ICT ADOPTION AND CULTURAL PRESERVATION AMONG KADAZANDUSUN COMMUNITY IN SABAH, MALAYSIA

By

FANG YI XUE

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

February 2024

FEM 2024 4

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of in Doctor of Philosophy

ICT ADOPTION AND CULTURAL PRESERVATION AMONG KADAZANDUSUN COMMUNITY IN SABAH, MALAYSIA

By

FANG YI XUE

February 2024

Chairman : Professor Sarjit Singh a/l Darshan Singh, PhD
Faculty : Human Ecology

The KadazanDusun community faces significant challenges in preserving its cultural heritage as a result of modernization and globalization. This study aims to determine the impacts of ICT adoption on cultural preservation among the KadazanDusun community. This study was conducted in Penampang and Ranau, Sabah, Malaysia where majority of the KadazanDusun community reside. A mix method approach using sequential explanatory research design was employed to achieve the research objectives. The quantitative method was used to (i) measure the level of ICT adoption for cultural preservation among the KadazanDusun community, (ii) determine the relationship of ICT adoption and cultural preservation among the KadazanDusun community, (iii) identify the factors that influence the ICT adoption for cultural preservation among the KadazanDusun community, and (iv) examine the relationship between moderating variables such as gender and age in adopting ICT for cultural preservation. Descriptive analysis was used to describe data on demographic background, quantifying the mean of the factors of ICT adoption and its impacts on cultural preservation. Secondly, correlation and multiple regressions analysis was

found to be the primary and suitable procedure, to identify the factors that influence the ICT adoption on the cultural preservation of the KadazanDusun community. Additionally, a hierarchical multiple regression analysis was conducted using PROCESS Macro for SPSS to test the relationship between moderating variables such as gender and age in adopting ICT for cultural preservation. Lastly, the qualitative method was used to explore the impacts of ICT adoption towards the culture of the KadazanDusun community. The findings showed the mean score of ICT adoption on cultural preservation is moderately good. The impacts of ICT adoption on cultural preservation showed the highest mean score on ethnic festival. All the factors of ICT adoption (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions) were correlated with cultural preservation, with effort expectancy has the strongest correlation value. The findings suggested that social influence (SI) has the strongest significant influence compared to all the other four factors ($\beta = 0.312$, $p = 0.000$). Gender only influences the relationship between Effort Expectancy and cultural preservation, where male inclines to adopt ICT for its ease to preserve the culture compare to KadazanDusun female. The qualitative data revealed five main themes across the entire data set related to how ICT impacts on the cultural preservation which are (i) accessibility and dissemination, (ii) cultural promotion and preservation, (iii) cultural learning, (iv) intergenerational transmission, (v) community engagement and participation, and (vi) challenges. This study underscores the significant role of ICT in influencing various facets of cultural preservation, with social influence emerging as a crucial determinant. The study not only contributes nuanced insights into the relationship between ICT adoption and cultural preservation but also unveils gender-specific variations and the importance of addressing the digital divide in facilitating the adoption process.

Keywords: Cultural Preservation, Information and Communications Technology (ICT), KadazanDusun, Sabah, UTAUT

SDG: GOAL 4: Quality Education, GOAL 10: Reduced Inequalities, GOAL 11: Sustainable Cities and Communities

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PENGGUNAAN ICT DAN PEMELIHARAAN BUDAYA DALAM KALANGAN MASYARAKAT KADAZANDUSUN DI SABAH, MALAYSIA

Oleh

FANG YI XUE

Februari 2024

Pengerusi : Profesor Sarjit Singh a/l Darshan Singh, PhD
Fakulti : Ekologi Manusia

