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Social-Cultural Beliefs and Behavioral Intentions to Adopt Renewable Energy Technologies in Uganda

Robert Muwanga[1] and Diana Philemon Mwiru[2]

ABSTRACT

The aim of this study was to examine the influence of social-cultural beliefs on behavioral intentions to adopt renewable energy technologies-RETs. Using the theory of planned behaviour framework, the study validated social-cultural beliefs as indispensable antecedents of people's behavioral intentions to adopt RETs. An explanatory quantitative research design was adopted, and data was collected using a survey questionnaire from a sample of 369 households in 3 urban districts of Kampala, Wakiso and Mukono in Uganda. PLS-SEM was then used for data analysis. Findings revealed that perceptions and religious beliefs influenced behavioral intentions to adopt RETs well as cultural beliefs did not have a substantial influence on intentions. Perceptions concerning the usefulness, usability and consequences of adopting RETs influenced intentions more than the other beliefs. With the help of these findings, promoters of RETs will be able to nurture positive perceptions and attitudes necessary for the success of these technologies. However, the applicability of these findings may be limited by the omission of factors closely related to beliefs like attitudes and norms from the research model that produced these results.

***Key words**: Renewable energy technologies, Social-cultural beliefs, Behavioral intentions, Theory of planned behaviour, Uganda*

INTRODUCTION

Usage of renewable energy is considered one of the most appropriate ways to deal with the global climatic problem and increase access to electricity (Adefarati & Bansal, 2019; Buonocore et al., 2016). Statistics from the International Renewable Energy Agency (IRENA, 2019) indicated that investments in and usage of renewable energy technologies- (RETs) are increasing, though not evenly across the world. These are more accepted and used in the developed world, particularly in Europe, than in less developed countries (Ali et al., 2020). In 2018, for example, up to 66% of new energy installations worldwide were renewable energy, where only 8.4% was in Africa (Akroush et al., 2018). This indicates low adoption of these energy alternatives. In Uganda, for example, under 0.06% of the population uses renewable energy despite efforts from government and private initiatives to increase accessibility and affordability (Uganda Bureau of Statistics –UBOS, 2018). This is mainly solar energy, with the rest of the renewables like wind, geothermal, biogas barely in use (Fashina et al., 2019).

Most studies attribute the non-acceptance and low adoption of RETs to factors like costs of acquiring the technology, low-income levels in these countries (Huenteler et al., 2014; Iqbal et al., 2018) and technical factors. Although other factors like social-cultural beliefs are identified as important aspects that must be considered for technology to succeed, few studies (Rhodes et al., 2014; Sovacool & Drupady, 2011; Zahari & Esa, 2018) have examined their influence on

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technology adoption. Specifically, the contribution of people's perceptions, religious and cultural beliefs on their intentions to use RETs has not been well explained. This has left an unanswered question; how do social-cultural beliefs influence people's behavioral intentions to adopt RETs? Additionally, social-cultural beliefs are not well represented in the existing theoretical and conceptual frameworks dealing with the adoption of technology. Also, studies addressing these factors in relation to technology adoption have remained predominantly qualitative (Huang et al., 2017; Katikiro, 2016; Sovacool & Griffiths, 2020; Ssentongo, 2012), leaving the influence of social-cultural beliefs on RETs adoption behaviour largely unknown. Therefore, the influence of these beliefs on people's behavioral intentions needs to be examined to offer a better understanding of RETs usage.

THEORETICAL REVIEW

Theory of Planned Behaviour (TPB)

Developed by Ajzen (1985) as an improvement to the theory of reasoned action, this is a psychological theory that explains the relationship between people's beliefs and behaviour through behavioral intentions. According to the theory, behavioral intentions closely relate to one's willingness and chances of engaging in specific behaviour and are considered the most substantial determinants of actual behaviour. In fact, intentions are referred to as the personal motivation to engage in a particular behaviour (Fishbein & Ajzen, 1975). In this theory, behavioral intentions are influenced by attitudes, subjective norms and perceived behavioral control. Ajzen, the theory developer, considered these factors to represent three different kinds of beliefs: behavioral beliefs, normative beliefs, and control beliefs, respectively. These can also be expressed as personal, social and volitional beliefs and represent the measures of the main factors of the TPB. However, this is a one-dimensional treatment of beliefs that fails to capture other forms of beliefs that may be unique and context-specific (Hoie, Moan & Rise, 2010; Hoque & Hossan, 2020).

