Identifying the needs of communities in rural Uganda: A method for determining the 'User-Perceived Value' of rural electrification initiatives

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A B S T R A C T

This research paper describes the use of a 'User-Perceived Value Game' to explore the value of development initiatives as perceived by villagers in 119 interview settings in seven Ugandan villages. Based on the findings from the game, a 'User-Perceived Value Framework' is developed, consisting of 64 value categories. This is depicted graphically as a 'User-Perceived Value Wheel' supported by a 'Key Phrase Wheel', both can be modified using computer-assisted software developed by one of the authors. The aim is to understand the reasons why something is perceived by the end user to be important. This will lead to an improved understanding of how a development initiative can be better tailored for lower-income markets. The initiative can then be marketed appropriately, which will result in user acceptance because the initiative will be perceived to have personal value to the user and therefore the user will care for its upkeep. The paper concludes with a brief application of the 'User-Perceived Value Wheel' to demonstrate how this tool can be used to better understand the true sustainability drivers behind rural electrification development initiatives.

Contents

1. Introduction

To date it is reported that globally approximately two billion people lack reliable access to energy services [1]; the majority of these live in rural areas [2]. Despite efforts to tackle this 'energy crisis', progress has been limited [1]. According to a study

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undertaken by the Shell Foundation, within the most energy deficient regions there are a lack of businesses which are viable, which achieve scale and which develop holistic solutions to tackle poverty [3]. Inhibiting factors include: appropriate design, after-sales service and understanding the target market [4]. This review of literature has revealed that the latter receives little attention. As Hirji [5] puts it: *"Most poor customers are no different from any other in how they make purchasing decisions; their limited means simply means they are extremely good at assessing risk and value."* Henceforth, in order to deploy development initiatives sustainably in low-income settings, more time needs to be spent on identifying what users truly value. Previous research found that: *"understanding the perceived value (what is important) to the individual customer […] as well as to the community as a whole is important in order to appreciate their real motivations and the drivers for ensuring the sustainability of a scheme [6]."*

In line with this, this paper presents the use of a 'User-Perceived Value Game' as a tool for indirectly identifying the true user value arising from seven local electrification initiatives in rural Ugandan villages. The paper argues that to deploy rural development initiatives in a sustainable manner, the rural context needs to be better understood. The initiative can then be marketed appropriately, which will result in user acceptance because the initiative will be perceived to have personal value to the user and therefore the user will care for its upkeep. This paper focuses on the methodology behind understanding user-perceived value and on the development of a 'User-Perceived Value Framework'. It then concludes with a brief demonstration on how this tool can be used to better market the benefits of initiatives in alignment with the values of beneficiaries of rural electrification initiatives.

1.1. Understanding the relationship of needs, wants and user-perceived value

Understanding the value perceived by end users can play a significant role in the uptake of new products or services [7]. Indeed, incorporating the needs and wants of the end users to

increase the user-perceived value of a product or service has long been acknowledged in marketing and product design literature and referred to as, for example, User Value Proposition (CVP). Wants can be seen as a manifestation of needs based upon user-perceived value. Fig. 1 depicts the complex link between needs, user-perceived value and wants, as understood in this research.

Needs are defined as the basic human requirements, such as food, shelter and love [8]. Every individual has the same 'need' categories; however, the extent to which these needs persist depends on the degree to which they have already been satisfied, as well as whether or not they are recognised. Amongst existing motivational theories there are a number of different systems for classifying basic needs, ranging from two to five classifications [9]. For a comprehensive review of existing motivational theories refer to [10]. Maslow's [11] comprehensive hierarchy defines five categories: physiological; safety; love/belonging; esteem; and self-actualization. Each of these classifications houses a number of basic needs such as food, shelter, health, respect for others and morality. A 'want' often refers to a specific object that suggests an individual's preference (e.g. a hamburger), whereas a 'need' is more generic and refers to a theme/category of requirement (e.g. hunger requires food) [12]. The user-perceived value is the link between the needs and the wants and is defined as follows: *"the extent to which a good or service is perceived by its user to meet his or her needs and wants"* [13]. According to Gallarza and Saura [14], understanding the user-perceived value is important as it enables project developers to better understand consumer decisions. In recent years it has become recognised as one of the more important decision-making measures [14] – something that has not yet been considered for the implementation of rural development initiatives. In this research, the user-perceived value is seen as something that can change, taking into consideration an individual's social, economic and cultural predispositions and perceptions, as well as, environmental and external influences (such as exposure to TV) and their life stage.

