other things for the purpose of saving energy?

a) Yes ☐ b) No ☐

D) Energy Saving Belief

11. To what extent do you believe it is a good thing to reduce energy usage at work?

Not at all	Less beneficial	Effective	Very much	Very effective
0	1	2	3	4

12. To what extent do you belief that energy conservation is beneficial for environment?

Not at all	Less beneficial	Effective	Very much	Very much
0	1	2	3	4

E) Comfort Productivity Link

13. To what extent do you believe that your comfort is tied to your productivity?

Not at all linked	Very weakly linked	Weakly linked	Strongly	Very strongly
-2	-1	0	1	2

i) Are you willing to sacrifice your comfort in summers by reducing the energy used for cooling system?

a) Yes ☐ b) No ☐

ii) Would it be easy for you to reduce the energy used in winters for heating system?

a) Yes ☐ b) No ☐

F) Group Norms

14. i) Do you think majority of your colleagues actively save energy at work?

Definitely no	No	Not sure	Yes	Definitely yes
-2	-1	0	1	2

ii) Do you think majority of your colleagues actively support the idea of energy saving at work?

Definitely no	No	Not sure	Yes	Definitely yes
-2	-1	0	1	2

G) Organizational Support

15. Have you ever heard of saving energy or improving energy efficiency in any of your team/organization meetings, or read so in your company newsletters?

a) Yes ☐ b) No ☐

16. Have you ever heard to saving energy or improving energy efficiency from your boss/supervisor, or from your colleagues?

a) Yes ☐ b) No ☐

17. Have you ever noticed any sign for saving energy or improving energy efficiency in your office buildings?

a)Yes ☐ b) No ☐

18. Does your employer incentivize energy efficiency or energy saving behavior?

a) Yes ☐ b) No ☐

19. Are you willing to save energy at work at some cost of comfort?

a) Yes ☐ b) No ☐

If yes, then mention the reason of saving energy at workplace.

_____

20. Would it be easy for you to communicate with your coworkers about energy usage?

a) Yes ☐ b) No ☐

If No, then what are the main reasons?

a) I don't feel comfortable. b) They would mind it.

c) They would not pay attention. d) Others _____