Nevertheless, people's beliefs represent much more than what the theory captures, including social-cultural beliefs, religious beliefs, and others that may arise from the difference in context and application. The theory has also been criticized for being too limited in terms of factors considered to affect human behaviour, which is thought to be influenced by a long list of other factors. However, given its flexibility and applicability, many research fields have continued to borrow, modify and use the TPB to identify and explain a wide range of beliefs thought to influence behaviour in business, health, marketing and other spheres of life (Charag et al., 2019; De Leeuw et al., 2015; De Pelsmeaker et al., 2017). Hence it has been considered the most applicable theory in explaining behaviour. It is upon this background that this study introduced other forms of beliefs considered important in influencing people's behavioral intentions towards the adoption of RETs.

EMPIRICAL REVIEW

Behavioral Intentions to adopt RETs

As portrayed in the TPB, behavioral intentions are an important factor that connects people's beliefs with their behaviour (Lebdaoui & Chetioui, 2020). That is to say, intentions depict an individual's possibility of engaging in behaviour. These have been used to explain various behaviours like banking behaviour in India (Charag et al., 2019), entrepreneurship behaviour in Brazil (Paiva, Sousa, Lima, & Silva, 2020), and social media usage behaviour in Saudi Arabia and South Africa (Alsheddi, Sharma, & Talukder, 2020; Lekhanya, 2013). Different beliefs have been identified in these studies, and their contributions to specific behaviours have been tested. Regarding behavioral intentions to adopt RETs, several beliefs have been mentioned among the factors influencing people's usage behaviour, though little effort has been made to empirically

explore and validate these claims. Since most studies addressing the usage of RETs have emphasised policy, accessibility and financial factors as necessary for widespread adoption (Obonyo, 2021), the contribution of people's beliefs cannot be ignored. Beliefs such as perceptions (Davis, 1989; Zahari & Esa, 2018), religious beliefs (Essoo & Dibb, 2004) and cultural beliefs (Bach, Hopkins & Stephenson, 2020; Slowikowski & Jarratt, 1997) are known to guide people's choices and ways of life and influence people's behavioral intentions, which manifests as motivation to accept and use the technology (Asadi et al., 2020).

Cultural beliefs and behavioral intentions to adopt RETs

Behavioral intentions to adopt technology are associated with the cultural beliefs that maintain and support social life in different societies. These may include but are not limited to traditions and rituals that define people's identity and the rules and taboos maintained to which people are traditionally attached (Naimi & Mark, 2010; Ssentongo, 2012). Traditional beliefs mainly place restrictions on people's conduct to maintain social order, though they may act as the foundation for the desired behaviour as well (Hatah et al., 2015). These beliefs constitute a considerable part of people's daily decision-making processes that may involve energy usage by dictating household dietary requirements, like the type and amount of food consumed, nutritional and food taste requirements, among others (Muggaga et al., 2017). Other beliefs may relate to food preparation methods, rituals and importance attached to cooking places and cooking fuel (Aggarwal, Syed, & Garg, 2019; Rhodes et al., 2014). Such beliefs define people's identities and behaviour, yet their role in influencing people's intentions to adopt RETs is largely unexplored. However, it has been suggested that for any technology to be fully accepted, focus must be placed not only on social-economic but also on a good understanding of people's social-cultural beliefs and values (Eder, Mutsaerts, & Sriwannawit, 2015). Straub, Loch and Hill (2001) explained that the importance and value attached to certain beliefs brought about by the difference in cultural setups define the chances of adopting particular technologies.

Since cultural and traditional beliefs predominantly revolve around national pride, self-respect, and social conformity, the desire to preserve such long-term customs and values result in behaviour. Relating to the adoption behaviour of RETs, these beliefs revolve around the use of things like smoke and fire, food and diet specifications, delusions about the use of electricity and a variety of other social aspects (Sovacool & Griffiths, 2020). In societies that maintain such beliefs and traditions, decisions concerning life support applications are highly dependent and influenced by these beliefs. For example, sun-worshipping in China was found to have a strong positive connection with the use of solar water heaters (Huang, Castán Broto, & Liu, 2017). However, in other societies like Zimbabwe, traditions of sun-worshipping with beliefs that sunlight belong to the gods using solar technology that taps into it is equated to stealing from the spirits and has been highly discouraged (Sovacool & Griffiths, 2020). According to Devine –wright (2008), social-cultural beliefs (whether personal or societal) are vital in guiding people's attitudes and intentions of using the technology. These constitute the elementary needs for technology in society and will determine the rate at which technology is adopted and used (Walker et al., 2016). Hence, this study's first hypothesis is that:

H1: Cultural beliefs positively influence people's behavioral intentions to adopt RETs.