Conventional marketing (employed predominantly by for-profit private businesses) focuses on presenting products or
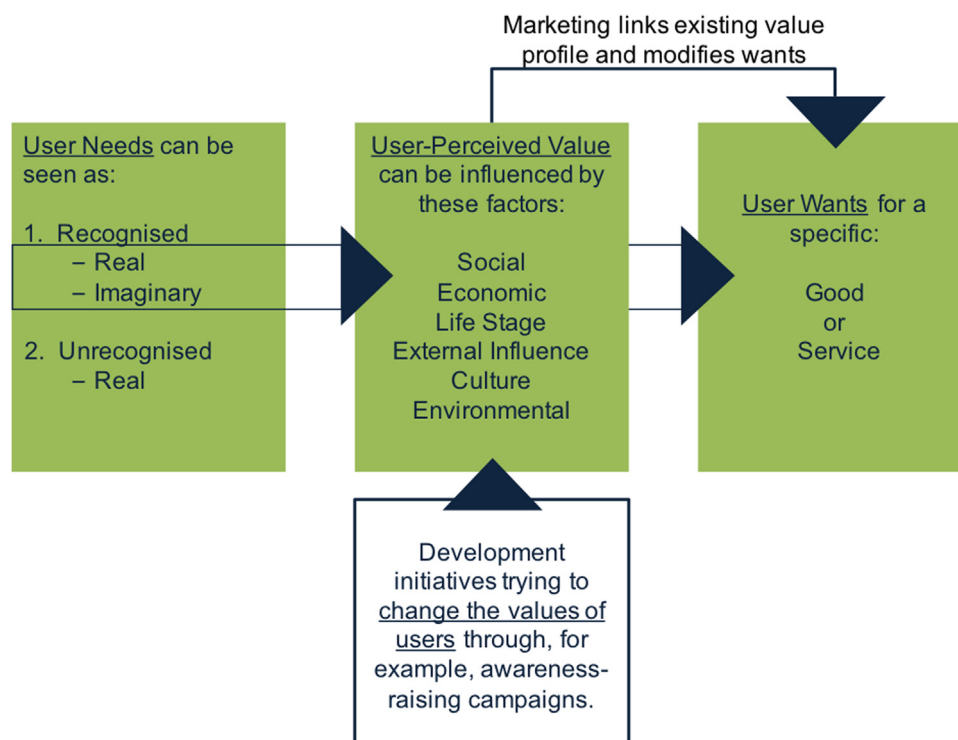

Fig. 1. Linkage between needs, User-Perceived Value, and wants.

services as meeting the consumers' 'needs' by hooking onto existing value profiles ('user-perceived values'). Thus the provider may seek to convince the consumer that their existing 'need' (e.g. hunger) can be satisfied by a specific 'want' (e.g. a hamburger from McDonalds – the product) through messaging that appeals to the existing values of the consumer (e.g. time saving [fast delivery], affordability [low cost], appealing [taste]). In contrast to for-profit businesses, development schemes have a predominantly not-for-profit, humanitarian character, thus focusing instead on understanding end-user 'needs' for appropriate design of development initiatives. Such organisations then typically seeking to change user-perceived values through awareness-raising campaigns. An illustrative example of such an approach is the 'Light in Dark' Campaign [15]. Although raising awareness can serve as a development instrument in that it aims to educate the public on important social, economic or health issues, as a marketing tool it often fails to link 'needs' and 'wants' in the minds of consumers. Instead, it attempts to convince the user that what has been developed to meet their need is something they ought to want. A case in point is where the Shell Foundation aimed to introduce into rural Indian households specific designs of 'improved' cook stoves (i.e. the object or 'want') with the aim of reducing indoor air pollution arising from conventional open fire cooking and the resulting respiratory health issues (developmental 'need'). However, following the initial awareness-raising campaign, which used messaging centred on the health benefits of the products, product uptake was poor. The strategy was changed around when the Shell Foundation instead introduced the 'Room to Breathe Campaign'. This more user-specific marketing campaign brought notable success [16] through the alignment of advertisement messaging with (existing) gender-specific values of the end users. Product uptake had significantly increased following this change in marketing strategy. For example, marketing reflected that women placed great importance on improved cleanliness in the household arising from reduced smoke emission, whereas men prioritised the money-saving aspects of 'improved' cook stoves [ibid]. However, this is an isolated example, as appropriate marketing conducted by non for profit organisations for lower-income customers has so far focused mainly on identifying the most successful communication channels, such as radio, TV commercials, and road shows, but the vital message needed to trigger an understanding of how the product aligns with the actual users' needs has been largely neglected. One reason for this may be that marketing, linked to bargaining and sales, is far from the culture of not-for-profit NGOs or development agencies. It is instead mainly associated with commercial enterprises and perceived to have negative connotations. Therefore, appropriate marketing to low-income markets represents an unexplored opportunity for improving the acceptance of development initiatives. To do this, we have to take a closer look at conventional marketing techniques and apply them to the context of lower-income consumers.

1.2. Overview of existing methods and tools to assess user-perceived value

It has been widely acknowledged that consumers are most of the time unable to articulate their needs, wants and values [12,17,18]. The main reason for this is that they are often not aware of their own motivations or find it difficult to articulate these accurately. In line with this, Table 1 below is a review of existing consumer research methodologies used for the indirect identification of personal values.

All the methods discussed in Table 1 above adopt an indirect means of identifying personal values and find a predominant role in marketing research. Despite their successful application in conventional marketing, the following strengths and weaknesses for identifying the user-perceived value when applied to a developmental context have been identified.

Following the above assessment of strengths and weaknesses of the five consumer research methods, a common drawback was identified. None of the methods reveals the user-perceived value in a development context. This observation is in line with Gallarza and Saura [14], who highlighted the lack of methodologies to measure user value in a development setting. Nevertheless, the 'laddering' method and the ZMET are considered the most appropriate by the authors, so in order to develop the 'User-Perceived Value Game' this paper does draw on some of the mechanisms used in those research methods.

Table 1
Comparison of five consumer research methods for indirectly assessing user-perceived value.

