



**BEHAVIORAL ECONOMICS CONTRIBUTION TO THE
RESIDENTIAL ENERGY CONSUMPTION BEHAVIOR STUDY
(A structural analysis on the Algerian case).**

Nadia. TILIOUA* ⁽¹⁾

Pr Abderrezak. BENHABIB ⁽²⁾

Na.tilioua@gmail.com

abenhbib1@yahoo.fr

Ecole Supérieure d'Economie d'Oran,
Algérie.

Laboratoire MECAS, Université de
Tlemcen, Algérie

Received :04/05/2023

Accepted :26/05/2023

Published : 11 /06/2023

Abstract

Recent studies of "behavioral economics" have revealed the individuals "limits of rationality" due to their human nature. Barriers to sustainable energy consumption such as habit, comfort, difficulty in perceiving one's individual contribution, etc. explain this "deviant" behavior from the optimal choice's classical economics' predictions.

In addition to the economic and technical variables according to previous studies on the energy consumption topics, this work integrates variables resulting from behavioral economics works through a structural analysis inspired by the forecasting approach by analyzing a total of 37 variables, in seven dimensions to reach out the most relevant ones.

The results show how the most determining variables, whether direct or indirect, are not only economic in nature and reveal the behavioral economics enrichment .

✓ Keyword. Keyword. behavioral economics, forecasting, energy consumption structural analysis

1. INTRODUCTION

According to the past and current Algerian but worldwide economic and energetic context, research has focused on the classical assumption's basis. These last decades, empirical studies showed how far the reality might be from the classical predictions (R. h. Thaler, 2018; R. H. Thaler, 1988) resumed in a new but complementary economic field of the Behavioral Economics (BE) (Bourgeois-Gironde, 2018; Jacquemet et al., 2013; Serra, 2017) that uses insights from psychology to complete the classical economics assumptions (Serra, 2017) and suggest instead the research of the "rational" choice instead of optimal and lead to it due to biases in influences and/or perceptions of individuals (Tversky & Kahneman, 1974). The behavioral economics fields applications to energy consumption issues help public energy policies in countries as India, Australia, Nordic countries and so on (United Nations Environment, 2017)

These new assumptions open up new view perspectives. It introduces a new type of variables to explain the economic agent behavior as explanatory (independent) variables may find their basis in psychological explanations.

The purpose of this study is to explore whether the behavioral dimension is relevantly apparent as an essential dimension in one of the Algerian energy problematics (residential consumption).

Yet, energy context includes variant components, dimensions, variables and actors, therefore, a panoramic view of the energy system is needed. Broke down, to be compared, in definable dimensions, this structural analysis study the variables interactions according to the Michel Godet MICMAC Forecasting method that reveals the variables essential to the evolution of the system.

To achieve this paper, two components appear. The first part describes inputs from

behavioral economics that changes the way we choose variables especially when applied to the energy field. The second part of this work try to describe the structural analysis run on this case using behavioral dimension as inputs and then present results and discussion sections.

2. INPUTS FROM BEHAVIORAL ECONOMIC FINDINGS

The empirical individuals' behaviors contradict the classical economic the predictions (R. H. Thaler, 1988). Researchers as Kahneman, Tversky and Thaler, highlight that the gap does not seem to appear only between empiricism and theory but within behaviors themselves (Clochard et al., 2018; Tversky & Kahneman, 1974) distinguishing the knowledge, intentions, values from the action due to the 'human' side of the economic agent through his impulsivity, emotions, emotive attitudes. They have given, via psychology, some reasons such as the mental accounting, Information overload, Choice overload, Hyperbolic discounting, Confirmation bias, Loss aversion, Endowment effect, Status quo bias, Availability bias, Representativeness, Anchoring and adjustment, Social-proof and so on. (Rabin & Thaler, 2001, 2001; R. h. Thaler, 2018). Debates toward the classical theory led to three main theory new constructions':