Masyarakat KadazanDusun menghadapi cabaran besar dalam mengekalkan warisan budayanya disebabkan faktor pemodenan dan globalisasi. Kajian ini bertujuan untuk mengetahui kesan penggunaan ICT terhadap pemeliharaan budaya dalam kalangan masyarakat KadazanDusun. Kajian ini dijalankan di Penampang dan Ranau, Sabah, Malaysia di mana majoriti masyarakat KadazanDusun menetap. Pendekatan kaedah campuran menggunakan reka bentuk penyelidikan penerangan berurutan telah digunakan untuk mencapai objektif kajian. Kaedah kuantitatif digunakan untuk (i) mengukur tahap penggunaan ICT bagi pemeliharaan budaya dalam kalangan masyarakat KadazanDusun, (ii) menentukan hubungan penerimaan ICT dan pemeliharaan budaya dalam kalangan masyarakat KadazanDusun, (iii) mengenal pasti faktor-faktor yang mempengaruhi penggunaan ICT untuk pemeliharaan budaya dalam kalangan masyarakat KadazanDusun, dan (iv) mengkaji hubungan antara pembolehubah penyederhana seperti jantina dan umur dalam menerima pakai ICT untuk pemeliharaan budaya. Analisis deskriptif digunakan untuk menghuraikan data tentang latar belakang demografi, mengukur min faktor penggunaan ICT dan

kesannya terhadap pemeliharaan budaya. Kedua, analisis korelasi dan regresi berganda didapati sebagai prosedur utama dan sesuai, untuk mengenal pasti faktor-faktor yang mempengaruhi penggunaan ICT terhadap pemeliharaan budaya masyarakat KadazanDusun. Selain itu, analisis regresi berganda hierarki telah dijalankan menggunakan PROCESS Macro untuk SPSS untuk menguji hubungan antara pembolehubah penyederhana seperti jantina dan umur dalam menerima pakai ICT untuk pemeliharaan budaya. Akhir sekali, kaedah kualitatif digunakan untuk meneroka kesan penggunaan ICT terhadap budaya masyarakat KadazanDusun. Dapatan kajian menunjukkan skor min penggunaan ICT terhadap pemeliharaan budaya adalah sederhana baik. Kesan penggunaan ICT terhadap pemeliharaan budaya menunjukkan skor min tertinggi pada perayaan etnik. Kesemua faktor penggunaan ICT (Jangkaan Prestasi, Jangkaan Usaha, Pengaruh Sosial, dan Kondisi Kemudahan) dikaitkan dengan pemeliharaan budaya, dengan jangkaan usaha mempunyai nilai korelasi yang paling kukuh. Dapatan kajian mencadangkan bahawa pengaruh sosial (SI) mempunyai pengaruh signifikan yang paling kuat berbanding keempat-empat faktor lain ($\beta = 0.312$, $p = 0.000$). Jantina hanya mempengaruhi hubungan antara Jangkaan Usaha dan pemeliharaan budaya, di mana lelaki cenderung untuk menerima pakai ICT untuk memudahkannya memelihara budaya berbanding wanita KadazanDusun. Data kualitatif mendedahkan lima tema utama merentas keseluruhan set data yang berkaitan dengan bagaimana ICT memberi kesan kepada pemeliharaan budaya iaitu (i) kebolehcapaian dan penyebaran, (ii) promosi dan pemeliharaan budaya, (iii) pembelajaran budaya, (iv) transmisi antara generasi, (v) penglibatan dan penyertaan komuniti, dan (vi) cabaran. Kajian ini menggariskan peranan penting ICT dalam mempengaruhi pelbagai aspek pemeliharaan budaya, dengan pengaruh sosial muncul sebagai penentu penting. Kajian itu bukan sahaja menyumbangkan pandangan

bernuansa tentang hubungan antara penggunaan ICT dan pemeliharaan budaya tetapi juga mendedahkan variasi khusus jantina dan kepentingan menangani jurang digital dalam memudahkan proses penggunaan.

Kata Kunci: Information and Communications Technology (ICT), KadazanDusun, Pemeliharaan Budaya, Sabah, UTAUT

SDG: MATLAMAT 4: Pendidikan Berkualiti, MATLAMAT 10: Mengurangkan Ketidaksamaan, MATLAMAT 11: Bandar dan Komuniti yang Mampan

ACKNOWLEDGEMENTS

I would like to express my heartfelt gratitude to all those who have contributed to the completion of this thesis. This journey has been a significant undertaking, and I am deeply indebted to the many individuals and institutions that have supported and guided me along the way.

First and foremost, I extend my sincere appreciation to my supervisor, Professor Dr Sarjit Singh Darshan Singh, for their invaluable guidance, unwavering support, and expert insights throughout the research process. To my co-supervisors, Associate Professor Dr Ahmad Tarmizi Talib and Associate Professor Dr Mohd Roslan Rosnon for their dedication and encouragement that have been instrumental in shaping the direction of this study towards completion.