Type of Method	Method Summary	Key Features
Empathic Design [19]	Empathic design is the process of identifying 'hidden' user needs by seeking to understand the behaviour and chosen environment of the observed participant(s).	Observation. Need focused. Drives innovation.
Free Elicitation [20]; based on theory by Collins [21]	Participants are asked to verbalise what comes into their mind with regard to certain products. They can be presented with a memory prompt (usually words). Their first statements are assumed to carry the most significance.	Storytelling. Memory prompt.
Repertory Grid [20,22]	Participants are asked to compare a triad of stimuli (products) [out of a larger product set]. They are required to state attribute(s) indicating why two are similar but different to the third. This method is used to identify which attributes are important from the participants' perspective as well as seeking to understand the participants' way of thinking.	Person-centred approach. Can be applied for a wide variety of contexts and purposes. A matrix of products vs. attributes can be generated.
Laddering [23]	Laddering is a method of enquiry through which participants link their personal reasons for preferring a particular product to distinct attributes. The interviewees are then questioned 'why' further, and through their answers these attributes are translated into characteristics and subsequently into values.	Captures people's core values and beliefs. The participants' product attribute is questioned ('why' probes).
Zaltman Metaphor Elicitation Technique (ZMET)[24,25]	The ZMET technique requires participants to collect pictures that represent their thoughts or feelings with regard to the topic of interest. Several days later, in an interview setting, the participants give an account, often in the form of a story, as to why they selected their chosen images.	Participants select stimuli. The participants' reasoning is questioned ('why' probes). Storytelling. Sorting exercise (participants rank their choices).

Table 2
Key strengths and weaknesses of consumer research methods for identifying user-perceived value in a developmental context.

Type of Method	Strengths	Weaknesses
Empathic Design [19]	No direct interference on participants' behaviour or responses; true representation of culture, environment and behaviour.	Fails to reveal user-perceived value; focuses instead upon the observer's perception of the participant's need. Could change someone's behaviour until trust between researcher and community is established. Building trust with participants to get true insight into behaviour and environment can be time consuming.
Free Elicitation [20]; based on theory by [21]	No direct influences on participants' response. Uniformity of enquiry through the use of prompts.	Stops short at attributes perceived as important by the participant, i.e. does not investigate the 'why'. The assumption that first thing comes to mind is of greatest importance is questionable.
Repertory Grid [20,22]	Tries to understand participant logic.	Not suitable for comparing across a variety of stimuli (goods or services). Fails to investigate the real 'why' as it is limited to the product array.
Laddering[23]	Captures people's core values and beliefs through 'why' probing.	The interrogatory nature of this method may lead to interviewee giving answers they think the interviewer wants to hear. Requires skilled interviewee to move participants from attribute to value. Risk of participants giving false reason due to further probing.
Zaltman metaphor elicitation technique (ZMET) [24,25]	Not limited to a set of stimuli. Can give a true reflection of what is important, as stimuli are collected by participants. Understanding people's core values and beliefs through 'why' probes.	Requires a technical understanding. The need for external probes may cause participants to get distracted from the task. External probes may change short-term value perception.

2. Methodology

In line with the above considerations, a 'User-Perceived Value Game' is proposed in order to better understand what users of development initiatives do actually find to be of value. The game was designed to overcome some of the aforementioned weaknesses such as, for example, not introducing external probing to the community but instead working with imagery that depicted items familiar to community members. Furthermore, the researchers decided that a 'game' was most appropriate to identify 'what is important' to low-income markets, as opposed to asking participants directly. This is in accordance with Ulwick [17] who states that: "*asking consumers what they want is useless, because they do not know what they want*" [18]. Key features of the 'game' include: stimuli selection; 'why' probing; storytelling; and the ranking of selected items. Building on the value framework developed by [6], data was coded using computer-assisted qualitative data analysis software (HyperRESEARCH) [post-coding], which is discussed further below.

2.1. Development of a 'User-Perceived Value Game'

The 'game' made reference to 46 items. These included, for example, livestock (cow, chicken), basic electronic gadgets (mobile phone, TV, radio), household goods (dishes, soap, blanket), and horticultural items (plough, hoe). Initial selection of items was based upon the 'game' developed by [26]; and with the support of academics and international experts these were adapted to a Ugandan context and represented graphically. The decision to represent such items graphically stems from the high level of illiteracy across developing countries [27].

In each of the seven villages, twelve one-to-one interviews were conducted. In addition, five focus group discussions were held (a women's group, men's group, mixed group, men discussing women's items, and women discussing men's items) with six participants each. The reason for conducting interviews in a variety of settings (i.e. individual, group men/women/mixed) was to obtain results representative of the community given the complex nature of different influences in human decision making. People have personal preferences but these may change in specific group settings. Thus to reflect the wishes of the community as a whole, values were identified within six different settings but analysed collectively to generate a comprehensive community profile.

Equal numbers of participants were selected from each gender, and there was also a variety of backgrounds and ages. The interviews were semi-structured in the form of storytelling, encouraging discussion of topics which resonated with each participant's experience. For each round of interviews (except men/women discussing women's/men's selections), participants were asked to:

1. Select 20 out of the 46 presented items. They were also given the opportunity to add additional items. Item selection was based on the respective importance to the participant [Select stimuli].
2. Rank their selection in order of importance [Ranking].
3. Give reasons as to why these items were most important to them personally. [Why-probing]. At this stage, participants were encouraged to give reasons (*"why is this important to you?"*) which reflected their personal lives [Storytelling].

