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DOI

<https://doi.org/10.1109/IUSER.2016.7857971>

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Potential Motivational Factors of Technology Usage for Indigenous People in Peninsular Malaysia

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Abstract—Interrelationship between ethnicity, motivation and technology usage is an interesting scope of study as it offers various dimensions to be explored, polished and refined. One of the most interest area is on the motivational factors for technology usage among the indigenous people from the viewpoints of socio-structural, socioeconomic and sociocultural. This paper present the findings on the motivational factors of technology usage based on the socioeconomic and sociocultural situational study of Orang Asli in Peninsular Malaysia. The study analysis was performed against the theoretical lens of need-based theory of technology use to uncover constructs of needs that can be identified as motivational factors for technology use. From the study it is found that Orang Asli has a tendency toward holding on to perceived idea of enjoyment, preservation of culture and benefits delivery as a motivation for them to use the technology. We propose the affect based needs and cultural needs as new constructs for technology use by the indigenous people.

Indigenous needs requirement, Enjoyment, Culture Preservation, Benefits Delivery, Technology Usage, Orang Asli

I. INTRODUCTION

Ethnicity or ethnic group is a human category which is based on the language used, ancestral, social, cultural, values, traditions, national or experiences where all these form principally an inherited status. In depth exploration of ethnic groups provide understanding and knowledge in various aspects such as cultural heritage, ancestry, origin myth, history, homeland, language or dialect, behavior, cognitive style, symbolic system such as religion, mythology and ritual, lifestyle, cuisine, dressing style, art, physical appearance, and many more. Diversity and differences between one ethnic groups from another prove that we cannot generalize the reaction of an ethnic group towards something. This is supported by numerous studies from various fields [1], [2], [3]. In the age where technology diffusion is widespread in areas of human work productivity and domestic and socializing use, it will be interesting to know technology use among indigenous people. Unfortunately, the literature on technology usage by ethnic group in particular, the indigenous people is scarce. The current literature on indigenous group and technology use is mainly focus on issues of access and does not cover issues of motivational factors for adopting technology.

In this study, we chose to focus on one group of indigenous people of Malaysia, known as Orang Asli. The study is motivated by the Government of Malaysia effort to promote technology usage among this group. The Ministry of Health is interested to deliver health education through the use of technology and faces obstacles for fulfilling this intention. It is known that Orang Asli is lagged far behind in terms of adopting the current technology. Although the government through the Ministry of Education has undertaken efforts to promote the adoption of ICT among school children including Orang Asli children through school programs to expose them to ICT [4],[5],[6] however, ICT use among them is still low [7].

Therefore in this paper we present the findings of our research on the motivational factors for ICT use among the indigenous people by using Orang Asli as our case study. We conducted a situational analysis on a group of Orang Asli against a theoretical lens of needs base theory of technology usage to explore potential motivational factors that can influence the technology use among them and propose new constructs for needs based theory for technology usage among the indigenous people.

II. THE INDIGENOUS GROUP AND TECHNOLOGY USE

A. Orang Asli in Peninsular Malaysia

Based on historical record, the indigenous groups which dwelled in Malaya (now known as Malaysia) originated from four main groups, ethnic Malay, the Orang Asli who settled in some part of Peninsular Malaysia [8], and native ethnic groups in Sabah and Sarawak [9], [10]. Compared to other indigenous groups, Orang Asli is the smallest community and does not gain the general public's attention. Orang Asli's background is officially has 18 tribes which are divided into 3 major categories known as Negrito, Senoi and Proto-Malay [9]. According to the census of 2006 the number of Orang Asli people is 141,230. In terms of the distribution of the Orang Asli settlements, 36.9% is in rural areas, 62.4% in the suburbs and 0.7% in urban areas [11].

Even though they were the first groups who settled in Malaysia, their presence fails to garner the general public's attention. Most of the socioeconomic position of Orang Asli peoples is still lagging behind in many fields, compared with other races in Malaysia [11]. Among the areas that get researchers attention are health, education and technology [9].

B. Orang Asli does not reject the technology use.

In general, local researchers agree that Orang Asli does not reject ICT development [12],[5] because the community believes that ICT is a platform to help them advance and succeed in the modern world. However, according to [7] the acceptance of any new things or ideas is often related to their cognitive styles, attitudes, behaviors and norms.