a. **Limited rationality Vs Perfect rationality:** in addition to their bounded will power, individuals have cognitive limits (Clochard et al., 2018). The concept itself belongs to Husserl 'Bounded rationality'. But also, the notions of emotions in economics appeared with Adam Smith and Keynes. This conceptualization indeed comes to take up the dichotomous model of individuals as opposed to the perfectly rational monist model. A dichotomy which is also not new since philosophers like Durkheim or Husserl explain this duality of man between brain and heart, reason and emotion (Durkheim & Filloux, 2010). By extension, its version applied to the economy can be defined by Kahneman who suggests System 1 and System 2 or even the 'doer' and 'the planner'(Kahneman & Clarinard, 2016).

b. **The rational choice Vs The optimal Choice:** The resolution of a complex optimization problem in a record time to make a decision is humanly impossible. But, the VNM expected utility model makes the assumption that an individual faced with a choice is guided at by utility and never by examples by simple preferences, desires or even lack of motivation. The rational choice does not totally exclude the concept of choice based on utility.(Kahneman et al., 1997)

c. **Mental accounting Vs Money fungibility:** The new behavioral economic theory opposes the idea that the way in which the money was earned does not influence the way in which this money is spent. The mental accounting theory explains how we keep a mental accounting so as to name the 'accounts' created and that each account can be used for a particular expense.

2.1. Behavior internal and external influences

Behavioral economics suggests understanding the elements responsible for this deviation in behavior as individuals are particularly subjects to cognitive and heuristic biases (Garapin, 2009). which characterize the limits of the perfect rationality of individuals. Psychologists define biases as a deviation of rational thought (Collectif, 2002) “thinking errors”. In order, to make decisions in a record time or to value a situation, people tend to use mental processes and simple strategies “heuristics in judgments and decision-making” which prevents perceiving reality in an exact way and then having a “deviant” behavior.

External influence is not limited only to social influence as known in psychology. It is also explained by the need to consider the individual in a whole structure (Bourdieu, s. d.-b) going back to the human geographical delimitation of territories (Bret, s. d.) and to consider collective and individual evolutions (Martin & Gaspard, 2017; Petit, 2011). Individuals, shaped by their environment, find themselves “thrown

into a strange and foreign economic context” (Bourdieu, s. d.-a). They acquire a set of dispositions and aptitudes during this process of life in society “habitus” (Bourdieu, s. d.-a; Ferréol & Noreck, s. d.; Montousse & Renouard, s. d.) and each adopts a behavior.

Being aware of these psychological aspects allows research to better understand the economic agent's behavior. And so, give tools to work on changing behaviors (Garapin, 2009; Wendel, 2013). But admitting the limits of individuals' rationality does not solve the problem of predicting behavior nor does it imply rational decision-making. The new approach is based on the following idea: humans have weaknesses that lead them not to make rational choices and therefore to have 'deviant' behaviors. And so, individuals are influenced by inner (of themselves) and outer (of their environment) elements. In short by the context! (Billaudot, 2004; Lahire, 2005) which can be changed to change individual behavior by changing the way information's are presented “choice architecture” (R. h. Thaler, 2018).

The intervention which consists in giving 'a nudge' to people to guide them towards a choice is theorized by Daniel Kahneman and under the term 'nudge' which is another form of influence.

2.2. Barriers to sustainable consumption according to behavioral economics

Behavioral economics has the role of complementing (and not replacing) the explanation of economic phenomena (Pollitt & Shaorshadze, 2013; Serra, 2017; Thaler, 2018) and thus, in the case of energy economics, it can contribute to facilitating the creation of a more responsive demand and If it is unlikely to reduce energy consumption by the level set by the international energy agency but can have suggestions for sustainable changes in energy (Martin & Gaspard, 2017). Mainly, authors although not going through the postulates of behavioral economics (Gautier, 2015)., maintains the idea that "support for renewables requires a change in the way

we consume"(Gautier, 2015). In a study done on modeling the response to electricity demand, it was argued that biases can impact demand and also that appealing to customers' pre-social preferences can be an effective way to solicit demand response. demand (Good, 2019) in addition to the technical and economic aspect in energy studies, taking into account the postulates of behavioral economics can change the way of modeling aggregates.

