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Determinants of Household Energy Saving Behaviour: An Application of the Goal Framing Theory

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ABSTRACT

Households are an important group that can be targeted to help reduce energy consumption and mitigate climate change. Drawing on the Goal Framing Theory (GFT), the study investigated the determinants of household energy (electricity) saving behaviour. The study examined the direct effects of the three principal constructs of the GFT (gain motivation, normative motivation and hedonic motivation) on household electricity saving behaviour. In addition, the study investigated the mediating effects of normative and hedonic motivations in the relationship been gain motivation and energy saving behaviour. The study adopted the quantitative research approach and the cross-sectional survey method was used to collect data from the respondents. The Partial Least Square Structural Equation modelling (PLS SEM) was used to test the hypotheses. The results indicated that gain, normative and hedonic motivations are significantly positively related to household energy saving behaviour. The mediating effects of normative motivation and hedonic motivation in the relationship between gain motivation and electricity saving behaviour are significant. The innovation of the study is the development and testing of a theoretical model that examined both the direct and indirect effects of the GFT constructs in the context of household energy saving behaviour. Empirically, the study contributed to the body of knowledge on the factors that affect household energy saving behaviour. Recommendations include communicating the economic and environmental impact of energy saving behaviour to households.

1. INTRODUCTION

Energy especially electricity is of fundamental importance to human society and has played a significant role in economic development, employment creation and the urbanisation of communities [1]. Access to energy is important to poverty reduction, innovations, investments in new businesses and shared prosperity [2]. Energy is an integral part of the South Africa's economy and energy security reduces poverty and promotes economic growth [3]. South Africa's energy sector is dominated by coal, which contributed about 69% of the country's total primary energy supply in 2016 [4]. The increase in the demand for energy spurred by societal development and increasing population growth has led to many economic, social and environmental challenges [5]. The problems created by the increasing levels of energy consumption include high energy costs, the insecurity of energy supply, the exhaustion of finite energy resources and environmental challenges such as greenhouse emissions and climate change [6]. The rational use of natural resources by individuals is one of the ways to manage the growing deterioration of the natural environment [7]. Household energy consumption can be described as the amount of energy resources that a household spends on activities such as washing, heating, cooling and lighting [8]. Buildings (residential and commercial) are a vital part of the global transition to a low-carbon future. Buildings account for about 40% of energy consumption worldwide and about 33% of global greenhouse gas emissions [9]. In line with global trends, the residential Sector in South Africa consumes about 25% of energy generated by Eskom (the primary electricity producing organisation). South Africa like many developing countries faces a double sided challenge of concurrently providing adequate electricity and managing the negative impact of greenhouse gas emissions [10]. Energy conservation has improved in the industrial sector due to policies implemented by firms, however energy conservation in the residential sector remains slow. While the contribution of the industrial sector in total energy consumption fell from 53.4% in 1973 to 42.0% in 2018, the contribution of the residential sector rose from 23.1% to 26.9% [11]. Hughes and Larmour [12] report that the residential sector comprises of about 16.9 million households and approximately 86% are electrified in South Africa. During peak periods, the residential sector can be responsible for about 35% of national electricity demand. Therefore, households are an important sector in efforts to promote sustainable energy use, reduce high level of gas emissions and mitigate climate change in South Africa and globally [13, 14].

The behaviour of the occupants of a house is one of the major factors that affect energy usage in residences [15]. Energy resources used at home include kerosene, gas, electricity, petroleum, diesel, solar and biofuel and waste [16]. The main form of energy used in households and organisations is electricity [17]. Energy-saving can be described as households' daily and habitual practices that lead to the reduction of energy consumption [18, 19]. Energy saving

behaviour is a subset of the larger pro-environmental behaviour defined as behaviours that create little harm or even benefit the environment [20]. Energy saving behaviours can be classified into curtailment (energy conservation) and efficiency (energy efficiency) [21]. Curtailment behaviour focuses on low cost or free energy saving behaviour that is repeated frequently. Efficiency behaviour relates to infrequent structural changes or the purchase of energy efficient appliances [22]. Although energy efficiency is significant to reducing energy use, changes in human behaviour are also important because gains related to technical efficiency from energy efficient appliances tend to be overtaken by consumption growth [20, 23]. This study focuses on curtailment energy saving behaviour by households. This kind of energy saving behaviour is habitual, requires little structural adjustment and cost effective to households [23].

