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Behavioural Economics in Energy Consumption: Rational or Habitual

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Abstract:
Purpose: This paper attempt to draw the people's energy consumption based on a set of social practices which are influenced incommunity lifestyle choice and through the institutional structural form of the society.
Methodology/Design/Approach: This article has a conceptual understanding of energy using behaviour, exemplified by some energy consumption practices through reviewing prior literature. The question whether the energy consumption is really a rational fact or habitual acts in explaining on the ground of three perspectives of environmental behaviour such as; the rational economic perspective, the behavioural perspective and the sociological perspectives.
Findings: People's energy consumption basically depends on energy using social practices.Changing behaviour and everyday practices at home in energy consumption is simply a way of reducing energy demand for sustainable energy consumption.
Originality: Earlier study focus on the relation betweenbehavioural economics and energy consumption but no research carried out energy using and behavioural relation. The present study focused on that particular arena.
Research Limitation: Research limitations of the study is no practical testing any hypothesis and only conceder previous literature based on concept.

Key Words: Behavioural Economics, Energy Consumption, Rational, Habitual

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I. INTRODUCTION

Human being is not a rational activist by nature all the time as it reflects of using energy.It's known to all that more energy consumption pays more bills but habitually we forget it and use energy inefficiently. We very frequently take irrational decision because every decision in human life is a complex process. People routinely deviate from the 'rational choice' model of human behaviour and that's the case of taking irritation decision (Zabel, Hasans-Ulrich, 2005).Every day we are taking decision not considering rationality or habitually such as choosing products, saving money, giving charity, energy, telecoms, environment, health, agriculture, industry, education and so forth

The energy consumption in different sectors has emerged as a major challenge and opportunities for researchers, practitioners and policy makers. Consumer also seems to be gaining awareness of the value and need for sustainable energy practices considering the climate change. There is often a sizable discrepancy between people's self-reported knowledge, values, attitudes and intentions, and their observable behaviour-example including the well-known "knowledge-edge-action gap" and "value-action-gap". But neither is household energy consumption driven primarily by financial incentives and the rational pursuit of material interest. In fact, people sometimes respond in unexpected and undesirable ways to rewards and sanctions intended to shift consumer's cost benefit analysis in favour of sustainable behaviour. With the growing energy consumption practices designing and delivering effective behaviour change programs is critically important for policymakers, practitioners and researchers grappling with the challenge of shifting; energy consumer behaviour in positive ways, e.g., toward more energy efficient practices, greater uptake of renewable an energy-saving technology, more frequent use oflow-emission transportation, better responsivenessto dynamic/ cost-reflective centricity pricing, and higher participation in demand-side management.

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It is argued that reductions in household energy use could be much greater if improved domestic technologies and products were to be more rapidly adopted and use more effectively. Individual energy behaviour is perceived as a significant barrier to achieving a major step change in energy efficiency (Wilson C, Dowlatabi H., 2007). This barrier exists in spite of growing environmental awareness and financial and environmental benefits of energy efficiency measures(Christie L, Doon M, Walton, 2011). Reducing energy demand is not simply about developing energy efficient measures and technological progression, but also changing behaviour and everyday practices matters.

This paper aims at to decorate some important inside on the complex process whether energy use could be at the rational level or habitual fact by presenting a clear grouping of the factors that drive behaviour. The focus of this paper, however, is on how decisions are actually made by individuals. It aims to provide a conceptual understanding of behaviour reviewing related different articles and journals. The concluding section highlights a major shift in understanding energy consumption behaviour in terms of the interplay of individual and social drivers.

II. ENERGY CONSUMPTION AND BEHAVIOURAL ECONOMICS: A LITERATURE REVIEW

The application of behavioural economic concept to the energy sector is in the early stages, with some relevant works being published in the last few years. For instance, (Frederiks, E.R.; Stenner, K.; Hobman, 2015) analysed a sizeable discrepancy between peoples' self-reported knowledge, values, attitudes, and intentions, with their observable behaviour, the question of how behavioural economics may be applied to energy and climate policy, investment in energy efficiency, and provision of public goods? For example, (Sullivan, D.; Resources, N.; Council, 2012), an augmented model with approaches derived from behavioural science was used to better encourage individuals to purchase, install, and properly use energy-efficient technologies. This aimed at complying with legal mandates and least-cost service obligations, in which utilities must help their customers save energy focused on exploring techniques that incorporate psychology, design, and behavioural economics insights into the utility of energy-efficient programs that could use "e-sensing" technologies (Cannistraro, M.; Lorenzini, 2016). On the same topic, a welfare analysis of taxes and energy efficiency standards based on an alternative time-consistent behavioural model was presented(Tsvetanov, T.; Segerson, 2013).Nevertheless, it is argued that behavioural economics seems unlikely to provide the "magic bullet" to reduce energy consumption—however; it offers new suggestions as to where to start looking for potentially sustainable changes in energy consumption.