Thereby, for a better consumer behavior understanding, different approaches, actions to be taken, actors and tools that complement each other must be deployed (Martin & Gaspard, 2017). Expanding the measurement indicators is necessary to approach the consumer whose consumption varies according to the life cycle and also whose perception and standard of comfort are opposed to economic constraints and can take precedence over the environmental issue (Lévy et al., 2014).

One of the most important findings concerns the barrier of habit taken up by a certain number of authors, we understand that habit has an important role to play in the question of energy consumption (Barnes et al., 2004; Maréchal, 2010) and one of the most important aspects of habit is the quality of habit of being unconsciousness which may explain why people underestimate its role. Asking people to describe their habits is already a step towards awareness. This is about the role of the behavior lock in (Barnes et al., 2004; Maréchal, 2010) which is in fact a behavior which stagnates in a state of ineffectiveness because of culture, or habit etc. and here the author raises the role of habit.

Finally, to bring together these methods from BE to the field of energy. a report by the UNE, speaks of barriers to consumption (United Nations Environment, 2017) suggesting five behavioral barriers to sustainable consumption: habit that replaces many choices consequences of consumption are often hard to see, sustainable

consumption may not seem personally relevant, behavior is influenced by peers and social groups, it can be hard to follow through on sustainable choices. In this report, there is an international incentive to change behavior, which would be crucial to achieve a level of effectiveness. This change is made via public policies, which is a serious challenge, thus inviting all economic actors, thus taking up the suggestions of several authors in the discipline who maintain that the approach of the individual is supplemented by a better understanding of the individual. This

3. STRUCTURAL ANALYSIS

This study is inspired by the forecasting approach as proposed and fully described by M. Godet (Godet, 2006, 2007a, 2007b). It consists of “building a set of representations of the current state of the system and its environment” (Godet, 2007a). This step allows the identification of the key variables, via a structural analysis, which represent the points to be studied in priority.

Structural analysis allows to describe a system using a matrix that connects all the individually selected variables. To consider all the variables, the system is divided to be better described and then influences between the variables are described which implies quantifying the intention of the direct relationship between the variables. These intentions range from 0 to 3.

3.1. Constraints and limits

Constraint of non-completeness. As a final, complete and definitive list would

be impossible to determine, a thematic dimension is added to each variable to lead to a context.

Limits of subjectivity: This method has a subjectivity default in the filling of the direct influences' matrix. In order to limit it a binary matrix is produced, only describes the existence/absence of direct dependence/influence.

3.2. Energy system Framing

This case study system is broken down into the strategic analysis PESTEL Model (Political, Economic, Social, Technological, Environmental, Legal) and also the Behavioral axe. It is also framed from a global to specific level of action.

a. PESTEL model framing

- **Political:** Policies, issues and institutional framework both international and national in which the energy system evolves.
- **Economic:** Economic aggregates that govern economies.
- **Social:** Concerns people culture and organization.
- **Technological:** Techniques that allows better demand organization
- **Environmental:** worldwide environmental debates. Legal/Infrastructural: Physical organization of the energy market.
- **Behavioral:** Barriers for a sustainable consumption according to behavioral economics findings.

b. System breakdown from global to specific:

- **Global framing:** Geopolitics and globalization where The energy system is evolving.

- **National framework (macro level):** National positioning in the world and national aggregates
- **Games of national stakeholders:** The consumer interactions environment such as government authorities.
- **Residential consumer:** individual considerations that describes the consumer

3.3.Data analyses

Results are given by the use of the specific to this method Micmac software developed by a French Computer Innovation Institute 3IE (Institut d'Innovation Informatique pour l'Entreprise) under the supervision of its conceptual creators LIPSOR Prospective (foresight) Strategic and Organisational Research Laboratory.