In the last interview, the mixed-group discussion, villagers were asked "*how could electricity benefit you with any of the selected items?*" Findings from this section were analysed separately and are discussed as part of Section 4.

2.2. Data analysis

The 119 interviews were transcribed and analysed using the computer-assisted qualitative data analysis software HyperRESEARCH. Interviews were coded (or indexed) using a qualitative analysis process called cross-sectional indexing [28]. This method was chosen as it allowed the researchers to compare themes across interviews by specific codes: in this case values. The reasons the authors chose to use this software-driven cross-sectional indexing method was to ensure consistency across interviews for each specific code, as the large volume of codes and subsequent scores (each time a code was chosen) put emphasis on the importance of consistency in data processing.

This coding was an iterative process. Indexing categories were

Table 3
Value framework for development initiatives: definitions of 64 values as understood in this research paper.

EMOTIONAL VALUE

Conscience

VALUE	*VALUE DEFINITION (people value)*
Harmony	Being at peace with one another.
Preservation of Environment	The preservation of natural resources.

Comfort

Appealing (senses)	The pleasure provided to one's senses (taste, feel and smell).
Aesthetic (items)	The physical appearance of an item or person which is pleasing to look at.
Comfort	Being content, at peace with oneself or having a positive feeling.
Entertainment	Giving or receiving pleasure, diversion or amusement
Memorability	The ability to associate with a past event with emotional significance.

Safety

Safety (Animals, Items, Nature)	The prevention of injuries and accidents inflicted by animals, items or nature.
Security (people)	To remain free from danger and threats posed by other people.

EPISTEMIC VALUE

Information

Information Access	The ability to stay informed.

Knowledge

Knowledge Attainment	The ability to learn or be taught new knowledge.
Skill Attainment	The ability to learn a new skill.

FUNCTION VALUE

Accessibility

Access to Area	The ability to continuously access local region.
Banking Access	The ability to continuously access banking services.
Mobile Phone Access	The ability to continuously access mobile telecommunication services.
Mobility (People)	The ability to move from one place to another.
Transportation	The ability to convey someone or something.

Convenience

Availability	The ability to get, buy or find items or services in the area.
Communication	Interacting with someone who is far away.
Multipurpose	To use something for a multitude of purposes.
Portable	The ability to easily carry, transport or convey an item by hand.
Time Benefit	The ability to accomplish something in the most time efficient manner.
Time Management	The ability to work or plan towards a schedule.
Unburden	The ability to make a task easier by simplifying it.

Cost Economy

Capital Cost	The amount of expenditure incurred through the purchase of an item or service.
Operational Expenditure	The cost incurred during the operation of an item or service.
School Fees	The ability to pay for school attendance/tuition.

Income Economy

Asset	Having physical, non-monetary possessions.
Barter Trade	The ability to undertake non-monetary trade of goods and/or services.
Business Opportunity	The ability to undertake entrepreneurship beyond the normal occupation in the particular area.
Income	The ability to derive money from the sale of a good or service.

Quality and Performance

Effectiveness	The ability to accomplish a purpose or produce the intended or expected result.
Durability	The ability to preserve or use [an item] for a long time.
Productivity	The ability to increase productivity.
Reliability	The ability to rely or depend upon a service or the function of an item.
Usability	The physical interaction with the item: whether it is easy to operate, handle or look after.

INDIGENOUS VALUE

Social Norm

Celebration	[An item or service] associated with and/or chosen as playing an important part during celebration.
Manners	Ways of behaving with reference to polite standards and social components.
Morality	The ability to follow rules and conduct.
Tradition	Behaviour or a way living that is embedded into the specific village culture.

Religion

Faith	God or the doctrines or teachings of religion.

INTRINSIC HUMAN VALUE

Health

Longevity	The ability to have a longer life span.
Health Care Access	The ability to access medical services or medicine.
Treatment	The ability to have hospital or medical attention as a consequence of illness or injury.
Preservation of Health	Practices performed for the preservation of health.

Physiological

Education Access	The ability to access educational services.
Energy Access	The ability to obtain energy services or resources.
Food Security	The ability to have a reliable and continuous supply of food.
Shelter	A place that gives protection from bad weather or danger.
Water Access	Continuous access or the availability of water.
Water Quality	The ability to have clean water (purity/contamination, colour and taste).

Quality of Life

Community development	The improvement of services or soft and hard infrastructure for the benefit of a collective group or people.
Wellbeing	The ability to have a good or satisfying living condition.

SOCIAL SIGNIFICANCE VALUE

Table 3 (*continued*)

EMOTIONAL VALUE	
Identity	
Appearance	The personal appearance in the public eye or mind.
Belongingness	The ability to associate with a certain group and their values and interests.
Dignity	The state or quality of being worthy of honour or respect.
Performance (personal)	The personal productivity which someone achieves in his or her work.
Status	
Aspiration	Becoming someone better more powerful or wise.
Modernisation	The transition to a modern society, moving from a traditional society to the manner of a developed one.
Reputation	The commonly held opinion about one's character.
Social Interaction	
Altruism	The principle and practice of unselfish concern.
Caring (Family)	Kindness and concern for family members/friends/others.
Role Fulfilling	The ability to fulfil the tasks or responsibilities associated with a certain role i.e. parental duties.
Togetherness	Warm fellowship – as among friends or members of a family.