Many theoretical frameworks have been used to explain the reasons why individuals engage in pro-environmental behaviour [24]. These include the Theory of Planned Behaviour (TPB), derived from the Theory of Reasoned Action (TRA) [25, 26], the Norm Activation Model (NAM) [27], the Value-Belief-Norm theory of environmental model (VBN) [28] and the Goal Framing Theory (GFT) [29]. The GFT suggests that an integrative approach is needed to understand the factors that influence pro-environmental behaviour. The GFT is based on three goals (motivations): gain, normative and hedonic. Gain motivation is based on enhancing the personal gains from sustainable behaviour especially the benefits and the costs and can be linked to the TPB. Normative motivation focuses on the perception of an individual about the moral correctness of a pro-environmental behaviour and can be associated with the NAM and the VBN). Hedonic motivation focuses on anticipated feelings of pleasure and excitement for engaging in a pro-environmental behaviour [29]. Past studies have investigated the three motivations individually through different theories. For instance, many studies on pro-environmental behaviour have used the TPB which is linked mainly to gain motivation [29, 30]. However, the literature is sparse about the interactive and integrated effects of these motivations in the context of pro-environmental behaviour [31, 32]. The aim of the study is to investigate the determinants of household electricity saving behaviour using the Goal Framing Theory (GFT).

The study will have theoretical, empirical and policy significance. Theoretically. The study will test the applicability of the GFT which is an integrative model in explaining household energy saving behaviour. Energy saving behaviour is influenced by many factors and the use of an integrated model enables a researcher to explore the effects of many constructs [29]. The study will examine the direct and indirect effects of the constructs of the GFT. In addition, the GFT emerged from different areas in psychology especially the effects of goals and cognitive processes and follows the psychological approach to understanding individual pro environmental behaviour [29, 33]. Studies that have used the GFT in the context of household energy saving behaviour are sparse. The GFT has been applied in the context of electric vehicle adoption and the pro-environmental behaviour of university students [31, 34]. Empirically, the study will contribute to the literature on household energy saving behaviour. South Africa proposes to deepen its emissions cuts by almost a third with the aim of transiting to a low carbon economy by 2030 [35]. In addition, one of the goals of COP 26 is to cut global emissions in half by the end of this decade and achieve net zero by the middle of the century. Individuals, businesses and governments are expected to contribute to net zero [36]. Understanding the determinants of energy saving behaviour by households can help to achieve these local and international environmental goals.

2. LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESES

2.1 Goal framing theory (GFT)

The GFT was developed from the goal setting theory and argues that goals frame the way that individuals process information and act on it [33]. Individual shape their goals according to three separate goals which are gain, normative and hedonic. Gain goals help an individual to develop and manage their resources. Normative goals describe the idea that individuals shape their behaviour by taking others into consideration. Hedonic goals focus on making an individual feel better [33]. In the context of pro-environmental behaviour, normative goal shows why individuals act pro-environmentally. Gain and hedonic goals often result in individuals not acting in an environmentally sound manner [33]. Pro-environmental behaviour can be encouraged by reinforcing normative goals or by making gain and hedonic goals less incompatible with normative goals [33]. Goals are related to motivations. A goal describes the cognitive representation of a desired state while motivation refers to the psychological driving force that leads to action in the pursuit of the goal. The decisions and behaviours of individuals are often the result of the goals or motives that they possess [37].

2.2 Gain motivation and energy saving behaviour

A gain goal frame makes individuals to be careful about the changes in their personal resources. It is a goal that deals with issues related to resources such as saving money, increasing income and ensuring financial security [29]. Rezvani et al. [31] find that gain motivation is significantly positively related to the intention of consumers to adopt electric vehicles in Sweden. The findings of the study by Chakraborty et al. [34] indicate a significant positive relationship between gain motivation and the pro-environmental behaviour of university students in India. De Dominicis et al. [38] find that personal benefits influence self-interested individuals to behave more pro-environmentally. Altruistic individuals are influenced by both personal benefits and environmental benefits to engage in pro-environmental behaviours. This suggests that gain goal can influence individuals to act more pro-environmentally. Donmez-Turan and Kiliclar [39] used the goal frames to investigate the pro-environmental behaviour of university students. A group of students was given financial reward to determine gain goal while a control group was given no financial reward. The findings indicate that individuals that are goal–oriented significantly exhibit higher levels of pro-environmental behaviour compared to the control group.