3.4. Selected system

Table 2. List of selected variables

*	**	Variable	Axe	Framing
1	33	International Energy markets	P	Global framing
2	32	Geopolitical stability	P	Global framing
3	23	Challenges of economic transition	P	National framework
4	24	Energy transition challenges	P	National framework
5	20	Socio-political stability	P	National framework
6	17	Energy policies effectiveness' level	P	National players' games
7	22	Economic growth and development	E	National framework
8	27	Exports	E	National framework
9	25	Energy production's level	E	National framework
10	21	Energy prices	E	National framework
11	3	Consumption patterns	E	Residential consumer
12	1	Consumer financial resources	E	Residential consumer
13	18	Aid and subsidies	E	National players' games
14	34	Globalization	S	Global framing
15	10	Demography	S	National framework
16	4	Comfort requirements	S	Residential consumer
17	5	Habit in consumption	S	Residential consumer
18	2	Lifestyles	S	Residential consumer
19	12	Communication and information	S	National players' games
20	13	Social influence	S	National players' games
21	9	Education, research and development	T	National framework
22	11	Outreach and communication means	T	National players' games
23	35	Technological change	T	Global framing
24	16	Access to technology and equipment	T	National framework
25	26	Production and distribution capacity	T	National framework
26	15	Availability of renewable energies	T	National players' games
27	36	Environmental issues	E	Global framing
28	37	Involvement of NGOs and influence groups	E	Global framing
29	31	Unconventional energy	L(I)	Global framing
30	30	Renewable energy	L(I)	Global framing
31	28	Gas	L(I)	National framework
32	29	Oil	L(I)	National framework
33	14	Energy accessibility	L(I)	National framework
34	6	Action's level promoting sober behavior	B	Residential consumer
35	8	Awareness' level promoting sober behavior	B	Residential consumer
36	7	Intention's level promoting sober behavior	B	Residential consumer
37	19	household consumption behavior understanding level	B	National players' games

*Sorted according to the PESTEL(I)-B Model ** Matrix Sorting

a. Some variables description

- **Action's, intentions and consciousness's levels to sustainable consumption:** determinants of action according to Max Weber designed on three dimensions: cognition (brain), conation (muscle), affectivity (heart). At a certain level, the intention which is "the ability to forge mental representations and to fix these as a goal" (Collectif, 2002) can be about only mental representation. It's effective since it becomes a fixed goal. (Pouch, 2010). It depends on the "capacity to behave in an adapted way...and the capacity to act on ourselves to transform ourselves" (consciousness)
- **Accessibility to Energy:** In non-producing countries, accessibility to energy can have an economic dimension. For the study, this includes the availability of equipment that promotes the energy transition.
- **Availability of renewable energies:** Renewable energy supply including energies, installations and facilities, various and appropriate products and equipment.