Fig. 2. 'User-Perceived Value Wheel'.

initially recorded based upon the 'User-Perceived Value Framework' developed by Hirmer and Cruickshank [6]. Based on the coding guidelines by Bryman [29], and following the initial indexing category selection, additional categories began to emerge throughout the analysis of the interviews (open coding) until finally an exhaustive list of codes was generated. Following this, codes were revisited and defined to be inclusive of all values but mutually exclusive. To ensure consistency of the use of categories, all scores were revisited several times. Statements linked to specific codes were then compared against one another, resulting in a total of 64 codes (cross-sectional indexing). The three examples below illustrate the use of codes, highlighted in [**bold**].

Example 1. Baluku a man from a village in the Ruwenzori Mountains chose a TV because [**TV**]: "*I have a television; I can get first class news around the world* [**Access to information**] [**Quality**]. *I can start up a business of showing football to people. It becomes a source of income for me and my family* [**Income Generation**] *and also entertainment to my family as well* [**Entertainment**]. *In my village having a television, you are referred to as a rich person* [**Reputation**]. *So that's why I chose it.*"

Example 2. Women in a village in the West Nile Region discussing why the Men in their village may have selected corrugated iron sheets [**Corrugated Iron Sheets**]. Their reason is as follows:
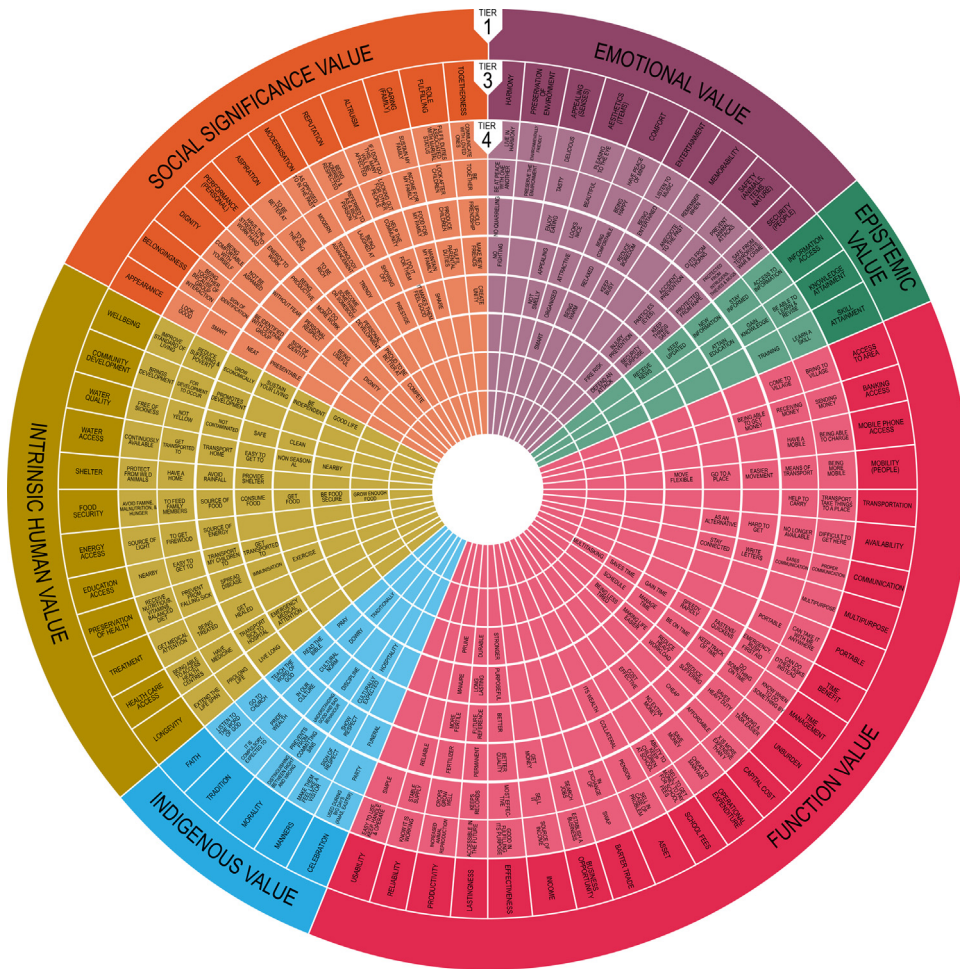
Fig. 3. 'Key Phrase Wheel' to help aligning statements with user-perceived values.

"*Reason is the suffering they face from using grass which can be eaten by termites and rats, they make holes on the roof where sun rays and moon lights go direct into the room. When it rains, the water wets everything in the room including people who sleep there* [**Comfort**] [**Reliability**]. *Iron sheets are durable* [**Durability**]; *accidents of fire are common and it gets grass-thatched houses, everything in the house can just burn into ashes within shortest time* [**Safety**]."