It is well-known that ICT adoption among Orang Asli is very slow compared to other communities in Malaysia [9]. Among the main contributors to this problem are the educational and economic constrains [5]. Appropriate and effective strategies to promote Orang Asli's use of ICT are still not fully grasped by neither the government nor the NGOs. This is evident because there is no other successful ICT project for Orang Asli apart from e-Bario and e-Badian which targeted Sarawak's indigenous. This indicates that Orang Asli has somehow been lagged behind in ICT use even though there are a few individuals among them who are skilled and follow the development of ICT on their own.

III. THE THEORETICAL LENS FOR TECHNOLOGY USE

A. Motivational Factors

Motivation is a non-intelligence aspect which in Latin, the root of the word motivation give meaning "to move". Thus, the study of motivation can be considered as the study of action. In modern theory of motivation, [13] have concluded that it is more focused on its relationship with the beliefs, values, and goals with action. There are various theories of motivation and they categorize it into four as presented in the table below:

TABLE I. THEORIES OF MOTIVATION

Category of Theories	Description	Theories
Theories focused on expectancy	This category focus on individuals' beliefs about their competence and efficacy, expectancies for success or failure, and sense of control over outcomes.	ARCS Model of Motivational Design Theory Control Theories Self-Efficacy Theory
Theories focused on the reasons of engagement	This category focus on the reasons why individuals have for engaging in different achievement tasks	Intrinsic Motivation Theories Interest Theories Goal Theories
Theories integrating expectancy and value constructs	This category focus on the linking of two issues which are (i) self intrepetaion, and (ii) the actual achievement	Attribution Theory Modern Expectancy-Value Theory Self-Worth Theory
Theories integrating motivation and cognition	This category focus on two issues which are (i) how motivation gets translated into regulated behavior, and (ii) how motivation and cognition are linked	Social Cognitive Theories of self-Regulation and Motivation Theories Linking Motivation and Cognition Theories of Motivation and Volition Integrating Theories of Self-Regulation and Expectancy-Value Models of Motivation

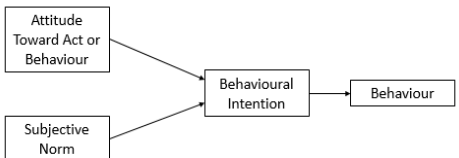
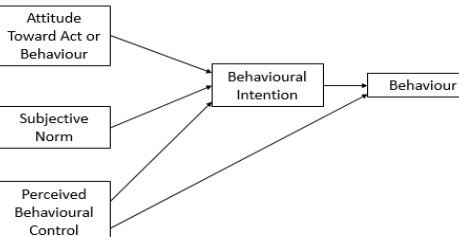
From various perspectives of motivation, motivational factors can be defined as the influence that seeks to generate "the move". In a simple analogy, the motivation is to make a pen moving forward. So, we can consider it as a motivation in the category of Goal Theories. The motivational factors might be a push, blowing, or pull.

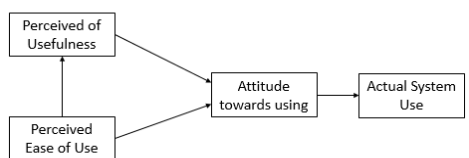
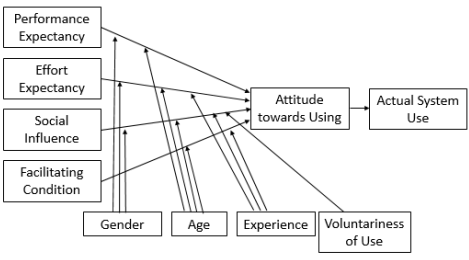
B. Evolution of Technology Usage Principle

Among the topic that often gets the attention of the researcher in the field of information system is to understand the individual use of technology [14]. The evolution of the theory of technology has evolved over time. Among the early theory that has gained the attention of the researcher is the theory of Reasoned Action (TRA), which was introduced by Martin Fishbein and Icek Ajzen check in year 1967 [15].

TRA has been employed by many scholars as the basis for another work such as the Theory of Planned Behavior [15] which aims to improve TRA. In addition, the TRA is also the basis of the most influential theory which is the Technology Acceptance Model (TAM) [16]. TAM replaced the TRA's attitude measure with two technology acceptance measure which is usefulness and ease of use and TAM became a theory which in turn widely used and gained attention of the researchers to expand that theory. Among the theory that derived from TAM are TAM 2 [17] and Unified Theory of Acceptance and Use of Technology (UTAUT) by [18]. A summary of each theory on the use and acceptance of technology is shown in the table below.