Arroyo and Carrete [7] find that gain goal increases the adoption of green energy especially for individual with medium socio-economic status. Hameed and Khan [32] investigate the determinants of intention to purchase energy saving air conditioners in Pakistan. The study however finds that the direct effects of gain goal on intention and behaviour are insignificant.

Gain motivation can also affect normative and hedonic motivations. Pro-environmental behaviour and action can be encouraged by clearly relating gain and hedonic motivation to normative motivation. This is because doing the right thing will make individuals to feel good and increase their resources [34]. In addition, gain and hedonic motivations are likely to be linked to one another because they are related to self-interest and interest in others and both depict the basic need of individuals to derive pleasure and care about their resources [34]. The study by Chakraborty et al. [34] finds significant positive relationships between gain motivation and normative motivation and gain motivation and hedonic motivation. The study also finds that normative motivation mediates the relationship between gain motivation and pro-environmental behaviour. Rezvani et al. [31] find that the relationship between gain motivation and intention of consumers to adopt electric vehicles is partially mediated by hedonic motivation. In addition, the effect of normative motivation on intention is partially mediated by hedonic motivation. Hameed and Khan [32] find that the mediating effect of hedonic motivation in the relationship between gain motivation and consumer intention is significant. However, the mediating effect of normative motivation in the relationship between gain motivation and intention is insignificant. Consequently, the following hypotheses are developed.

H1: Gain motivation and household energy saving behaviour are significantly positively related.

H2: Gain motivation and normative motivation are significantly positively related.

H3: Gain motivation and hedonic motivation are significantly positively related.

H4: The relationship between gain motivation and energy saving behaviour is mediated by normative motivation.

H5: The relationship between gain motivation and energy saving behaviour is mediated by hedonic motivation.

2.3 Normative motivation and energy saving behaviour

A normative goal frame triggers subgoals that are linked with appropriateness. This includes behaving the right way, showing an exemplary behaviour and behaving in a way that contributes to a clean environment [29]. Chakraborty et al. [34] find a significant positive relationship between normative motivation and the pro-environmental behaviour of university students. The findings of the study by Rezvani et al. [31] reveal that normative motivation has a significant positive effect on the intention to adopt electric cars in Sweden. Donmez-Turan and Kiliclar [39] find that normative-goal oriented individuals (students that are giving a moral reward) exhibit more pro-environmental behaviour than a control group (students not given any moral reward). Arroyo and Carrete [7] find that normative motivation influences the adoption of green energy by individuals of high socio-economic status. The findings of the study by Hameed and Khan [32] indicate that the direct effect of normative motivation on intentions is positive and significant. However, the relationship between normative motivation and behaviour is positive but insignificant.

Normative motivation can also impact on hedonic motivation. Onwezen et al. [40] argue that anticipated pride and guilt can lead to individuals behaving themselves in a manner that supports their personal norms. The findings of the study by Onwezen et al. [40] confirm the mediating effects of that anticipated pride and guilt in the relationship between personal norms and behaviour. Rezvani et al. [31] find that the relationship between normative motivation and the intention of consumers to adopt electric vehicles in Sweden is indirectly influenced by hedonic motivation. Chakraborty et al. [34] used normative motivation as a mediator in the relationship between hedonic motivation and gain motivation. First, the study finds a significant positive relationship between hedonic motivation and normative motivation confirming that the two constructs are related. Second, the study finds that normative motivation mediates the relationship between hedonic motivation and intention of university students to engage in pro-environmental behaviour in India. Hameed and Khan [32] find that the mediating effect of hedonic motivation in the relationship between normative motivation and consumer intention is significant. Consequently, it is hypothesised that:

H6: Normative motivation is positively related to household energy saving behaviour.

H7: Normative motivation is positively related to hedonic motivation.

H8: The relationship between normative motivation and household energy saving behaviour is mediated by hedonic motivation.