Example 3. Scola a widow from a village in the northwest of Uganda chose a flush toilet because [**Flush Toilet**]: "*If I have a flush toilet in my house I think I can be a king of all kings* [**Reputation**] *because I can't go out on those squatting latrines* [**Aspiration**]. *By the way you can get diseases on those squatting latrines* [**Preservation of Health**]. *Some diseases are anus itch and Candida and me I have never suffered from those diseases. As me, Scola the widow, it can protect me from going outside alone (she cries). My husband used to escort me to everywhere I used to go, and now I am scared anything may happen* [**Comfort**]. *And recently I was almost raped by a thug when I escorted my son to the latrine at around 10:30 pm in the night* [**Security**]. *That flush toilet it helps a lot on those young children who are just learning how to sit on the toilet because there no risk that a kid will fall into the toilet, actually we have so many cases in our village of kids that fall into pit latrine* [**Safety**] [**Caring**]".

The authors did not attempt to infer meaning beyond the villagers' statements regarding why something is important. For instance, in Example 2, the women explained that the men were concerned about indoor fire (in this research, the explicit tagging for accidents is Safety). Arguably the real reason why men are

concerned about indoor fire maybe not be personal safety but the cost and attributes related to convenience – for example, one may suppose that the incurred cost and effort required to rebuild the house may be the tacit reason why the men are concerned about the fire.

Each of the above tags represent a score of one for each value and these are counted to generate a value profile (further discussed below).

3. Development of value framework for development initiatives

To understand the wide range of perspectives on what is important to lower-income markets, a value framework for development initiatives was developed consisting of 64 values, based on 6696 scores from the 119 interviews.

This framework (Table 3) was developed based on the interviews with villagers in rural Uganda. It comprises a comprehensive list of what was perceived as important by villagers in a rural setting. The framework does not include high level values such as love and freedom as these were not expressly identified. These implicit values may fall under categories such as 'caring' or 'mobility'. So for example a woman selects a radio as her husband would love to have a radio (Caring). Through further 'why' probing the women may have explained that she chose a radio because, as she loves him, she wants her husband to be happy. However, as described in Table 2, because of the interrogatory nature of 'why' probing leading to interviewee giving answers they think the

Fig. 4. Value Profile of seven villages across rural Uganda graphically represented using the 'User-Perceived Value Wheel'.

Fig. 5. Example of how villagers linked their selected items to electricity.

interviewer wants to hear, this was not done in this research. The framework in Table 3 is then graphically represented in a 'User-Perceived Value Wheel' (Fig. 2).

The benefit of the 'User-Perceived Value Wheel' is that it graphically depicts the individual values but also the value clusters across different tiers. Within the wheel, the beneficiary's perceived value scores can be recorded and managed through computer-aided software developed by the authors.[1] The software can quickly filter the scores and represent them as a heat map. This assists the researcher in identifying which values (Tier 3) or value clusters (Tier 2) are of greater or lesser importance from the survey results

– see Fig. 4 in Section 4 for an example of a modified value profile.

The 'User-Perceived Value Wheel' is supported by a 'Key Phrase Wheel' (Fig. 3). The 'Key Phrase Wheel' provides a comprehensive list of key phrases (Tier 4) that are nested under a user-perceived value code (Tier 3). This wheel helps the identification of values by allowing sentences (storytelling) gathered through market research to be categorised under certain values based on the underlying key phrases. This is similar to the three examples listed under the data analysis section. The key phrases are inclusive of a wide array of scenarios and are sufficiently generic to be adaptable to a variety of statements, enabling the context-driven assessment of all key values affecting the user-perceived value.

The wheels can be categorised into 4 tiers as follows:

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[1] For usage of software please go to www.hirmer-wheel.com.

Table 4
Link between top then preferred benefits and electricity as seen by the villagers.