TABLE II. SUMMARY ON THEORIES OF TECHNOLOGY USAGE

Theory	Summary
<p>Theory of Reasoned Action</p> <p>(Martin Fishbein and Icek Ajzen, 1967)</p>	<p>The theory aims to explain the relationship between attitudes and behaviors within human action.</p>  <pre> graph LR A[Attitude Toward Act or Behaviour] --> B[Behavioural Intention] C[Subjective Norm] --> B B --> D[Behaviour] </pre>
<p>Theory of Planned Behaviour</p> <p>(Icek Ajzen, 1991)</p>	<p>This theory is improvement of Theory of Reasoned Action by including perceived behavioural control to explain human behaviour.</p>  <pre> graph LR A[Attitude Toward Act or Behaviour] --> B[Behavioural Intention] C[Subjective Norm] --> B D[Perceived Behavioural Control] --> B B --> E[Behaviour] </pre>

Theory	Summary
Technology Acceptance Model <i>(Davis, Bagozzi and Warshaw, 1989)</i>	Theory on how users' acceptance and usage a technology. 
Unified Theory of Acceptance and Use of Technology <i>(Venkatesh, Morris, Gordon B. Davis and Fred D. Davis, 2003)</i>	UTAUT aims to explain user intentions to use an information system and subsequent usage behavior. 

In general it can be stated that the basic principles of technology usage is about perception, behavioral intention to use and the technology usage [19] as the figure below.

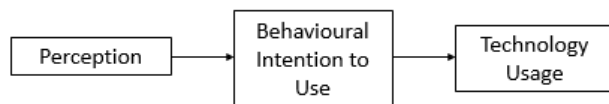


Figure 1. Traditional Framework of Technology Usage

However, [33] stated that it is time that this framework has to be reviewed. [19] took the suggestion to review and introduced a New Theory of Technology Usage related to needs-based perspective by focusing on the question of “why” because they believes nowadays the most frequently asked questions about technology usage is “why”. ‘Why he likes to play game?’, ‘Why mom always visit blog about food every Saturday?’, ‘Why there are more visitors yesterday compared than today?’ Answering “why” will enable designers to come up with better design that meets user’s needs and requirements.

[19] introduced the Theory of Technology Usage and its first version is illustrated in Figure 2, below.

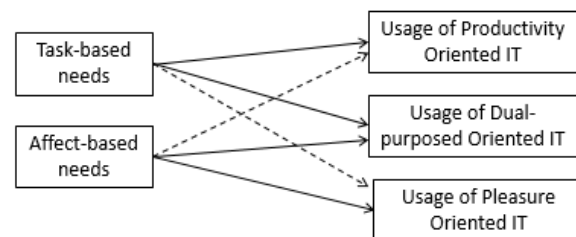


Figure 2. The First Version of the Theory of Technology Usage

[19] later improvised the theory by introducing the purpose of IT as the mediating factor between needs and usage of IT and the resulting new version of the theory is shown in Figure 3 below.

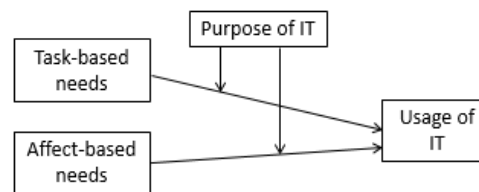


Figure 3. The Second Version of the Theory of Technology Usage

C. The Beneficial Technology

In today’s world which is governed by the bursts of technology, almost every second humans use it and this enables them to regulate and control almost everything at the tips of their fingers. Globally, technology rules as it becomes widespread at a rapid pace. Almost all matters and tasks will involve the use of technology even if it is for a simple activity like preparing a cup of coffee by using a coffee maker to more complex task such as flying the plane using an auto-pilot mode. Today’s lifestyle which is highly dependent on technology contributes to more vibrant and colorful landscape of technological industry. The phenomenon of rapid technological development leads to the introduction of new and innovative products.

Many think that the technology is able to provide benefits to humankind if it is developed and used properly. Multiple errors caused by design errors or misuse of such technology for example, as a user we should not blindly confidence in technology [20] because the technology can be damaged. Put a very high confidence of the technology without double checking can undermine the credibility of users [21].

Therefore, the benefits realization process for the identification, definition, tracking, realization and optimization of benefits ensures that potential benefits arise from the system or application that is actually realized [22] is very important. By emphasizing this, the study is able to deliver the benefits to the user and the system or application will be considered as beneficial as long as the user used it ethically. Besides, it also can answering the “why” questions.