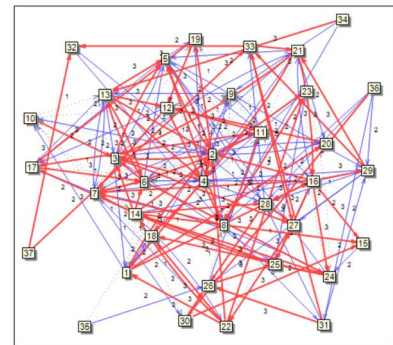
Table 3. Matrix system

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37		
1	0	3	0	3	0	0	0	0	1	2	0	0	0	0	0	3	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2	1	0	3	3	3	0	1	0	0	2	2	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3	2	2	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0		
4	0	3	3	0	0	0	2	0	1	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0		
5	0	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0		
6	1	0	3	2	2	0	0	0	1	0	1	0	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7	0	0	0	0	0	3	0	0	1	0	2	0	2	0	0	0	2	0	1	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	
8	0	0	0	0	3	0	3	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	
9	2	2	0	0	0	0	0	1	0	0	1	1	2	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10	0	0	3	1	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11	0	0	0	0	2	1	3	3	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
13	0	3	2	3	3	3	2	0	0	0	0	3	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14	0	0	3	0	0	3	1	0	0	0	0	0	0	0	3	0	3	0	0	0	0	2	3	3	0	0	0	3	2	1	0	0	0	0	0	0	0	0	
15	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16	0	3	0	2	0	1	3	0	0	0	0	0	0	0	3	0	0	0	0	0	2	0	0	3	3	0	0	3	3	3	0	0	0	0	0	0	0	0	
17	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
19	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20	0	2	0	0	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
21	0	0	3	2	2	2	1	1	0	0	0	0	0	0	3	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22	3	3	0	0	0	0	2	0	1	1	0	0	0	3	0	0	0	3	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
24	0	0	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
26	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	3	3	0	0	0	0	0	0	2	0	0	0	0	
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	2	2	2	0	0	0	0	0	3	0	0	0	0	0	
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	2	2	0	0	0	3	0	0	0	0	0	0	
32	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	
34	0	0	0	0	0	0	0	2	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
36	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	2	0	0	0	0	0	0		
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0		

4. RESULTS AND DISCUSSION

The analysis of the input matrix takes into account 16 plans of the system studied at 4 levels of study each at two modalities: Subjective (0-3 matrix)/Objective (Binary matrix), Effective/Potential, Direct/indirect and Influence/dependence level. The analyses try to find important variables among 160,000 interactions. Figure 1 can account for the complexity of the system studied, which includes the dimensions and the various potential framings that can describe the energy consumers behavior.

Fig.1. Graph of indirect influences



Source: MICMAC Software

By calculating intensities' differences between levels, essential variables are same for the subjective and objective plans. Thus, the subjectivity constraint will not prevent the analysis of the results obtained.

The variables are classified according to their influence indicator on the system (left table) and dependence (table on the right). By combining the four classification methods direct, indirect, influence and dependence, 19 variables can be retained (Table 2) ordered according to their appearance according to a maximum of methods and a minimum in terms of rank: Lifestyle, Consumption patterns, Action's level promoting sober behavior, Comfort requirements, Energy accessibility, Access to technology and equipment, Social influence, Habit in consumption, Intention's level promoting sober behavior, Economic growth and development

Table 1. Top 10 Variable classification by influence (left) and dependance (right)

Rank	Variable	Variable	Rank	Variable	Variable
1	14 - L-N-Acc-En	13 - S-J-Influ	1	2 - S-R-Mode-v	5 - S-R-Habit
2	16 - T-N-Appare	16 - T-N-Appare	2	7 - C-R-Intent	2 - S-R-Mode-v
3	13 - S-J-Influ	14 - L-N-Acc-En	3	3 - E-R-Consom	3 - E-R-Consom
4	2 - S-R-Mode-v	22 - E-N-Croiss	4	5 - S-R-Habit	7 - C-R-Intent
5	22 - E-N-Croiss	21 - E-N-Pri-En	5	4 - S-R-Confor	4 - S-R-Confor
6	21 - E-N-Pri-En	6 - C-R-Action	6	8 - C-R-Consci	19 - C-J-Compré
7	1 - E-R-PA	2 - S-R-Mode-v	7	6 - C-R-Action	6 - C-R-Action
8	4 - S-R-Confor	1 - E-R-PA	8	27 - E-N-Export	17 - P-J-Eff-po
9	6 - C-R-Action	3 - E-R-Consom	9	28 - L-N-Gaz	27 - E-N-Export
10	3 - E-R-Consom	9 - T-N-Edu-Rn	10	17 - P-J-Eff-po	12 - S-J-Com-in
11	7 - C-R-Intent	4 - S-R-Confor	11	12 - S-J-Com-in	28 - L-N-Gaz

Source : MICMAC Software

Considered thematically, the results indicate that essential variables are not only economic. They concern the residential consumer in his individual but also collective and social dimension while indicating the role of the interplay of actors between the household and the State. Moreover, the economic dimension which matters to this system concerns the national framework before the individual framework of the residential consumer. The most important of them are social, behavioral then economic and concern the individual but also the collective level.