ITEM	VILLAGERS STATEMENT (QUOTATIONS)	TECHNOLOGY
Income: Money derived from the sale of a good or service.		
Garden	Ability to sell produce through extended opening hours of shops. (*)	Electric Light
Garden	If you have electricity people will even come and buy vegetables from you. (*)	Power
Mobile Phone	It has strengthened my day-to-day way of getting income without spending on transport. (*)	Charger
Preservation of Health: Practices performed for the preservation of health or hygiene.		
Clothes	Electricity is so helpful to iron clothes in the community so as to be smart and maintain personal hygiene.	Electric Iron
School	Me, I have picked a school: electricity in school is important like now my child is sick of using a lamp.	Electric Light
Pit Latrine	Electricity helps us to see when going to the latrine because we will have lights in the toilet as well and we can't spoil the toilet since we can see well.	Electric Light
Food Security: The ability to have a reliable and continuous supply of food.		
Hoe	When you have electricity you can easily sharpen a hoe and a panga that help us in our gardens to plant crops which leads to production of enough food.	Machinery
Cow	For meat, milk production hence proper preservation of products from going bad after a short period of time.	Fridge
School	Some time the school may lack firewood and in such cases electricity can be used for cooking.	Cooker
Garden	Grains especially can be taken to the mills to be grinded and more production is meant compared to the local method.	Grain Mill
Knowledge Attainment: The ability to learn or being taught new knowledge.		
House	Electricity helps our children read books.	Electric Light
Bible	Many can learn bible studies because they have access to light.	Electric Light
School	Electricity helps our children to study well and also helps in computer trainings within the school because someone cannot even study computer in the school without using electricity.	Electric Light &Computer
School Fees: Ability to pay for school attendance/tuition.		
Computer	If I had a computer I can be able to start up a business like printing, photocopying and for sure I can make good money to take care of my family and even pay my children's school fees. (*)	Computer
TV	I can also make business out of it by starting up a video hall hence making a lot of money and taking care of my family and children going back to school easily. (*)	TV
Mobile Phone	It helps me a lot to pay school fees for my children by sending money through mobile money to someone at school.	Charger
Maize Mill	This mill helps me grind my maize and cassava, then I sell some and get money for my children's school fees. (*)	Grain Mill
Business Opportunity: Showing a sense of entrepreneurship beyond the normal occupation in the particular area.		
Clothes	With power I will begin do business and dry cleaning business and get money.	Washer/Dryer & Iron
Garden	Electricity enforces me to have a store, buy machine for rice, ground nuts which use electricity.	Grain Mill
Hen	Electricity is important here in poultry keeping especially broilers and layers need electricity the whole night to keep them warm during cold weather.	Heat Lamp
Cow	Make a diary business out of it by preserving the milk and make good business out of it.	Fridge
House	Electricity also helps our businesses in the house like saloon to operate smoothly.	Hairdresser
Time Benefit: Being able to accomplish something with the least waste of time or minimum expenditure of time.		
Bed	Electricity helps to make various beds in workshops. Let me tell you without electricity, in workshop I can spend five days making one bed but with electricity I can only use one day to make a bed.	Lathe
School	Computers would be brought in schools to do most activities in a shorter period of time.	Computer
Stove	I chose this because it's quick and fast to cook. If you want to prepare a quick meal its better to use a gas cooker because these days it's hard to get firewood and more especially in the rainy season. It's also environmental friendly. (*)	Cooker
Comfort: State of being content, having a positive feeling.		
Flush Toilet	With electricity, my visitors can feel so comfortable, so electricity provides light both in our toilets and the entire house.	Electric Light
Road	If there is electricity, we can use security lights and walk comfortably without any fear and they are a beauty in the road.	Street Lighting
Radio	Also, my children and my husband will get entertained and be happy. Honestly, a radio is very important because seeing my children dance makes me happy. (*)	Power
Operational Expenditure: Refers to the cost occurred during the operation of an item or service.		
Hydropower	If you have electricity it will help us save some money that as we would normally buy paraffin and candles to help us light.	Power
School	Power makes life easy and affordable unlike buying kerosene; our children will study well and develop.	Electric Light
Grain Mill	With power our Posho-Mill will not use diesel and give us good quality maize flour.	Power
Safety (Animals, Items, Nature): The condition of being protected from or prevent injuries or accidents.		
Road	When the road is all connected with electricity, you can be able to see the snakes on the road and even to scare away youths who date […] at night. The light also helps at night to show directions.	Street Lighting
Pit Latrine	If you squat without lights the snake might bite you.	Electric Light
Motorbike	When we have electricity we shall put security lights to keep safe our motorcycles.	Street Lighting

– **Tier 1** represents the high level value cluster including: Emotional Value; Epistemic Value; Functional Value; Indigenous Value; Intrinsic Value; and Social Significance Value. These are shown as the outer ring of Figs. 2 and 3.
– **Tier 2** represents value clusters, embracing a set of values within the same value definition. Shown as the inner ring on Fig. 2.
– **Tier 3** shows the main value codes as shown in the three examples above. Shown as the middle ring in both Figs. 2 and 3.
– **Tier 4** houses the key phrases used to score the different values (Tier 3). This aims to help the user of the 'User-Perceived Value Wheel' to identify which value can be linked to a certain

statement, and it is shown in Fig. 3 as the inner ring.

4. Application of the 'Key Phrase Wheel' and 'User-Perceived Value Wheel' in a rural electrification context

This section explains with examples how the 'User-Perceived Value Wheel' can be used to better understand the true sustainability drivers behind initiatives for rural electrification. The aim here is selectively to promote electricity solutions that will resonate with the value profiles of end users so that they cherish the

value of the project. Most end users lack familiarity with electric light; however, they do have, for example, security and safety concerns. Therefore there is a way to link electrification projects with the end users' needs by appropriate project selection and communication of the relevant added values.

This linkage is illustrated by Example 3 under Section 2.2. Data Analysis. There Scola, a widow from the village of Bwindi in Uganda, selected a flush toilet over a pit-latrine because she AS-PIRES to be a 'king' in her community. Additionally, a flush toilet in the house also means not having to walk to the pit latrine at night, so she recognises the added personal value of SECURITY. Furthermore, a flush toilet can help guarantee the SAFETY of her children, as they can no longer fall into the toilet.

Using this insight to understand what Scola perceives to be of personal value, we can then determine applicable value categories. For the above example, her response falls under the categories of "ASPIRATIONAL", "SECURITY" and "SAFETY". If we now hope to market electric lighting to Scola, we may expect she will be more likely to buy in to the initiative if it is pitched by accentuating the benefits in line with her personal values. Emphasising the way in which electric lighting symbolises city living, as well as wealth, will tick her ASPIRATIONAL values. This is because the provision of street lighting can provide a SECURE environment for her when walking to the toilet at night and solar lanterns can provide a SAFER environment for her children to study because it reduces the risk of a house fire by eliminating open flames.