Religious beliefs and behavioral intentions to adopt RETs

Other social-cultural beliefs are the religious beliefs that have occasionally been associated with various behavioral trends. Also referred to as religiosity, these beliefs are known to affect people's

actions, choices and behaviours (Bailey & Sood, 1993; Mathras et al., 2016). Agarwala, Mishra and Singh (2019) argued that religious beliefs command behaviour and set guidelines for preferred lifestyles for followers based on spirituality and moral values. These also build tolerance levels and ethics onto which decision making is based, thereby affecting one's risk acceptance, mostly relying on the interdependences within the religious community to which they belong. However, in other instances, people's religious beliefs yield negativity and reduce willingness to use technologies that appear to conflict with their religious values. This adds to the fact that, through religious beliefs, people's attitudes, behavioral intentions and behaviour are affected (Paiva et al., 2020), although such attitudes are more likely to develop for technologies with clear and strong religious association.

Religious beliefs also act as a unifying factor by providing supportive structures and a sense of belonging for group members, thereby impacting their social lives and choices. Therefore, becoming aware of some of the religious beliefs and rituals of a particular society can be instrumental for the success of RETs. It is assumed that some religious laws and rituals can be exploited to encourage more technology usage. Mathras et al. (2016) added that the different dimensions of religion (beliefs, rituals, and values) affect people's behaviours, such as relationships with certain products, product choice, and selective acceptance. For example, the decision to subscribe to Islamic banking by the Kashmiri people in India were found mostly based on Islamic religious beliefs that seemed to match well with their way of life (Charag et al., 2019). Similar findings have been reported in many societies with relatively strong religious beliefs (Baazeem, 2019; Essoo & Dibb, 2004; Griebel, Park, & Neubert, 2014). However, the same beliefs have been found to have negative or no influence on behavioral intentions in other contexts. These include the negative influence on the usage of social media in South Africa (Lekhanya, 2013) and the rejection of biogas stoves that would use pig dung by the dominantly Muslim societies of Bangladesh (Sovacool & Drupady, 2011), among others. In Paiva et al. (2020), religious beliefs were found to have no substantial influence on entrepreneurial behaviour intentions for university students. Irrespective of these, most of the literature suggests a positive relationship between religious beliefs and behaviour. Hence the study's second hypothesis is that:

H2: Religious beliefs positively influence behavioral intentions to adopt RETs.

Perceptions and behavioral intentions to adopt RETs

Some of the major concerns for people adopting RETs are based on their perception of the technology in terms of character and abilities. Perceptions, in this case, mean the processes through which people make sense of the technology (Shahin et al., 2019), which may revolve around the usefulness, safety compatibility and consequences of accepting the technology in the form of risk or expense (Geddes, 2021; Zahari & Esa, 2018). Although Scuotto et al. (2020) suggested a positive linear relationship between individual perceptions and their intentions to adopt a technology, the consequences of such beliefs can be positive or negative and far-reaching. A technology that is negatively perceived is likely to face more challenges than that perceived positively. In earlier works (Davis, 1989; Venkatesh et al., 2003), perceptions are represented as one's conviction about the usefulness of the technology and the ease with which the technology can be used. These represent both the cognitive and emotional interpretations and reactions towards the technology (Lok, 2015). Hence the technology may be accepted if perceived as valuable and likely to improve life or rejected if perceived as risky and likely to tamper with one's way of life. The difference in individual preferences results in intentions towards or against the

technology (Spence et al., 2015). Therefore, understanding these beliefs and the contextual, cultural details in the technology design and implementation process are essential for the success of any technology (De Leeuw et al., 2015).