Resources as choices: The energy transition is intended to move towards a model where renewable energies are preferred. However, the results obtained seem to place oil in the present and gas in the future. Renewable energies are still heavy trends, they are the subject of many intentions but the effective action is not yet part of the heart of the energy consumption system. Only the potential plan shows a certain dynamism for renewables. What seems to influence the system is the availability of renewables not as a resource but as a consumption choice. The most influential variable directly on the energy consumption of households seems to be the accessibility to energy, to which must be added access to the necessary equipment. According to the results obtained,

the level of infrastructure conditions the energy consumption of households in Algeria.

Context influence: Fundamentally economic variables alone may not explain the households' behaviors. Consumption can be done in terms of choice, for comfort reasons (Lévy et al., 2014) or simply act out of habit (Barnes et al., 2004; Maréchal, 2010; United Nations Environment, 2017) These variables are clearly classified among the most dependent variables of the system and which are the results of the interactions of the variables which display the most influence. What these rankings also show is the importance of the social dimension. Indirect social influence is the most determining variable of the system. This result is in line with social science studies which have shown that humans are indeed influenced by their environment (Pouch, 2010; Simon, 1969). Many people stress the importance of better understanding the economic agent in order to better approach him (Albou, 1984; Petit, 2011; United Nations Environment, 2017) and to suggest adequate solutions to the problems.

4. CONCLUSION

The difficulty of explaining, predicting and changing the behavior of consumers in general and in energy in particular is such that the consumer has faults of rationality and that there is a lot of gap between his intention, his values, his knowledges and his actions that prediction based solely on economic and technical values is difficult to translate, hence the usefulness of using the principles of psychology and behavioral economics to make these predictions more effective, ultimately allowing more appropriate policies where the author gives suggestions for the use of biases in public policy-making the key cognitive biases and motivational factors that may explain why energy-related behavior so often fails to align with either the personal values or material interests of consumers.

This work combined classical and behavioral economics foundations applied to energy consumption issues. As the energy complex is a very complex system, a global overview was needed to analyze which dimension is the most relevant to this question. The structural analysis according to the forecasting method is a good tool that takes into account all this complexity to study this question as a whole.

One of the limits of this method is the subjectivity when quantifying the intention of the direct relationship between the variables from 0 to 3 which results has been compared to a binary system. The top ten of the most relevant variables were same in both plans.

Results show that the most relevant direct variables are, for the first framing not only economic but also social and behavioral and for the second framing concern individual but collective aspect.

For further researches, energy consumption behavior studies can take more than technical and economic variable to predict the consumer behaviour. Behavioral economics by using insight from psychology use also experimental method and other models than homo-economicus as individual decision models such as prospect or regret theory and other alternatives or quasi-hyperbolic discount models... The second models are models of games with bounded rationality which take up the stakes of game theory by admitting that the cognitive demands expected in the classic versions are too high. Other models like learning patterns are patterns that imply that decisions change as individuals learn. This learning is based on beliefs, or on experience for example. Finally, the models of social preferences are models which explain that there can be motivations of a moral and social order which intervene thus opposing the individual interest and the collective interest.

All these tools and theories suggested by the behavioral economics may give new perspectives for economic research and ways to understand and approach consumer.