2.4 Hedonic motivation and energy saving behaviour

A hedonic goal frame triggers one or more subgoals that leads to the improvement in the way that an individual feels in a particular situation. This includes avoiding efforts, avoiding negative events, seeking pleasure, seeking excitement and seeking improvement in self-esteem [29]. Chakraborty et al. [34] investigate the effect of hedonic motivation on the pro-environmental behaviour of university students in India. The results show that hedonic motivation has a positive but insignificant relationship with pro-environmental behaviour. Hameed and Khan [32] find that hedonic motivation positively affects consumer intentions to purchase hybrid cars. Rezvani et al. [31] examine the effect of hedonic motivation on the intention to adopt electric vehicles by consumers in Sweden. Empirical findings support a significant positive relationship between hedonic motivation and intention to adopt electric vehicles. Steg et al. [41] point out that hedonic values may affect pro-environmental behaviour because the purchase of pro-environmental goods or services may provoke emotions, and individuals expect these emotions when making choices. Pro-environmental behaviour may be motivated by hedonic reasons (i.e. because people enjoy it) [42]. Consequently, it is hypothesised that:

H9: Hedonic motivation is significantly positively related to household energy saving behaviour.

Figure 1 depicts the research framework used for the study.

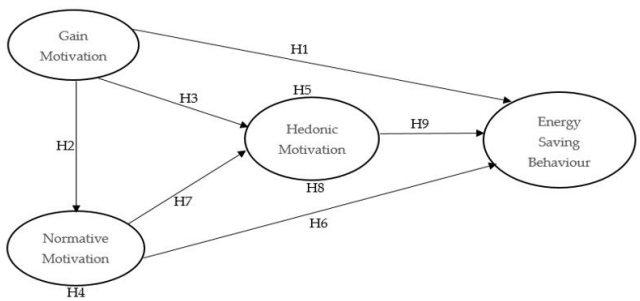

Figure 1. Research framework

3. RESEARCH METHODOLOGY

The study adopted the quantitative research approach. The causal research design was adopted for the study and data was collected from the respondents through the cross-sectional survey method using self-administered questionnaire. The study area was Polokwane in the Limpopo Province of the Republic of South Africa and the respondents in the survey were the owners of residences. The study adopted the convenience sampling method. Two research assistants helped in the data collection process between March and September 2021. Data collection. The telephone numbers of the respondents were obtained during questionnaire distribution. Each respondent was given two weeks and was reminded through telephone calls or the email. Questionnaires that were not completed after eight weeks were treated as non-response. The questionnaire was also translated to Sepedi, the local language widely spoken in the study area. Before actual data collection, the questionnaire was pre-tested in a pilot study and also examined by two experts in the area of sustainability. The pilot study led to minor adjustments to the questionnaire and helped to improve face and content validity. The hypotheses of the study were tested using Structural Equation Modelling (SEM) using the Smart software 3.0. SEM enables a researcher to more efficiently assess the measurement models and the structural paths especially when the latent constructs are based on multi-item indicator variables [43]. The two major approaches to SEM are the covariance-based approach (CB-SEM) and the partial least squares (PLS-SEM). This study used the PLS SEM a variance based approach to test the research hypotheses. PLS SEM is used to evaluate the measurement of latent variables and test relationships between latent variables. PLS-SEM normally achieves higher levels of statistical power and demonstrates much better convergence behaviour than CB-SEM [44]. The Cronbach's alpha was used to confirm the internal consistency of scale. The items to measure the constructs of the study were developed by the researcher from previous studies with acceptable psychometric properties and anchored on the five-point Likert scale ranging from "1 strongly disagree" to "5 strongly agree. Appendix one depicts the measures and sources of the constructs of the study. The participants in the survey were informed about the purpose of the study and that participation was voluntary and anonymity will be ensured. To ensure confidentiality and anonymity, the names of the participants were not included in the survey instrument. The cover page of the questionnaire contained information about the purpose of the study, voluntary participation, confidentiality and anonymity.

4. RESULTS

4.1 Response rate and biographical detail

Five hundred questionnaires were distributed and two hundred and five usable questionnaires were returned. The number of items used to measure the constructs of the study are fifteen as depicted in Appendix one. Using the ten times rule by Hair et al. [44], the minimum sample size of the study is 150 respondents. The biographical characteristics of the respondents are Gender: females 106 and males 99. Age 21-30 years (0) respondent, 31-40 years, 105 respondents, 41-50, 74 respondents, 51-60 years 26 respondents. Level of education: Matric qualification 78 respondents, Diploma 45 respondents, Degree, 52 respondents postgraduate 30. respondents.