In a study examining the factors affecting household adoption of alternative energy in India, Roy and Mohapatra (2021) concluded that beliefs such as perceptions did not affect behavioral intentions to adopt these technologies. However, while examining predictors of behavioral intentions to use home energy management systems in the United Kingdom, Whittle, Jones and While (2020) explained that people's perceptions concerning the usefulness and ease of application of the technology were major predictors of people's intentions to use the technology. Similarly, in Zulu, Chabala, and Zulu (2021), people's perceptions in terms of benefit, risk and cost associated with using RETs influence their behavioral intentions to use solar energy technologies in Zimbabwe. Other studies indicating the relevance of perceptional beliefs in explaining behavioral intentions include Jansson (2011), Qian and Yin (2017). Therefore, the third hypothesis stated that:

H3: Perceptions positively influence behavioral intentions to adopt RETs.

METHODOLOGY

With the main aim of examining the influence of social-cultural beliefs on people's behavioral intentions to adopt RETs, a positivistic philosophy was considered appropriate. According to Saunders, Lewis and Thornhill (2019), it is under positivism that objective truth can be obtained through scientifically testable observation. To achieve this, the study employed an explanatory-quantitative research design that was cross-sectional in nature. An explanatory design is suitable for inquiries seeking to identify how particular factors (independent variables) explain the changes in dependent variables (Aggarwal, Syed, & Garg, 2019). Unlike anthropological studies that address cultural beliefs qualitatively, this study used a quantitative assessment of beliefs. As suggested by Straub et al. (2001), with reasonable measurements, a quantitative assessment would provide an alternative approach necessary to propagate knowledge in this area. The study was carried out on households in the urban districts of Kampala, Wakiso and Mukono in central Uganda with the aim of capturing the views of urban dwellers who are considered equally responsible for high usage of biomass fuels of firewood and charcoal regardless of the accessibility to alternative fuels like RETs (Beyene & Koch, 2013). Statistics indicate that these are among the districts with the least connectivity to RETs like solar in the country. Using multilevel sampling, a sample of 396 households was drawn from the three districts, including both users and nonusers of solar technology as a form of RETs. Data was collected between the months of April and June 2021 using a survey questionnaire.

The measurements for this study were developed using already existing scale items from empirically tested studies. These included cultural beliefs by Renko and Bucar (2014), religious beliefs from Essoo and Dibb (2004), perceptions and behavioral intentions from Davis (1989). These constituted a total of 20 measurement items measured on a 5 point Likert scale, which ranged from 1= Strongly Disagree, 2 = Disagree, 3 = Not sure, 4 = Agree, and 5 = Strongly Agree. These were preceded by other questions that captured the sample demographic characteristics. Sample characteristics were determined using descriptive statistical analysis using Statistical Package for Social Sciences (SPSS) version 22.0. The study then employed partial least squares structural equation modelling (PLS-SEM) in SmartPLS 3.0 software for hypotheses testing.

Among the key demographic characteristics of the study sample were; gender, age, education level, number of children, and whether they used solar technology. It was established that most of the respondents were female (54.2 per cent), males made up 45.8 per cent. In terms of age, up to 60 per cent of the respondents were young adults between 18 and 35 years old. Most of the respondents were semi-literate, with more than half (70.2 per cent) having secondary level education or less. Finally, 66.1% indicated to have used some solar energy technology, and 33.9% had not used any. Other descriptive results were generated portraying the respondent's views of the study variables. The means and standard deviation of responses for beliefs and behavioral intentions are indicated in Tables 1 and 2.

Results in Table 1 indicate that respondents had different opinions on different beliefs concerning the use of RETs. The average scores for almost all the beliefs were above 4.1, which is above the mid-value of 3 (Not sure). This means that majority of the respondents agreed with what was suggested concerning their beliefs and usage of RETs. Only 1 item scored below the mid-mark (2.8), indicating that people disagreed with the fact that they considered their cultural beliefs when buying solar products. The highest score (4.3) was generated from 2 items relating to the belief that food cooked traditionally tastes better than that cooked by modern technology and the belief that using solar helps accomplish household tasks faster.