I am also thankful to the KadazanDusun community members who generously shared their time, experiences, and perspectives during the interviews. Their willingness to open up and provide valuable insights has enriched the depth and authenticity of this research.

I would like to acknowledge the Universiti Putra Malaysia for providing a postgraduate research fund of RM25,000 that facilitated the progress of this study.

My gratitude extends to my husband, Dinesh, family members and friends for their unwavering support, understanding, and encouragement throughout this journey. Your belief in my abilities has been a driving force in overcoming challenges and striving for excellence.

Lastly, I would like to thank all the researchers, authors, and scholars whose works have laid the foundation for this study. Your contributions have been instrumental in shaping the theoretical framework and methodology.

In essence, this thesis stands as a collaborative effort, and each individual mentioned here has played an integral role in its realization. Thank you for being a part of this journey and for making this achievement possible.

This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Sarjit Singh a/l Darshan Singh, PhD
Professor
Faculty of Human Ecology
Universiti Putra Malaysia
(Chairman)

Ahmad Tarmizi bin Talib, PhD
Associate Professor
Faculty of Human Ecology
Universiti Putra Malaysia
(Member)

Mohd Roslan bin Rosnon, PhD
Associate Professor
Faculty of Human Ecology
Universiti Putra Malaysia
(Member)

ZALILAH MOHD SHARIFF, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 10 October 2024

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

The rapid development of ICT over the last decade that continues to have an immeasurable and deep impact on the cultures and communities of the world's Indigenous peoples, nations and tribes, the majority of whom remains living in extreme poverty without the access to basic provision for food, water, shelter, electricity and other basic infrastructure (United Nations, 2003). The native communities across the world have been facing tremendous issue varying from land rights, language, and other cultural aspects, while at the same time being discriminated when it comes to integration into a globalization culture in accessing to technological tools (Ashraf, Grunfeld & Quazi, 2015). Similarly, the KadazanDusun community struggles with cultural preservation due to modernization (Chong, 2015), language shift (Lasimbang & Kinajil, 2000), external influences, and intergenerational disconnection (Cosmas et al., 2019; Adam et al., 2021). Despite increasing research on ICT adoption in developed countries, there is limited understanding of its impact on cultural preservation within the KadazanDusun community, particularly concerning UTAUT in developing countries like Malaysia (Olushola & Abiola, 2017).

Culture and development have to interact with one another in order to ensure the survival of humans. The rapid development of Information and Communication Technlogy (ICT) which often labeled as a double-edge sword has brought about impact to indigenous cultural survival. It has been suggested that ICTs have the potential to be both constructive and destructive in terms of cultural production and

preservation (Grace, Kenny, & Qiang, 2004). According to Mustafa (2006), the human beings are facing an identity crisis due to the impact of globalization in which identity construction has become increasingly complicated due to rapid innovations of ICT. On contrary, communication technologies, particularly social media both present opportunities and challenges for minority language preservation and revitalization (Lackaff & Moner, 2016). However, the fact remains that with ICT advancement, the community can benefit better in terms of learning about different cultures while at the same time, promoting and preserving their own culture through this technological platform. Ashraf, Grunfeld, & Quazi (2015) draw our attention the usefulness of ICTs that have the potential in addressing disadvantages faced by the indigenous community in terms of land rights, cultural aspects, which is to reconstruct what has been eroded and facilitating integration into non-indigenous societies.

The Geneva Declaration of the Global Forum of Indigenous Peoples and Information Society (2003) stated that:

> *"Information and Communication Technology (ICT) should be used to support and encourage cultural diversity and to preserve and promote the language, distinct identities and traditional knowledge of indigenous people, nations and tribes in manner which they determine best advances these goals."* (United Nations, 2003, p.6)

The United Nations has highlighted that the indigenous peoples are the keepers of knowledge, with many years of generations passing rich sets of knowledge about the natural world, health, technologies and techniques, rites and rituals and other cultural expressions.

1.2 Cultural Preservation

The concept of preservation is often related to cultural heritage, as in order for one's cultural heritage to survive, it must have been passed on by previous generations and safeguarded by the current generation. The idea of cultural preservation is widely debated in the community as there is a growing search for identity as a result of the cultural globalization processes that occurred all over the world (Hosagrahar, Soule, Girard, & Potts, 2016).