In a broader context, another previous work (Kangur, A.; Jager, W.; Verbrugge, R.; Bockarjova, 2017)proposed a long-term electrical distribution demand evolution model based on urban and regional growth. In this dynamical model, concepts of land use, urban poles, and urban economy were used to create relations among different types of low- and medium-voltage consumers (residential, commercial, and industrial). Data from a questionnaire with Dutch car drivers were used to parameterize the consumer needs and decision strategies modelled. The model was based on four types of needs: financial, functional, social and environmental. This differs from our proposed model that focuses on simple heuristics under a bounded rationality scenario.

The behaviour analysis of on electricity consumption may be very challenging as, in contrast to other consumer goods, the customer does not "see" the energy bought, but only perceives the work it performed. Nevertheless, it is an essential product to provide comfort, connectivity, information, and security in modern societies. Therefore, it is very important to discuss the single most important agent of the power sector environment, the consumer, trying to achieve a better understanding of its behaviour and interactions.

1. Contravening Behavioural Economics Concepts

The following are behaviours and concepts that have been identified within the behavioural economics field as sufficiently consistent and widespread to contravene the neoclassical paradigm and confound models developed on that basis. While these concepts are separately discussed and an attempt is made to classify them as either cognitive biases or symptomatic of bounded rationality, there is a large degree of overlap and reinforcement across the concepts and between these labels.

- **Inconsistent Temporal Framing** – Consumers tend to have higher implied discount rates on purchase decisions relative to decisions regarding savings, placing lower value on future costs relative to an upfront purchase consistent with discount rates of 25% to over 100%. However, the irreversibility of many energy efficiency decisions is viewed as supporting some level of differential in implied time value of money.
- **Status Quo Bias –** Consumers tend to dislike change and will more strongly weight current equipment and energy consumption and cost characteristics, regardless of information to the contrary. This behaviour has been widely recognized in numerous programs that reflect an opt-out rather than an opt-in to increase

participation. People also tend to become psychologically invested in existing equipment, regardless of the costs and benefits of replacement.

- **Loss Aversion** – Consumers tend to have greater aversion to losses than desire for gains, all else equal.
- **Decision-making Heuristics** – Consumers revert to simple rules of thumb and simplified math when faced with complex decisions. For example, consumers tend to choose an option perceived as a compromise or "middle of the road" choice.
- **Salience Effect** – Consumers attach a disproportionate weight to readily observable factors, contributing for example to an overemphasis on the initial cost of energy efficient appliances (Gillingham, Newell, and Palmer, 2009).
- **ProsaicallyBehaviour**– Consumers tend to be readily influenced by what others are doing, regardless of costs and benefits, and care more about levels of performance and participation relative to others rather than absolute levels.
- **Permanent Income Hypothesis Paralysis** – Consumers may be fully aware of the long term economic benefits of a decision to make a change and also be fully aware of their higher short-term costs resulting from not making a particular decision, making them rational economic agents from an analytical perspective. However, these same consumers are irrationally concerned with long term economic security (perception of permanent income) and their ability to service debt payments associated with the purchase of a highly efficient end-use, leading to a state of paralysis and inaction.

2. Three Perspectives on Energy Using Behaviour

There are three dominant perspectives for understanding the energy using behaviour of the people. These three perspectives are rational economics, the behavioural aspect, and finally the sociological perspectives (Tetlock, 1991). The researchers elaborated the discussion of these three perspectives for explaining the consumer behaviour for energy consumption for finding the solution of the aim of this paper. That is whether this consumption is rational or habitual.

4.1The rational economic perspective

The rational economic perspective suggests that people are utility maximises and their decisions are based on rationally ordered preferences, which in turn are based on the level of unity attached to, and probability 0f securing, each choice. ln doing so, the follow a number of logical steps: define the problem, identify the decision criteria, weight each criteria, generate options, rate option on each criteria, compute the optimum option, and monitor and evaluate (Bazerman, 1998).This mode suggests that peoples' choices are based on rationality calculating the cost and benefits. Access to information is crucial for making optimal decisions withhighest benefit and lowest cost. This implies that people will reduce their energy use, invest in energy efficient measures, or retrofit their houses, if they possess the requisite information and if their self-interested benefits outweigh costs (Wilson C, Dowlatabi, 2007). According to the model, a key role 0f intervention is therefore to provide information. This has led to a myriad of policy initiatives based on giving feedback to household on their uses of energy and providing them with"new actionable information on consumption that could be clearly understood" (Darby S. Smart, 2010).The idea is that having the information about energy use of different appliances and different patterns of use, people will be motivated to reduce their consumption.