D. Cultural

Linguistically, culture is a complex and holistic way of life which includes knowledge, belief, art, morals, law, custom and any other capabilities and habits acquired by an individual as a member of society. According to [23], cultural values are related to an orientation that is individualistic (values referred to as power, achievement, hedonism, stimulation and self-direction), collectivistic (benevolence, tradition and conformity) or mixed (security and universalism).

Considering cultural value as a mediator in certain study has gained researchers attention such as for Quality of Life [24], [25]. Similarly in Human Computer Interaction or discipline in

which the cultural dimension is often associated with ICT4D lines that tend to be associated with developing ethics and society. However, most of the cultural dimension is taken into account in terms of physical ability and facilities in technology use [26], [27], [28].

IV. SITUATION ANALYSIS

We carried a study to explore the breadth and depth of the socioeconomic and sociocultural implications of ICT use among the Orang Asli. We aim to understand the needs and requirements for technology use and appropriation as well as the barrier of ICT adoption in Orang Asli ethnic. This will give us an insight into their learning ability, economic capability, cognitive style, daily practice and behaviour towards ICT. The first part of our findings was published as in [29].

A. Activities Conducted

In the first part of our study, we employed a qualitative approach to carry out an empirical study which aims to identify the influence of socioeconomic and sociocultural of Orang Asli towards acceptance and use of ICT.

Focus groups and observations were conducted with 75 Orang Asli considered as informer from 5 villages in Peninsular Malaysia. Focus groups were conducted to cover four aspects namely healthcare, education, subsistence, and ICT adoption. Meanwhile, the observation was meant to find out individuals who are more likely to use technology, how far they use the technology, and are there any issues while they were handling the technology. Informer's activities of using technology was observed for 10 hours, from 8.00 am until 6.00 pm without them realizing it.

From the data obtained we conducted a thematic analysis to analyze the rich qualitative data obtained. To support the result obtained from thematic analysis, a card sorting exercise and open-ended interviews were carried out with six experts from three different fields; anthropology, medical practitioner specifically for Orang Asli, and development and growth of Orang Asli community. They were interviewed to gain their opinion on cognitive style of Orang Asli, socioeconomic development, sociocultural condition, and ICT usage among Orang Asli.

B. Findings

After carrying out the analysis of the data obtained, the initial finding that the record shows that there are four main aspects to be considered in the efforts to attract Orang Asli to use and benefit from ICT. These are i) influential people, ii) infrastructure barriers, iii) social development issues, and iv) motivational factors. We summarized the findings obtained as shown in Table III.

TABLE III. SITUATIONAL ANALYSIS FINDING

Factor	Sub Factor	
	Sub Factor	Description
Influential People	Batin	A person of reference and decision-makers in most cases.
	School student	Received formal education on ICT and adults trust them on issues related ICT
Infrastructure Barriers	Cost to be borne	Their standard of living is still relatively low.
	Lack of training materials or centers	There is only one ICT training center for specifically for Orang Asli located at Johor while the Orang Asli population is on the whole of peninsula Malaysia
	Lack of facilities	Provision of facilities is still not comprehensive, especially for rural areas. No electricity and internet connection.
Social Development Issues	Illiteracy	Awareness on education is still low especially in rural area.
	Preservation of tradition culture	Adults are very concerned about the impact of technologies on their belief and culture.
Motivational Factors	Elements of entertainment and enjoyment	They like entertainment and fun in their own way. Thus, they expect ICT also has that matter.
	Evidence of benefits ICT can provide	They hope that ICT can provide benefits. Not only will waste time and absorbing as people are saying.
	Positive attitudes	They do not want the use of ICT will contribute to self-value and the good qualities they have in themselves will be lost.
	Respects to their ancestral beliefs and customs	They do not want the use of ICT, will make their beliefs and culture handed down by their ancestors will manipulated by technology providers.

V. GENERALIZATION CRITEREON-RELATED ANALYSIS

From the empirical findings obtained, we now perform generalizing criterion-related analysis. According to Cronbach, generalization is always based on judgments about similarity and differences [30]. Basically, [31] believed there are two approaches which can be used in the process of generalizing the criterion-related evidence or data that is meta-analysis and substantive model. However, for this situational analysis finding, meta-analysis is unsuitable to be used since meta-analysis is designed to extract useful and general conclusions from large numbers of empirical studies. Therefore, we decided to use substantive models approach since it is the basis for generalizing validity data that offers several advantages, including more emphasis on the nature of the criterion and possibly some assistance in developing better criteria.