Despite cultural globalization making waves in this information age, cultural identity is more than just a collection of accumulated thoughts, beliefs, traditions, languages, and behaviors; it is the result of a cultural selection process in which individuals or social actors respond to external stimuli across different time frames. As a result, this explains why some cultures thrive while others become extinct, and why some appear to be practiced as a norm by a larger modern society (Morin, 2016).

Every community has its distinct traditions, values, and norms. Over the years, culture changes and develops from time to time, in terms of innovation for cooking utensils, and communication purpose and other material support. Culture is dynamic as human beings are capable of adapting to changing conditions due to the push and pull factors – economic, climatic, political, or ideological. Thus, human progress along one line of development.

The importance of incorporating culture into development has gained traction in both local and global contexts. The United Nations has placed a strong emphasis on integrating culture into development because culture is a critical human factor in

achieving sustainable development. The agenda for the protection and safeguarding of cultural heritage was introduced by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) after the World World Two. Five UNESCO Conventions underlie its efforts to safeguard heritage: the 2003 Intangible Cultural Heritage Convention, the 2001 Underwater Heritage Convention, the 1972 World Heritage Convention, the 1970 Convention on Preventing the Illicit Trafficking of Cultural Property and the 1954 Convention on the Protection of Cultural Property in the Event of Armed Conflict and its two (1954 and 1999) Protocols.

Due to the destruction from the war, the agenda of safeguarding heritage was mainly focused on material culture like heritage sites until recently in 2003, UNESCO has acknowledged the importance of the intangible cultural heritage as it carries the identity of the community and ensure cultural continuity. Consequently, the United Nations has called upon the global nations to carry out the Agenda 2030 for Sustainable Development include an explicit heritage target, Target 11.4, calls for cities and human settlements to be more inclusive, safe, resilient, and sustainable by strengthening efforts to protect and safeguard the world's cultural and natural heritage (United Nations, 2015).

Malaysia is a country with a diverse populations of ethnic, religions, beliefs systems and community cultures. Malaysia, like any other country, is embroiled with the impact of modernization which leads to adverse impact on its cultural heritage. As a member of the global community, Malaysia had ratified the UNESCO’s Convention Concerning the Protection of the World Cultural and Natural Heritage, on 7 December 1988, which called upon each states parties to identify potential sites and their role in

protecting and preserving the cultural and natural heritage; to integrate heritage protection into comprehensive regional planning programmes and give this heritage a function in the community life (UNESCO, n.d.). At the national level, Malaysia has established its own National Heritage Act, 2005 to provide for the conservation and preservation of National Heritage, natural heritage, tangible and intangible cultural heritage, underwater cultural heritage, treasure trove and for related matters. Besides, the current launching of National Culture Policy 2021 by the Prime Minister (a continuation of the previous policy established in 1971) based on the five principles of Keluarga Malaysia is used as guidelines and reference in planning the development of the country's arts, culture and heritage sector (Bernama, 2021).

Despite various government initiatives, most cultural preservation work in safeguarding the cultural heritage is mainly focused on tangible cultural heritage and has not expanded significantly on intangible cultural heritage (Suaib, Ismail, Sadimon, & Yunos, 2020). The importance of Intangible Cultural Heritage (ICH) was outlined by UNESCO as cultural transmission and identity work takes place not solely depends on the material culture, but also relationship with the people.

1.3 The KadazanDusun Community

The KadazanDusun community are the largest native ethnic group in Sabah. The community was made up of 30 or more subgroups and had a population of between 20 and 33 percent of Sabah's population (West, 2010). Based on the Department of Statistics Malaysia report released on 2022, Sabah's population stood at roughly 3.6 million, making up the top five most populous state in Malaysia. The largest indigenous ethnic group, which forms 19.4 percent of the population, is the

KadazanDusun which is approximately 698,400. Eventually they are considered as minorities in the context of the whole country. They, like all other indigenous minorities, are still grappling with development issues, political control, and political marginalisation (Puyok et al., 2011).

The issue of minority and indigenous cultures is not only a local one, but it has also drawn massive attention around the world (Minority Rights Group International, 2016). In relation to the scope of this study, the KadazanDusun community's culture has also faced challenges due to local and global modernization.