4.2 PLS SEM

4.2.1 Measurement model

The following requirements were observed in the measurement model the factor loadings (>0.708), Average variance explained (>0.500), Cronbach's alpha (>0.700) and composite reliability (0.7 to 0.95). The study used the Fornell-Larcker criterion and the heterotrait–monotrait ratio (HTMT) to assess discriminant validity [44]. Table 1 depicts the measurement model. Tables 2 and 3 show the discriminant validity. The square root of the AVE should be higher than the correlations among the latent variables and all the values of the HTMT ratio were below the conservative threshold of 0.850.

4.2.2 Structural model

The factors that should be taken into consideration in evaluating the structural model include the common method bias (CMB), the R^2 the Q^2 and the evaluation of the path coefficients [44]. The existence of CMB can be identified through the variance inflation factor. The VIFs obtained in the study are lower than 3.3 which suggests that CMB is not an issue. The model ($R^{2)}$ is 58.6%. The GOF (0.36) and the Q^2 (0.42) suggest a significant predictive power of the model. The effect size (f^2) shows the effect of one construct on another construct and values are 0.02 (small), 0.15 (medium) and 0.35 (large). The effect sizes (0.239 to 0.282) and the standardised root mean square residual (SRMR) of 0.04 support a good model fit.

Table 1. Measurement model

Construct	Measurement items	Loading	Cronbach's alpha	Composite reliability	AVE
Gain motivation (GAI)	GAI1	0.804	0.816	0.838	0.632
	GAI2	0.783			
	GAI33	0.799			
Normative motivation (NOR)	NOR 1	0.799	0.762	0.835	0.625
	NOR2	0.814			
	NOR3	0.762			
Hedonic motivation (HED)	HED1	0.821	0.776	0.818	0.601
	HED2	0.764			
	HED3	0.738			
Electricity saving behaviour (ELE)	ELE1	0.803	0.822	0.896	0.590
	ELE2	0.764			
	ELE3	0.813			
	ELE4	0.738			
	ELE5	0.759			
	ELE6	0.727			

Table 2. Fornell-Larcker criterion

CONSTRUCT	GAI	NOR	HED	ENE
GAIN	**0.795**			
NOR	0.683	**0.791**		
HED	0.604	0.526	**0.794**	
ENE	0.536	0.504	0.601	**0.768**

Diagonals in bold signify the square root of the AVE while the other figures depict the correlations.

Table 3. HTMT

CONSTRUCT	GAI	NOR	HED	ENE
GAI				
NOR	0.601			
HED	0.539	0.597		
ENE	0.601	0.526	0.572	

Table 4. Path coefficient and T-statistics

Hypothesised path	Path coefficient	T-statistics	Decision
H1 GAI→ENE	0.226	6.129 *	Supported
H2 GAI→NOR	0.143	4.072 **	Supported
H3 GAI—HED	0.175	2.866**	Supported
H6 NOR-ENE	0.209	5.261*	Supported
H7 NOR-HED	0.103	0.805	Rejected
H9 HED→ENE	0.147	3.297**	Supported

*p<0.01; ** <0.05

Table 4 depicts the results of the structural model. The results (β 0.226, T 6.129, p<0.01) show that gain motivation and energy saving behaviour are significantly positively related supporting hypothesis one. The results (β 0.143, T 4.072, p <0.05) show a significant positive relationship between gain motivation and normative motivation supporting hypothesis two. The results (β 0.175, T 2.866, p <0.05) show a significant positive relationship between gain motivation and hedonic motivation supporting hypothesis three. The results (β 0.209, T 5.261, p <0.01) show that normative motivation and energy saving behaviour are significantly positively related supporting hypothesis six. The results (β 0.103, T 0.805, p >0.05) show an insignificant relationship between normative motivation and hedonic motivation. Hypothesis seven is rejected. The results (β 0.147, T 3.297, p <0.05) show that hedonic motivation is significantly positively related to energy saving behaviour supporting hypothesis nine.