5. Bibliography List :

- Albou, P. (1984). La Psychologie économique. Presses universitaires de France; 83.
- Barnes, W., Gartland, M., & Stack, M. (2004). Old Habits Die Hard: Path Dependency and Behavioral Lock-in. Journal of Economic Issues, 38(2), 371-377. 95. <https://doi.org/10.1080/00213624.2004.11506696>
- Billaudot, B. (2004). Institutionnalisme(s), rationalisme et structuralisme en science sociale. Économie et Institutions, 4, 5-50. 150. <https://doi.org/10.4000/ei.791>
- Bourdieu, P. (s. d.-a). Les structures sociales de l'économie. 110. Consulté 29 mai 2022, à l'adresse <https://www.decitre.fr/livres/les-structures-sociales-de-l-economie-9782757844328.html>
- Bourdieu, P. (s. d.-b). Sociologie de l'Algérie. 114. Consulté 31 mai 2022, à l'adresse <https://www.cairn.info/sociologie-de-l-algerie--9782130521754.htm>
- Bourgeois-Gironde, S. (2009). Les émotions économiques. Réflexions sur les mécanismes d'adaptation cérébrale à l'environnement socio-économique. Revue européenne des sciences sociales. European Journal of Social Sciences, XLVII-144, Article XLVII-144. 8. <https://doi.org/10.4000/ress.64>
- Bourgeois-Gironde, S. (2018). Daniel Serra, Économie Comportementale, Paris, Economica, 2017, 208 p. Revue d'économie politique, 128(1), 169. 15. <https://doi.org/10.3917/redp.281.0169>
- Bret, B. (s. d.). Le Tiers-Monde. Croissance, Développement, Inégalités. 118. Consulté 2 juin 2022, à l'adresse <https://www.decitre.fr/livres/le-tiers-monde-9782729826857.html>
- Clochard, G.-J., Hollard, G., & Perez, F. (2018). Richard H. Thaler et les limites de la rationalité: Revue d'économie politique, Vol. 128(4), 535-548. 16. <https://doi.org/10.3917/redp.284.0535>
- Collectif. (2002). Grand Dictionnaire de la psychologie. Larousse; 85.
- Durkheim, E., & Filloux, J.-C. (2010). La science sociale et l'action (1er édition). Presses Universitaires de France - PUF; 107.
- Ferréol, G., & Noreck, J.-P. (s. d.). Introduction à la sociologie 8e édition -. 112. Consulté 31 mai 2022, à l'adresse <https://www.decitre.fr/livres/introduction-a-la-sociologie-9782200249175.html>
- Garapin, A. (2009). Rapprocher l'Homo Oeconomicus de l'Homo Sapiens. Vers une théorie des jeux réaliste et prédictive des comportements humains: Revue d'économie politique, Vol. 119(1), 1-40. 4. <https://doi.org/10.3917/redp.191.0001>
- Gautier, A. (2015). Repenser la tarification de l'énergie: Reflets et perspectives de la vie économique, Tome LIV(1), 175-184. 45. <https://doi.org/10.3917/rpve.541.0175>