Table 1: Descriptive Statistics for Beliefs

	N	Mean	SD
I consider my cultural beliefs before buying a solar product	369	2.8	1.6
I believe food cooked traditionally with firewood and charcoal is healthier	369	4.2	1.1
I believe food cooked traditionally tastes better	369	4.3	1.0
I believe cooking food with solar maintains its original taste	369	3.1	1.0
My religious beliefs support me to use solar	369	4.1	1.0
I live my life according to my religious beliefs	369	4.2	0.9
Although I believe in my religion, many other things are more important in life	369	4.2	0.9
Using solar enables me to accomplish tasks more quickly	369	4.3	0.9
Using solar improves my home performance	369	4.1	0.9
Using solar in my home increases my productivity	369	4.0	0.9
Using solar enhances my effectiveness at home	369	4.0	1.0
Using solar make it easier to do my job	369	4.2	1.0

Table 2 presents results about respondents' opinions of their intentions to adopt RETs (solar technology). All the items scored high above the mid mark of 3 with an average score of 4.3. This is an indication that the majority of the respondents agreed to the possibility of using solar technology in the future. The highest average score (4.6) related to people's willingness to recommend others to use solar technology, and the lowest (4.0) related to the willingness to use solar energy for cooking purposes. The standard deviation for all the items is below 1, averaging around 0.7.

Table 2: Descriptive Statistics for Intentions to Adopt

Intentions	Max	Mean	SD
I expect that I will use solar technology in my home in future	369	4.4	0.6
I will continue using solar technology in my home	369	4.3	0.7
I plan to use solar technology in my home more often	369	4.2	0.7
I intend to increase my dependence on solar technology at my home	369	4.1	0.7
I plan to use solar technology to improve the standards of living in my home	369	4.2	0.7
I will use solar for lighting purposes in the future	369	4.4	0.7
I will use solar for cooking purposes in the future	369	4.0	0.9
I will recommend others to use solar technology in their homes	369	4.6	0.6

RESULTS

With the application of PLS-SEM, the research model was assessed for both convergent and discriminant validity meant to determine the systematic variance captured by the measurement items relating to specific constructs. Convergent validity was ensured by determining the reliability of measurement items using factor loadings and Cronbach alpha values, internal consistency (CR) and average variance extracted (AVE). PLS-SEM was opted for since it is considered a more robust technique capable of estimating various relationships simultaneously, producing more reliable results, and is fit for model development (Hair et al., 2017; Lok, 2015). The technique also permits the testing of phenomena in an exploratory way, which allows the validation of variables that are not fully understood. The research model was measured reflectively following Hair et al. (2017) criteria.

Item reliability which measures the amount of variance in the construct captured by the measurement items is demonstrated in terms of factor loadings, which must be above 0.7. However, items with loadings above 0.4 are retained in the measurement model as long as their corresponding AVE and CR meet the required levels (Hair et al., 2010; Hair et al., 2017). Following this logic, 2 items (Bel1 and Bel4) were removed from measures of cultural beliefs, 1 item (Bel7) from the measurements of religious beliefs and 1 item (Int7) from measures of behavioral intentions, for having very low outer loadings (below 0.4).