Another role of policy intervention, according to this model, is to ensure that the market allows people to make optimal choices by correcting price signals through internalization of social and environmental 'externalities'. This is the basis of number of environmental taxes and levies (such as carbon tax) that are aimed at incorporating environmental costs into economic cost-benefit calculations.

At the same time, the rational model suggests that besides cost-benefit calculation. The probability of achieving the preferred outcome also plays a part in decision-making. Perceived behavioural control (PBC), as advocated by (Ajzen, 1991)describes the individuals' perception of the ease or difficulty with which they can adopt behaviour. 'Self-efficacy' is defined as the perception of "how well one can execute a course of action required dealing with prospective situations" (Jackson T., 2005). The implicit assumption within notions of PBC and self-efficacy is that if a behaviour is perceived as being impossible within a particular context it will not be adopted "despite the motivation being present". It is, however, suggested that encouragement and "emotional arousal" can increase feelings of self-efficacy (Darnton A, Verplanken B, White P. Whitmarsh, 2011).Again, information plays a key part because it is argued that feelings of self-efficacy can be strengthened through positive feedback on (Granhaj A, Thogersen, 2011), for example, the level of reduction in energy use. However, if the feedback is negative (no reduction), it may act as a deterrent for those with low perceptions of self-efficacy. Wilson &Dowlatabadi (2007) argue that it is crucial for interventions to enhance individuals' perceptions of self-efficacy through feedback mechanisms as well as education and training.

The rational economic model as dominant in the spatial planning field in the 1960 and 1970 in Europe and America, Since, it has been subject to criticism by planning theorists who argue that it fails to match the

seemingly disjointed and incremental processes of decision making by individuals and institutions (including planning systems) alike. However, despite a great deal of research indicating the limitations of the rational model, its assumptions have crept into the debate about 'attitude' and its assumed determining role in environmental behaviour. People's behaviour is understood to be preceded by their attitude towards that behaviour. This attitude is in turn informed by a rational evaluation of the characteristics of that behaviour (Jackson T., 2005) for example; the attitude towards purchasing and installing a low energy light bulb might be based upon an evaluation of its environmental impact, money saving potential. It's aesthetic qualities, the quality of the light and so on (Crosbie T, Baker K., 2010). Such assumptions imply that if we modify attitudes, we can modify behaviour and this can be done primarily through education, information provision and awareness rising.

4.2The psychological perspective

The psychological perspective does not consider people as irrational, but it argues that their rationality is bound by certain limiting cognitive characteristics and patterns. It draws on an evolutionary perspective, in which the human has developed to respond to complex, changing environments by developing mental shortcuts or heuristics (Gigerenzer G. Todd P M., 1999). This "rules of thumb" are simplifying mechanisms that allow us to make quick decisions whenever full analysis is either not possible or not wise due to the urgency of action such as escaping from imminent danger (Nicholson, 2000).While these mechanisms have proved useful and practical, they lead to a number of biases which run counter to some of the fundamental assumptions of the rational model. Some key biases are outlined below.

Firstly, we tend to treat choices differently depending on the manner in which they are described or 'framed', not what they actually are. If they are framed in terms of losses, we attach more risk to them than if they are framed in terms of gains. This cognitive illusion means that people are more risk averse in relation to potential losses than for potential gains; they are indeed loss averse. This has important implication for environmental policy in terms of, for example, choosing between policies that are based on people's willingness to pay (buying price) and those focusing on 'willingness to accept (selling price). The latter is shown by Kahneman andTversky (1979) to be up to 20 times the former. Layard (2005) provides an intriguing example, suggesting that most people would expect to be paid much more to mow their neighbour's lawn than they would be prepared to pay to have their own lawn moved by their neighbours. This implies that we tend to pay only a little to have something, and demand a lot to give it up (Dawnay E, Shah H., 2005). Framing, therefore, is significant in economic cost-benefit analyses. More importantly, such analyses are not sufficient in assessing the potential for a given policy being accepted and taken up by people. For example, Christie et al. (20lI) found that householders who were resistant to the installation of solar panels remained so even when they had to make no initial expense and were assured that their subsequent payments would not exceed the financial savings that the equipment generated. Clearly, factors other than financial concerns have influenced their decisions, such as the trust in the reliability of panels or the level ofdisruptions involved.

Secondly, in assessing information we pay more attention to information that is easily available and to memories that are easily retrievable because they have personal relevance or are emotionally vivid. For example, we may put more weight on our own experience of a malfunctioning energy efficient device than on the published statistics about the probabilities of such defaults. We also tend to cherry pick evidence to support our chosen options (a self Serving bias) or the decisions that have already been made (a confirmation bias(De Bondt W F M., 1998).