In comparison to their current state, the KadazanDusun community was a homogenous society because they shared a common language, culture and religious belief (Appell, 1965). According to Pugh-Kitingan (n.d.), change and globalization have impacted on Sabah's intangible cultural heritage. Sintang (2003) highlighted that the KadazanDusun community has become more complex due to various factors such as culture change, adaptation to different ecosystems, and the impact of foreign culture, which has resulted in the formation of diverse culture that we can see today. The entry of foreign culture was due to the white man, who triggered all these changes by introducing their superior technology and political organization during the colonial era, and who were the first to establish education, infrastructure, and Christianity. Nevertheless, on the basis of modernity, the KadazanDusun are more positive and welcome the different form of modernity brought by the foreign culture than that promoted by Malaysia, but not at the expense of cultural homogenization and loss of cultural uniqueness (Barlocco, 2010).

Although previous studies have highlighted the challenges faced by the KadazanDusun community in adapting to the local and global modernization, I would suggest that the KadazanDusun community embraces development and is capable of transforming the threat of globalization into opportunity and bring about birth to its cultural uniqueness today.

1.4 ICT Development in Malaysia

The Malaysian government has spent great amounts of money and resources in promoting the development of Information and Communication Technology (ICT) to enhance people's intellectual levels. The determination of the government in developing the digital community can be seen clearly as the ICT development programmes are significantly highlighted in each Malaysian Plan. The latest 2021 budget has also allocated RM9.4 billion to develop the national digital strategy across industry sectors and the people (Bernama, 2020). The Malaysian Communications and Multimedia Commission (MCMC) has also established the PRIHATIN network programmed which cost RM1.5 billion to benefit 8 million in the B40 group. The MCMC is also allocating RM7.4 billion for 2021 and 2022 to expand broadband services in the rural area (MCMC, 2020).

According to Hootsuite Digital 2019 report, Malaysia was ranked top five internationally and highest in Southeast Asia for mobile social media penetration, (The Sun Daily, 2019). According to the survey, internet penetration in Malaysia is at 80% with users spending an average of eight hours and five minutes online per day. The findings are consistent with those of a survey of Internet users conducted by MCMC (2017). As of 2016, there were approximately 21.9 million social media users. As of

fourth quarter of 2021, Malaysia mobile broadband penetration rate has surpassed 124.1% while in Sabah is 88% which is the lowest among all states in Malaysia.

At the Sabah state level, the state government has introduced a new Sabah ICT Blueprint with the aim of fully digitalized the state by 2025. It was also reported that an enormous allocation of RM21 billion allocation for the National Fiberisation and Connectivity Plan (2019-2023) by the former Deputy Prime Minister (Daily Express, 2020). These clearly indicated that both the state and federal governments are serious in addressing the digital divide in Sabah which has the lowest penetration rate among all states.

Following the rapid innovations of ICT, the Malaysian government has addressed the needs of the people by spending great amount of money and resources in enhancing the accessibility to ICT across rural and urban areas throughout Malaysia. This has also indicated that digital divide remains prevalent amidst the enormous allocation of budget for ICT development and positive reporting on the current Internet penetration in Malaysia. Conscious of this dilemma, the government has invested substantially to overcome the digital divide in order to ensure a holistic development of ICT in order to build a robust and well-rounded digital community in Malaysia. All of these are very important issues that need to be deliberated upon as the government gears up to build a viable and competitive digital community in Malaysia.

1.5 Statement of Problem

The central problem to this proposed study is mainly on the cultural sustainability of the KadazanDusun community in Sabah. In this era of modernization, the survival of

traditional knowledge including craftsmanship, local natural resources and creative industries has faced several challenges (UNESCO Institute for Statistics, 2016; Hosagrahar et al., 2016; James, 2014). The KadazanDusun community, being the largest indigenous ethnic group in Sabah, has faced numerous challenges in keeping up their cultural identity due to modernization. According to Lasimbang and Kinajil (2000), language loss can be observed in the KadazanDusun community as early in 1980s due to modernization and development.