Figure: Measurement model assessment

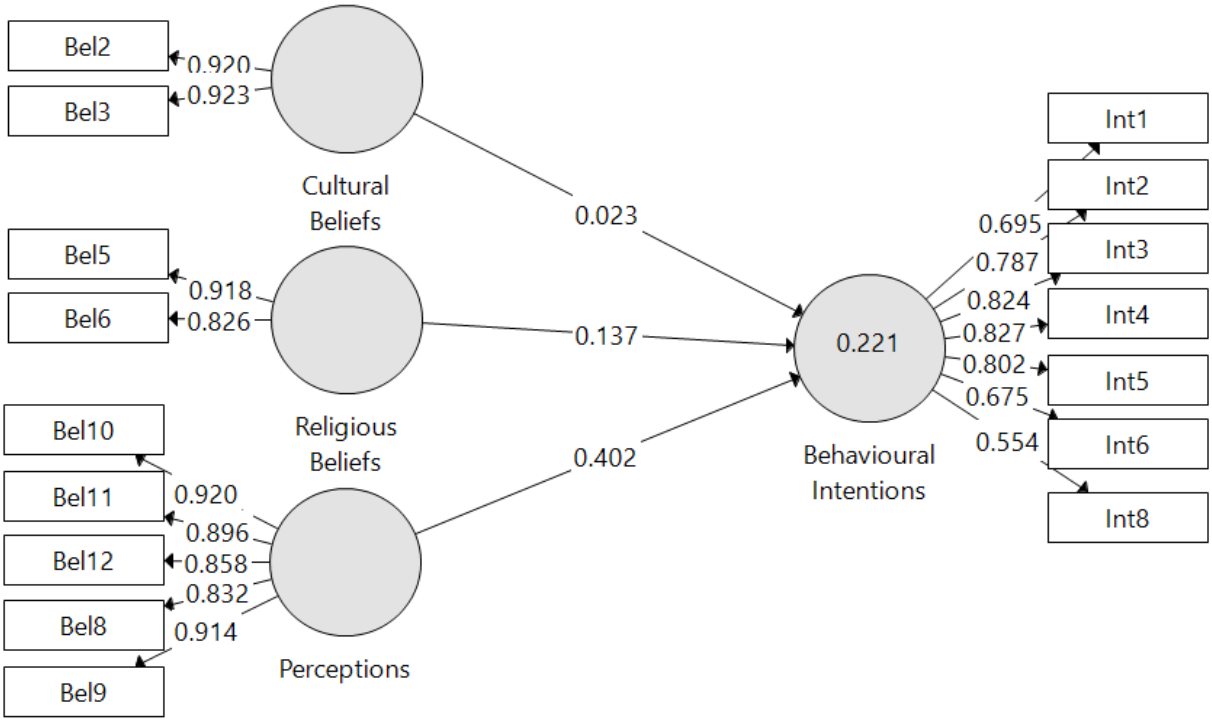

Table 3: Measurement Model Results

Construct	Indicator Items	Factor Loading	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Cultural Beliefs	Bel2	0.92	0.822	0.822	0.918	0.849
	Bel3	0.923				
Religious Beliefs	Bel5	0.917	0.701	0.754	0.865	0.762
	Bel6	0.827				
Perceptions	Bel8	0.832	0.93	0.94	0.947	0.783
	Bel9	0.914				
	Bel10	0.92				
	Bel11	0.896				
	Bel12	0.859				
Behavioral Intentions	Int1	0.687	0.864	0.895	0.895	0.552
	Int2	0.785				
	Int3	0.819				
	Int4	0.832				
	Int5	0.806				
	Int6	0.678				
	Int8	0.552				

For internal consistency, consideration is given to Cronbach's alpha and composite reliability of model constructs. The Cronbach's alpha values for all the study constructs were above 0.7 as a minimum requirement. Results also indicated that CR for all constructs met the minimum requirement of 0.7, that is, CR values for all the constructs ranged between 0.865 and 0.947, which indicated high reliability.

To complement item reliability, AVE for each construct was assessed to ascertain the amount of variance each construct explained in contrast with the measurement error. According to Hair et al. (2017), AVE is required to be greater than 0.5, which would signify that the construct is explaining more than half of the variations in its indicators. Results show that the AVE values were; cultural beliefs (AVE = 0.849), religious beliefs (AVE = 0.762), perceptions (AVE = 0.783) meaning that convergent validity for model constructs was ensured.

The Fornell-Larcker criterion for determining discriminant validity was employed to determine the theoretical and conceptual uniqueness of the model constructs. Under this procedure, discriminant validity is determined by comparing the square root of the AVE of each construct with the inter-correlations values among constructs (Ringle et al., 2014). The requirement is that the square roots of the AVE values are higher than the correlation with other constructs (Fornell-Larcker, 1981). The results in Table 4 indicate that the square root values of the AVE are high compared with the corresponding correlations among constructs which verifies that the model discriminant validity was ensured.

Table 4: Discriminant Validity

	Behavioral Intentions	Cultural Beliefs	Perceptions	Religious Beliefs
B. Intentions	**0.743**			
Cultural Beliefs	0.152	**0.921**		
Perceptions	0.449	0.219	**0.885**	
Religious Beliefs	0.271	0.285	0.306	**0.873**