Thirdly, in making judgments about which options to choose we use our intuition to filter the huge amount of information received, so that we can make decisions in the face of uncertainties and ambiguities. While this helps with the problem of so called 'analysis paralysis', it can also lead to over-confidence estimates or unwillingness to acknowledge new information. In situations of repeated decision making (such as picking the right temperature for washing laundry) we tend to identify emotionally and cognitively with familiar options that have been tried and tested rather than rationally weigh alternative options. That may explain why a great majority of households wash at 40 degrees Centigrade despite the availability of several other temperature options and improved washing detergents that wash equally well at 30C.

Finally, in evaluating the decisions that have been made, two further biases may occur. The first one is a tendency to attribute any good outcomes to our own actions, and any bad outcomes to factors outside our control, often in the attempt to maintain self-esteem. The second bias relates to the illusion that we have control over the risks ofour actions. This then leads us to discount information that suggests otherwise (Fenton-O'Creevy M, Nicholson N. Soane E. Willman P., 2003).

In summary the psychological perspective show how people'srationality is hounded by their cognitive characteristics. However, while for some this perspective implies that people's judgment ate always their biases and destined to systematic mismatch (Nisbett R E, Ross L., 1980). For others, they are signs for strength indicating that people can use their tacit knowledge to arrive at timely decisions.ln practice people move

between the two extremes, from simple heuristics orcognitive strategies, depending on the significance of the decision that they have to make (Fiske and Taylor, 1991). The psychological perspective stresses the habitual, ritual and conventional bases of human behaviour.letsuggest that people ate not always calculating national beings; that, they may not know their costs and benefits; and that they may not act in themon their self-interest. Habit plays a vital role in people's lives. Contrary to the rational choice models, people'sbehaviour is often habitual based on short cuts and routines rather than rational deliberation.

A distinction, however, can he make betweenindirect and directfeedback. Indirect feedback occurs sometime after consumption has taken place (such as on households 'energy hill). While directfeedback happens immediately at the time of consumption, (such as energy monitors or smart meters). Direct feedback has been shown to be more effective at saving energy than indirect feedback. It has led to improved energy literacy and interest in purchasing energy efficient appliances or renewable energy technologies.

4.3The Sociological Perspective

What is common between the rational and the psychical perspective is that both portray people as information-processors albeit often with highly biased (and limited) processing capacity and 'bounded rationality (Simone, 1957). Both focus on individual behaviourrather than social and cultural processes that play crucial roles in habit information, in providing categories within which we think and in framing what is legitimate or normal.

In line with the psychological perspective outlined above, the sociological perspective also considers people's rationality as bounded, not just by their cognitive capacity to process information, but also by the social context in which they operate. From this perspective, people are seen as being driven to control not just their environment (as is the ease in psychological approaches), but also to response to social pressures. These types of social pressures are particularly influential in decision making. The first is coercive and involves social sanctions if people do not act in socially legitimate ways.

The second type of social pressure is mimetic and involves imitating what others do (Routledge R W., 1993). In order to reduce complexity and save time, we may either choose or be compelled to copy others without necessarily considering the potential contextual differences. We tend to do what our neighbours do especially if we trust their judgment. Research has shown that households are motivated to take energy-saving action only after others have been seen to do so.

The third type of social pressure is normative, based on the values we hold and the acceptability of behaviours. It involves what we think we should do to not only avoid social censure but also maximize social reward. A great deal of the literature on environmental behaviour considers values and norms as central to the understanding of behaviour and the design of effective policies and programmes aimed at behavioural change. It is, therefore, justified to dedicate a section to these and elaborate them further.

III. FINDINGS AND CONCLUSIONS

Now it has been an important concern reducing households' energy consumption through the learning points of behavioural economicsmaking strategies for transition to low carbon societies. Such reduction can take place through technological advances such as energy efficient building materials and appliances and physical interventions such as retrofitting of the built environment. However, problems of rebound effect, low levels of take up and acceptability have directed attention to behavioural issues. Changing behaviour has increasingly become the buzzword of public policy. For achieving sustainable energy consumption in building a society of energy efficient some attemptsto steer society towards sustainable energy systems should go beyond a focus on influencing individual behaviour. It requires a radical re-working and re alignment of "technologies, routines, forms of knowhow,markets and expectations as well as institutional practices and systems of provision.

People's energy consumption is based on a set of social practices which are influenced by both their lifestyle choices and by the institutions and structures of society, including those which determine the dynamics of energy systems. For policy to be effective, it needs to be developed with a sound understanding of the complexity of these relationships. Effective policies have to take into account the importance of social context of behaviour, while also renegotiating habits and encouraging new habit formation. An important element' of changing habit is to 'unlock' existing behaviour or, in other words, raise the behaviour from the level of practical (everyday routine) to discursive (intentional. goal-oriented) consciousness. This can be done more effectively with a focus on communities rather than individuals.The evidence in this paper suggests that a shift in energy behaviour requires a multi-level and cross-sectoral approach which addressesmaterial, institutional, social and subjective determinants of behaviour simultaneously.

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