Table 5 depicts the results of mediation. The indirect path between GAI→NOR→ENE is positive and significant. The results as indicated by Table 5 show that the direct effect and indirect effect are significant. Also, the variance accounted (VAF) value bigger than 80% represents full mediation, a VAF value of between 20% and 80% means a partial mediation, while a value below 20% means no mediation. In addition, for complementary mediation, the indirect effect and the direct effect are significant and point in the same direction. For competitive mediation, the indirect effect and the direct effect are significant but point in opposite directions while for indirect-only mediation, the indirect effect is significant, but not the direct effect [44]. The VAF values are below 80% and a complimentary partial mediation is confirmed. Thus, hypotheses four that proposes that the relationship between gain motivation and energy saving behaviour is mediated by normative motivation is supported. In addition, the indirect path between GAI→HED→ENE is positive and significant and a complementary partial mediation partial is confirmed. Hypothesis five that proposes that the relationship between gain motivation and energy saving behaviour is mediated by hedonic motivation is supported. The indirect path between NOR→HED→ENE is insignificant. Hypothesis eight that proposes that the relationship between normative motivation and household energy saving behaviour is mediated by hedonic motivation is rejected.

Table 5. Mediation results

Mediation path	Indirect effect	Total effect and T-statistics	Confidence interval bias (corrected)		Decision	VAF
			LL	UL		
H4 GAI→NOR→ENE	0.178*	0.286* (1.398)	0.051	0.220	Accepted (partial mediation)	62..24%
H5GAI→HED→ENE	0.146**	0.320** (1.116)	0.053	0.177	Accepted (partial mediation)	45..63%
H8NOR→HED→ENE	0.107	0.306			No mediation	

*P<0.01; ** <0.05

5. DISCUSSION

Drawing on the Goal Framing Theory (GFT), the study investigated the determinants of household electricity saving behaviour. The study examined the direct effects of the three principal constructs of the GFT (gain goal, normative goal and hedonic motivations) on household energy saving behaviour. In addition, the study examined the mediating effects of normative and hedonic motivations in the relationship between gain motivation and energy saving behaviour. Based on the objectives, hypotheses were developed. The findings of the study indicated that gain motivation and household energy saving behaviour are significantly positively related. In addition, gain motivation is positively related to both normative and hedonic motivations. Furthermore, both normative and hedonic motivations mediate the relationship between gain motivation and energy saving behaviour. Gain goal deals with issues related to resources such as saving money [29]. The cost of electricity to residences in South Africa has increased significantly between 2013 and 2020. This has led to households to look for ways to reduce the amount spent on electricity [45]. The findings are consistent with previous empirical studies on GFT and pro-environmental behaviour. Rezvani et al. [31] find that gain motivation has a significant positive relationship with the intention of consumers to adopt electric vehicles. Chakraborty et al. [34] find a significant positive relationship between gain motivation and the pro-environmental behaviour of university students. In addition, normative motivation mediates the relationship between gain motivation and pro-environmental

behaviour of students. Rezvani et al. [31] find that the relationship between gain motivation and intention of consumers to adopt electric vehicles is partially mediated by hedonic motivation. In addition, the effect of normative motivation on intention is partially mediated by hedonic motivation. Hameed and Khan [32] find that the mediating effect of hedonic motivation in the relationship between gain motivation and consumer intention is significant. The findings of the study indicated that normative motivation is significantly positively related to energy saving behaviour. The findings also show that the relationship between normative motivation and hedonic motivation is insignificant. In addition, the mediating effect of hedonic motivation in the relationship between normative motivation and energy saving behaviour is insignificant. A normative goal frame suggests that energy saving behaviour is the appropriate thing to do and helps to reduce environmental challenges [29], Chakraborty et al. [34] also find a significant positive relationship between normative motivation and the pro-environmental behaviour of university students. Rezvani et al. [31] find that normative motivation has a significant positive effect on the intention to adopt electric vehicles. The findings of the study by Donmez-Turan and Kiliclar [39] show that normative motivated individuals tend to behave pro-environmentally. The findings of the study indicated that hedonic motivation is significantly positively related to energy saving behaviour. Steg et al. [41] remark that hedonic values may affect pro-environmental behaviour because the purchase of pro-environmental goods or services may provoke emotions. The findings of the study by Rezvani et al. [31] show that hedonic motivation positively affects intention to adopt electric vehicles. Hameed and Khan [32] find that hedonic motivation and the purchase of energy-saving air conditioners are significantly positively related.