Assessment of the structural model was preceded by examining collinearity issues using the variance inflation factor- VIF technique. This indicated that there was no multicollinearity among indicator variables since all VIF values were below the maximum acceptable value of 5 (Hair et al., 2017). The study employed coefficient of determination (R-square) to assess this interaction between the study constructs; social-cultural beliefs (cultural, religious and perceptions) and behavioral intentions. This was specifically meant to ascertain the changes in the endogenous variable (behavioral intentions) explained by the exogenous variables. It was established that the model generated $R^2 = 0.221$, indicating that the model explained up to 22 per cent of the variations in behavioral intentions to adopt RETs. Although this may be regarded as weak explanatory power based on the classification by Chin (1998), Hair et al. (2010) argued that R-square values are better interpreted according to context. Therefore, R^2 of 0.221 is considered moderate given the complexity in predicting human behaviour. Assessment of the quality of the predictive model -f-square (f^2) which displays the relative importance each construct carries in relation to predicting the outcome variable (Kock, 2014) indicated that; religious beliefs ($f^2 = 0.001$), cultural beliefs (f^2

= 0.021) and perceptions (f^2 = 0.184). These results show that perceptions carried a more meaningful effect and cultural beliefs carried the least relevance in the model. The overall predictive relevance of the model Q-square (Q^2 = 0.108) indicated that the model was relevant in predicting behavioral intentions.

Hypotheses Testing

While evaluating the structural model, the different model paths that represented the different hypotheses were tested using path coefficients and path significance. This is depicted in the p-values, which must be below 0.5 (p-value < 0.5) and the t-statistics, which must be greater than 1.96 (t-value > 1.96) (Hair et al., 2017) as indicated in Table 5.

Results in Table 5 show that of the 3 structural model paths, 2 were significant, and 1 was insignificant. There was a positive significant relationship between religious beliefs and intentions (β= 0.137, t= 2.286, $p < 0.05$) and so was the relationship between perceptions and intentions (β= 0.402, t= 7.568, $p < 0.01$). However, the interaction between cultural beliefs and intentions was positive but insignificant, reflected in the minimal path coefficient, small t-value and p-value greater than 0.05, (β= 0.023, t= 0.452, $p > 0.05$). This means cultural beliefs have no substantial effect on people's behavioral intentions to adopt RETs. Hence these results can be summed up as;

i. Hypothesis one, which stated that cultural beliefs positively influenced people's behavioral intentions to adopt RETs, is not supported.
ii. Hypothesis two, which stated that religious beliefs positively influenced people's behavioral intentions to adopt RETs, is supported.
iii. Hypothesis three, which stated that perceptions positively influenced people's behavioral intentions to adopt RETs, is supported.

Table 5: Structural Model Results

Hypothesis	Model Path	Coefficient	*t*-Statistics	*p*-Values
H1	Cultural Beliefs -> Behavioral Intentions	0.023	0.452	0.651
H2	Religious Beliefs -> Behavioral Intentions	0.137	2.286	0.022
H3	Perceptions -> Behavioral Intentions	0.402	7.568	0.000

DISCUSSION

This study intended to bring to light specific mechanisms through which difference in people's beliefs explain their behavioral intentions to use RETs. Hence, various beliefs have been validated in the TPB framework in relation to people's behavioral intentions. Although the TPB classifies beliefs as attitudinal, normative and control beliefs (Ajzen, 1991; Scuotto, 2015), this study adopted a more specific categorization of beliefs, that is, cultural beliefs, religious beliefs and perceptions. These sets of beliefs have been discussed as key antecedents of behavioral intentions for a variety of behaviors (Agarwal et al., 2018; Inglehart & Baker, 2000; Whittle et al., 2010) and have been shown to explain 22 per cent of the variation in intentions to adopt RETs.

Initially, cultural beliefs were thought to positively influence people's intentions to use RETs. That is to say, beliefs concerning food taste, nutrition, taboos and traditional values attached to cooking and fireplaces, as explained in Rhodes et al. (2014), affect people's willingness to use RETs. In

societies like Uganda, where people believe that not all foods can be prepared with RETs and that some food can only be prepared using fire were expected to influence their willingness to accept RETs. However, this supposition was rejected, indicating that cultural beliefs have no meaningful influence on behavioral intentions. In fact, this is an unexpected result since studies addressing adoption of RETs have mostly indicated that cultural beliefs are quite important elements for acceptance and usage of these technologies (Keiyoro et al., 2016; Sovacool & Griffiths, 2020). However, this could have resulted from choosing solar technology to represent RETs, yet it does not reflect all the contextual characteristics of all the RETs. In addition, most of the RETs are used as supplementary, other than primary source of energy allowing people's cultural requirements to be catered for by other sources of fuel like biomass (charcoal and firewood) used together with renewable energy.