- Godet, M. (2006). *Creating Futures : Scenario Planning as a Strategic Management Tool*. Brookings Institution Press; 127.
- Godet, M. (2007a). *Manuel de prospective stratégique Tome 1. Une indisciplinée intellectuelle*. Dunod; 125.
- Godet, M. (2007b). *Manuel de prospective stratégique—Tome 2—3ème édition—L’Art et la méthode*. Dunod; 126.
- Good, N. (2019). Using behavioural economic theory in modelling of demand response. *Applied Energy*, 239, 107-116. 3. <https://doi.org/10.1016/j.apenergy.2019.01.158>
- Jacquemet, N., L’Haridon, O., & Morin, P. (2013). *Economie expérimentale et comportements*. Introduction: *Revue française d’économie*, Volume XXVIII(2), 3-8. 11. <https://doi.org/10.3917/rfe.132.0003>
- Kahneman, D., & Clarinard, R. (2016). *Système 1, système 2 : Les deux vitesses de la pensée*. FLAMMARION; 88.
- Kahneman, D., Wakker, P. P., & Sarin, R. (1997). Back to Bentham? Explorations of Experienced Utility. *The Quarterly Journal of Economics*, 112(2), 375-406. 68. <https://doi.org/10.1162/003355397555235>
- Lahire, B. (2005). *Sociology, psychology and psychological sociology*. *Hermes, La Revue*, 41(1), 151-157. 15.
- Lévy, J.-P., Roudil, N., Flamand, A., & Belaïd, F. (2014). Les déterminants de la consommation énergétique domestique: *Flux*, N° 96(2), 40-54. 20. <https://doi.org/10.3917/flux.096.0040>
- Ly, K., Mazar, N., Zhao, M., & Soman, D. (2013). *A practitioner’s guide to nudging*. Rotman School of Management Working Paper, 2609347.
- Maréchal, K. (2010). Not irrational but habitual : The importance of “behavioural lock-in” in energy consumption. *Ecological Economics*, 69(5), 1104-1114. 6. <https://doi.org/10.1016/j.ecolecon.2009.12.004>
- Martin, S., & Gaspard, A. (2017). *Les comportements, levier de la transition écologique ? : Comprendre et influencer les comportements individuels et les dynamiques collectives*. *Futuribles*, N° 419(4), 33-44. 14. <https://doi.org/10.3917/futur.419.0033>
- Montousse, M., & Renouard, G. (s. d.). *100 fiches pour comprendre la sociologie (6e éd.)*. Dalloz Librairie; 113. Consulté 31 mai 2022, à l’adresse <https://www.librairiedalloz.fr/livre/9782749534626-100-fiches-pour-comprendre-la-sociologie-marc-montousse/>
- Petit, E. (2011). The Impact of social psychology on economic analysis. *Revue d’économie politique*, 121(6), 797-837. 28.

- Pollitt, M. G., & Shaorshadze, I. (2013). The role of behavioural economics in energy and climate policy. In R. Fouquet, Handbook on Energy and Climate Change (p. 523-546). Edward Elgar Publishing; 2. <https://doi.org/10.4337/9780857933690.00035>
- Pouch, T. (2010). La science économique sous le regard de Husserl. L'Homme et la société, 175(1), 165. 24. <https://doi.org/10.3917/lhs.175.0165>
- Rabin, M., & Thaler, R. H. (2001). Anomalies : Risk Aversion. Journal of Economic Perspectives, 15(1), 219-232. 55. <https://doi.org/10.1257/jep.15.1.219>
- sciences de Suède, L. royale des. (2018). Richard H. Thaler. Intégrer économie et psychologie: Revue française d'économie, Vol. XXXII(4), 3-56. 49. <https://doi.org/10.3917/rfe.174.0003>
- Serra, D. (2012). An historical outline of experimental economics : From the emergence to recent developments. Revue d'économie politique, 122(5), 749-786. 32.
- Serra, D. (2017). Économie Comportementale. Economica; 81.
- Simon, H. A. (1969). The Sciences of the Artificial (3e éd.). MIT Press; 74.
- Thaler, R. h. (2018). Misbehaving—Les découvertes de l'économie comportementale. Média Diffusion; 69.
- Thaler, R. H. (1988). Anomalies : The Winner's Curse. Journal of Economic Perspectives, 2(1), 191-202. 54. <https://doi.org/10.1257/jep.2.1.191>
- Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty : Heuristics and Biases: Biases in judgments reveal some heuristics of thinking under uncertainty. Science, 185(4157), 1124-1131. 59. <https://doi.org/10.1126/science.185.4157.1124>
- United Nations Environment. (2017). Consuming Differently, Consuming Sustainably : Behavioural Insights for Policymaking ∴ Sustainable Development Knowledge Platform. 1. <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=2404&menu=1515>
- Wendel, S. (2013). Designing for Behavior Change. O'Reilly; 77.
- West, P. M., Brown, C. L., & Hoch, S. J. (1996). Consumption Vocabulary and Preference Formation. Journal of Consumer Research, 23(2), 120-135.