In the process of generalizing criterion-related, we adapt the substantive model as we carried out the research, applied model or theory choice that has a relationship with an identified criteria because it plays a major role in determining the conditions, values, aspects or principles that can be considered similar. It requires deeper understanding in the established model or theory so that the generalization done fulfils the actual criteria obtained in the situational analysis.

Producing this general structure is not very esoteric or technical. It is largely dependent on common sense as compared

to any deep analysis of the nature of things. However, like any scientific theory, the structure includes assumptions and makes predictions. Using substantive model also helps us to make sense out of conflicting results by allowing us to distinguish between situations where the model should apply and situations where it should not apply. Eventually, it generates general interpretive implicit structure as seen in Table III and by adapting the Second version of the Theory of Technology Usage, we focusing at motivational factors to transform it into Figure 4.

TABLE IV. GENERALIZATION OF THE CRITERIA OBTAINED

Category	Technology Use	Motivation
Socioeconomic	1. Cost to be borne (Material) 2. Lack of training materials or centers (Material) 3. Lack of facilities (Material)	1. Evidence of benefits ICT can provide (Benefits Delivery)
Sociocultural	1. Illiteracy (Ability) 2. Preservation of tradition culture (Culture)	1. Elements of entertainment and enjoyment (Affect) 2. Positive attitudes (Self-Value Cultural) 3. Respects to their ancestral beliefs and customs (Community-Value Cultural)
Socio-structural	1. Batin (Power Distance) 2. School students (Power Distance)	1. Approval (Power Distance)

() – generalization

From the generalization of the criteria obtained we mapped the criteria on to the second version of the Theory of Technology usage to produce a new conceptualization of technology usage by indigenous people. The conceptual model is illustrated in Figure 4 below.

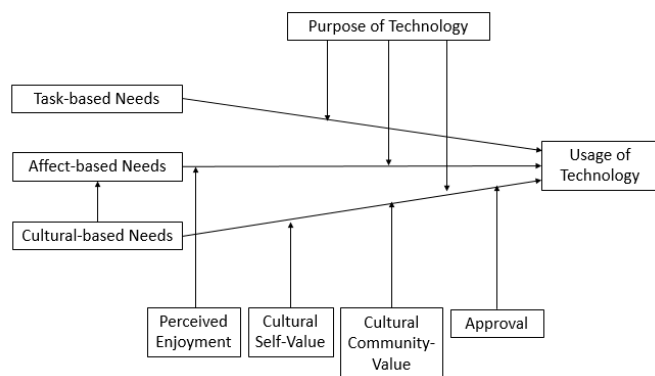


Figure 4. A Conceptual Model of Technology Usage for Indigenous People

The constructs of the conceptual model is described briefly and summarized in Table V.

TABLE V. DEFINITION OF CONSTRUCT IN CONCEPTUAL MODEL OF TECHNOLOGY USAGE FOR INDIGENOUS PEOPLE

Construct	Definition
Perceived Enjoyment	Is an intrinsic motivation that the activity of using a specific system/application is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system/application use.
Cultural Self-Value	It is a self-worth motivation that desires sense of one's own value or worth as a person to keep positive characteristics in traditions, beliefs, and fundamental rights as human being.
Cultural Community-Value	It is a situational interest motivation that desire deliberate act of keeping the distinctive spiritual, material, intellectual and emotional features that characterize a society or social group. It includes tangible value such as arts and letters as well as intangible values such as modes of life, the fundamental rights of the human being, value systems, traditions and beliefs [34].
Approval	It is an extrinsic motivation (in this case is Batin approval) that able to influence either to use or not to use the technology.
Purpose of Technology	It is a goal motivation that also can be defined as benefits delivery. The process of experiencing benefits promised by the system or application that is actually realized.

VI. CONCLUSION AND FUTURE WORK

In a nutshell, we described our efforts in the exploration of new knowledge on motivational factors in affect and cultural dimension needs to be able to understand the use of technology among Orang Asli. By adopting and adapting the new Theory of Technology Usage introduced by [19] and using empirical findings derived from previous work [29], a new conceptual model of Theory of Technology Usage for indigenous people was obtained. The new constructs now need to be validated empirically.

In the next phase of our work we will validate the conceptual model by validating each of the new constructs (Table V) through the prototype testing procedure.

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