Secondly, it has been established that religious beliefs influence behavioral intentions to use RETs. These are nurtured through religious teachings and rituals, especially in societies with strong religious values. They act as sources of inspiration and encouragement for using products considered religiously appropriate or not in conflict with their beliefs. Similar findings were reported by Agarwal et al. (2018) and Mathras et al. (2016), suggesting that religious beliefs facilitate a sense of belonging and bonding to followers, which acts as a source of information and encouragement necessary to influence each other's preferences, intentions, and behaviour.

Finally, perceptional beliefs were found to significantly and positively influence people's behavioral intentions to adopt RETs. This means that people's intentions to use technology are directly affected by the convictions related to the usefulness, applicability, benefit, and status or image expected to be gained from adopting that technology. These findings are similar to (Whittle et al., 2020; Zahari & Esa, 2018). In fact, when people are convinced that the technology can improve the execution of home activities and improve the appearance of their homes, their willingness to adopt and use these technologies increases. However, this also applies when the technology is perceived as risky, costly or less important, which would mean less willingness to adopt it.

This study further established that perceptions are the most important type of belief when it comes to behavioral intentions. The stronger the perceptions maintained, the higher the chances of influencing people towards usage of RETs. Therefore, campaigns to improve the way people perceive these technologies need to be emphasized to enable widespread acceptance. Cultural beliefs had a negligible effect on behavioral intentions, contrary to findings in studies like Scuotto et al. (2020) and Sovacool and Griffiths (2020), who attached high relevance to such beliefs in influencing behaviour. Therefore, promoters of RETs need not focus much on such beliefs but rather concentrate on religious and perceptions.

CONCLUSION

This study has provided new evidence to support the claim that people’s social-cultural beliefs are important elements to be considered to achieve widespread acceptance and usage of RETs. The study has generally supported the premise that social-cultural beliefs significantly influence people's behavioral intentions to adopt RETs. People’s perceptions of the technology happened to be the most relevant form of beliefs and need to be emphasized to encourage more adoption. People are more willing to adopt energy technologies that they perceive as useful, applicable, status improving and safe. In addition to perceptions that are already captured by many theoretical frameworks, the study considers cultural and religious beliefs as additional important factors to be

considered in production and promotion campaigns if RETs are to succeed. This finding improves the current theoretical explanation of technology adoption behaviors considering the contribution of the additional beliefs highlighted in this study.

Results from this study also present a firm foundation upon which policies regarding enhancing positive perceptions and attitudes necessary for the widespread adoption of RETs can be built. Additionally, the new insights from this study point to the relevance of people's social and cultural beliefs that can be utilized to formulate policy measures necessary for increased acceptance and usage of these technologies. Through a quantitative approach of observing social-cultural beliefs, the study has contributed to the development of an alternative approach for examining the influence of social-cultural aspects on adoption of technology. Additional factors like religious and cultural beliefs can also be used in more empirical examinations and other contexts to offer a better explanation of technology adoption behaviour. However, this study did not consider many other social-cultural factors to which beliefs are closely related, like attitudes and norms (Ajzen 1991), rituals and practices (Sovacool & Drupady, 2011). Consideration of such closely related factors would improve the explanatory power of the suggested research model.

From a practical perspective, aspects like religious rituals, values and togetherness need to be exploited to encourage more usage of RETs. These have been found to significantly influence the formation of intentions to use RETs, especially where the technology is in alignment with their beliefs and values. With over 88% of the world's population following some religion (Johnson & Crossing, 2020; Mathras et al., 2016), religious beliefs present an ample opportunity through which usage of RETs can be channeled. However, less emphasis should be placed on cultural beliefs like preferences for traditional food preparation methods, food taste, values attached to traditional fireplaces, and superstitions about fire and electricity. These were found to contribute less to nurturing behavioral intentions for adopting RETs.

Therefore, future research endeavors ought to examine the contribution of other social-cultural factors that are likely to influence people's behavioral intentions with and without social-cultural beliefs. A more robust model with more social-cultural factors would be preferable for this purpose. Also, there is a need to examine the different dimensions of beliefs related to other RETs that may share different characteristics from solar technology.

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