6. CONCLUSION

The study investigated the determinants of household energy saving behaviour in South Africa using the GFT. The PLS SEM was used to test the hypothesised relationships. The findings indicated significant positive relationships between gain, normative and hedonic motivations and household energy saving behaviour. In addition, the study investigated the direct and indirect relationships between the GFT constructs. The findings revealed that gain motivation and normative motivation are significantly positively related. In addition, gain motivation has a significant positive relationship with hedonic motivation. However, the relationship between normative motivation and hedonic motivation is insignificant. The mediation results showed that the relationship between gain motivation and energy saving behaviour is mediated by normative motivation. The findings also indicated that the relationship between gain motivation and energy saving behaviour is mediated by hedonic motivation. Finally, the findings showed that the relationship between normative motivation and household energy saving behaviour is not mediated by hedonic motivation.

The study makes a significant contribution to the understanding the factors that can affect household energy saving behaviour. Theoretically, the study confirms the applicability of the GFT in explaining household energy saving behaviour. The three constructs of the GFT are positively linked to household energy saving behaviour. In addition, the study examined the indirect effects of normative and hedonic goals in the relationship between gain motivation and household energy saving behaviour. The findings of the study indicated that normative motivation can help to explain the relationship between gain motivation and household energy saving behaviour. The findings suggest that doing the right thing and protecting the environment (normative motivation) can help to save the amount spent on electricity (gain motivation) with a positive effect on energy saving behaviour. However, the indirect effect of hedonic motivation is insignificant. Theoretically, the study shows the direct and indirect effects of the GFT in the context of household energy saving behaviour.

The findings of the study have practical implications for households and the organisations that provide electricity in South Africa. The findings indicated significant positive relationships between gain, normative and hedonic goals and household energy saving behaviour. Gain motivation deals with issues related to resources such as saving money, increasing income and ensuring financial security. To improve gain motivation, households should be made aware that curtailment efforts can help to reduce energy consumption, reduce energy costs and ensure energy security. Based on these findings, it is recommended that Governments, electricity producing firms and media should create extensive awareness about the private and public benefits of electricity saving through aggressive information campaign. Normative motivation focuses on behaving the right way, showing an exemplary behaviour and behaving in a way that contributes to a clean environment. To improve normative motivation, it is recommended that governments and media should continue to increase the level of awareness that high energy consumption creates environmental challenges. In addition, one of the ways to mitigate climate change is for households to do the appropriate thing and reduce energy consumption at home through energy saving behaviour. Hedonic motivation focuses on avoiding efforts, avoiding negative events, seeking pleasure, seeking excitement and seeking improvement in self-esteem. To improve hedonic motivation, households should be made aware that saving energy is not a difficult thing to do. This can be done by government and media providing information to households about the various ways to save electricity at home and how easy some of these conservation methods are.

The study has the following limitations: Data was collected from households in one city in South Africa through the convenience sampling method and this limits the generalisability of the findings. Adding other cities in South Africa and an international comparative study will help in generalising the findings of the study. In addition, the effects of demographic variables such as gender, age and level of education were not examined. A multi group analysis that takes into consideration demographic factors and social class and income will add to knowledge on household energy saving behaviour. The study utilised the cross-sectional research design. This limits cause and effect relationship and other studies can adopt a longitudinal research design.

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APPENDIX ONE: QUESTIONNAIRE

Construct	Items	Source
Gain motivation	1. Saving electricity at home reduces the cost of electricity 2. Saving electricity at home helps to save money 3. Saving electricity at home has economic benefit	[29, 31, 32, 34]
Normative motivation	1. Saving electricity at home helps to preserve natural resources 2. Saving electricity at home helps to protect the environment 3. Saving electricity at home is the appropriate thing to do	[29, 31, 32, 34]
Hedonic motivation	1. Saving electricity at home makes me feel happy 2. I enjoy saving electricity at home 3. Saving electricity at home gives me pleasure.	[29, 31, 32, 34]
Electricity saving behaviour	1. Do not switch on lights at home for longer than necessary 2. Do not leave the television on at home if not watching 3. Do not put on the heater at home for longer than necessary 4. Do not put on the air conditioner for longer than necessary. 5. Do not cook food for longer than necessary. 6. Use washing machine only once a full load of dirty clothes has accumulated.	[5, 17]