This gives helpful insight into the use of values and how to translate them to an appropriate initiative (in this case electrification). However, it may not be desirable to focus exclusively on individual value profiles as they are sometimes not practicable (considerations of cost, time and economies of scale) and may not align with the shared values of the wider group. The methodology designed in this research allows for the amalgamation of individual values and, in turn, a broader understanding of the values held by a community. Fig. 4 shows what values are deemed most important across seven rural villages in Uganda and presents them as a heat map, with the deeper colour representing the most important and the lighter colour the lesser important values. For example Income was scored 464 times thus being the most important value, as opposed to Preservation of Environment being scored only 6 times and thus being the least important value.

Based upon mixed group discussions with the interviewed villagers about *'how electricity could be of benefit with respect to their selected items'* (electricity specific interviews), Fig. 5 illustrates how villagers linked their selected item to a particular technological solution. This information can be used to better communicate rural electrification projects to villagers, based on their own understanding of electrification. The figure focuses on 3 example items (namely road, clothes, and cow) to demonstrate these links. The different values and the linked arrows are indicated with corresponding colours. A black arrow then shows where a particular technological solution (e.g. a Road) supports multiple values. Through the process of storytelling, particular values were procured regarding how the electrical solution may be of benefit. This is illustrated below and followed by extracts from the storytelling process.

Road [selected item]: *"If there is electricity on the road side (**street lighting** [link to electricity]), it prevents from snake bites (**safety** [value]). Road lights can also prevent crimes (**security** [value]), especially a boy and a girl doing immoral acts - electricity lights can expose them (**morality** [value])."*
Clothes: *"Clothes can be ironed with flat iron (**iron** [link to electricity]), which can be connected to electricity, which makes one to look smart (**appearance** [value]), and even ironing can kill some germs on the clothes (**preservation of health** [value])."*

Cow: *"It's difficult to milk cows if they are many so, if there was electricity, we could the milking machines for milk (**automated milking machine** [link to electricity]) (**productivity** [value]). We can also keep the milk in electric fridge (**fridge** [link to electricity]) (**preservation** [value])."*

Table 4 illustrates how electricity may benefit villagers, based on the ten most preferred benefits (Income, Preservation of Health, Food Security, Knowledge Attainment, School Fees, Business Opportunity, Time Benefit, Comfort, Operational Cost Savings and Safety). Where villagers failed to establish a connection between electricity and the specific value, statements were taken from the six non-electricity specific interview settings (marked with an asterisk *). Note that some items may have multiple values. Sometimes the item may be the technology in itself.

To put these comments into context, understanding the true needs and desires of the local population can be a key element in overcoming the shortfall in uptake of technology. This understanding can also improve project longevity by 'selling' a service that is valued.

Here is an example of a typical problem which needs to be overcome. By simply offering to replace light from kerosene lamps with electric light, the value to the end user is not immediately clear. Subsequently, in those cases where the project to supply electricity falls into neglect, end users simply return to traditional lighting methods and take no initiative to repair the electric system. However, modern technologies can still offer benefits that are *indirectly* linked to aspects perceived as "very important" in rural communities. In the 'value game' example already described (Scola), developers can offer lighting solutions that are valued for reasons *other* than illumination per se - e.g. safety and security, benefits greatly valued in a rural village. Whilst this may only require small adjustments to the project design, substantial efforts are needed to communicate these 'additional' benefits to the target users.

Accordingly, providers of development initiatives need to align their projects with traditional marketing procedures commonly adopted to improve the sustainable uptake of goods or services. By recognising the wants of the end user, a particular infrastructure development may be associated with existing needs, convincing users that they want it. In doing so, development initiatives can start to introduce new concepts into the value systems of their target end users. In doing so, development initiatives can start to introduces new concepts into the value systems of their target end users.

5. Conclusion

Three major challenges continue to hinder the sustainable uptake of initiatives targeted towards low-income users – appropriate design, after sales services and appropriate marketing. Whilst substantial improvements have been made in the fields of appropriate design and after-sales services, there have been only limited improvements with regard to appropriate marketing.

Understanding *why* something is important to the end user will usually lead to improved understanding of how a development initiative can be beneficial for a lower-income market. The initiative can then be communicated appropriately and thus receive user acceptance because it is perceived to be of value to the user. The user will therefore care for the upkeep of the initiative, with the consequent outcome of sustainability achieved.

Identifying what is of value to users is a matter common to marketing and advertising. Therefore, the author has considered and adapted conventional marketing techniques to a 'developing country' context. These techniques enable personal priorities to be

identified by extracting them from indirect information.

As part of this research a 'User-Perceived Value Game' was developed to identify values in different settings. The game goes beyond the standard marketing techniques by creating unbiased responses. Based on the application of a 'User-Perceived Value Game', analysis of 119 interviews across 7 rural Ugandan villages was conducted, and a 'User-Perceived Value' Framework was developed. This was then graphically represented in the form of a 'User-Perceived Value Wheel' supported by a 'Key Phrase Wheel'; both can be modified using computer-assisted software developed by one of the authors. Using these wheels, implementers of development initiatives can graphically depict which values are perceived to have the greatest personal importance to potential users.

Relying upon this information, implementers may then communicate the *benefits* of a good or service in order to be better aligned with the personal values of their user. This will increase the likelihood of uptake, maintenance and sustainability of such initiatives.

Acknowledgements

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