Another research conducted by Chong (2015) found that the KadazanDusun traditional musical instruments are slowly fading off due to the rising of modern instruments. Cosmas, Sombuling, Melai, & Poninting (2019) highlighted the efforts to keep the KadazanDusun tradition alive has not be forgotten by the community and various organizations should play a role in raising awareness among the younger KadazanDusun generation about the importance of preserving the values of KadazanDusun traditional costume and traditional musical instruments.

Another research conducted by Adam et al. (2021) on approaches and challenges of indigenous knowledge transfer among the Dusun and Bajau in Kota Belud, discovered that the indigenous people, particularly the youth, have developed dependency on technologies which have exposed them to foreign, non-indigenous culture and dogmas through mass media, in which has discouraged them from learning about their own culture (Tang & Gavin, 2016).

The development of ICT has resulted in changes to the community's cultural settings. Nevertheless, cultural heritage faces both imminent benefits and threats due to the

rapid advancement and technological impact into the society. While modernization introduces new technology that may impede the cultural aspect a community, technology can also aid in the preservation of the community's cultural heritage. A research by Machidon, Duguleana & Carrozzino (2018) on cultural heritage and Virtual Reality applications has technically improve human interaction and engagement in giving a new breath in learning the cultural heritage. However, there is no comprehensive study conducted on the role of ICT in the preservation and transmission of culture, specifically on intangible heritage (Alivizatou-Barakou et al., 2019).

Digital technology contributes significantly to the fulfilment of every Sustainable Development Goals (ITU, 2021). Sustainable development aspires to ensure everyone's basic needs are met as well as given the opportunity to fulfil a good quality of life. According to a report by World Commission on Environment and Development (1987), the basic needs also include rights of all to preserve the cultural identity, and their right to not be alienated by the society as well as the community. It has become an essential role in assisting communities to increase their overall well-being through community development.

Documentation of intangible cultural heritage is one of the form of safeguarding, following with the transition of intangible expression to digital cultural heritage. According to UNESCO (2018), "safeguarding" includes a variety of measures aimed at ensuring the long-term viability of intangible cultural heritage, such as identification, research, preservation, protection, promotion, enhancement, and transmission,

particularly through formal and non-formal education, as well as the revitalization of various aspects of such heritage.

A research discovered that the largest Orang Asli community in Malaysia, which is the Semai tribe, has experienced language, cultural knowledge and traditions to be in endangered and towards the verge of disappearing (Sumathi & Inge, 2018). The research also highlighted the importance of documentation in order to ensure the cultural survival of the indigenous minorities.

The diffusion of technology which transformed almost every part of human lives has also reinforced the growing concern of digital inequalities in modern societies. A recent study conducted by McKinsey and Company (2020) found out some 2.5 billion people were remained offline while the business of building advanced networks and innovating frontier technologies like high-band 5G are in the works. According to a report by UNDP (Opp, 2022), 60% of the world's population who is now online are from developed countries, while in less developed countries, online one in five people are online. The similarities of both developed and non-developed countries are the indigenous communities continue to be underserved, as they are among the least likely to be connected to the Internet and frequently lack equal access to the digital skills required to make the most of ICTs. The digital divide issue usually dichotomize between genders, geographical areas and socio-economic classes due to lack of IT context, lack of ICT accession and ownership, lack of time and expertise in the use of ICT, lack of innovation requirements, lack of critical thinking and lack of English language skills (Ghobadi & Ghobadi, 2015; Yaman, 2015).

The majority of indigenous people live in rural and remote areas that become a major contributor to digital divide issues (Intahchomphoo, 2018). For example, a study conducted by Singleton et al. (2009) found that the indigenous communities in Australia who live in the remote area could not get good quality of Internet connectivity. This also applies to the same for indigenous peoples living in the remote areas of the United States (Filippi et al., 2013).

Previous research conducted by Sarjit *et al*. (2012) which focused only on the six ethnic minorities in Peninsular Malaysia, found that ethnic minorities view ICT as an important tool in sustaining their cultural identity. Even though the ethnic minorities in Peninsular Malaysia view ICT as an important tool to safeguard their cultural identity, they are still experiencing digital divide, mainly because most native villages still do not have easy access to facilitate and encourage aboriginal people to use ICT (Sarjit *et al*., 2009).

While Malaysia is at the forefront of ASEAN ICT development with 124.1% of mobile broadband penetration rate, the issue of digital divide persists, particularly in rural areas such as Sabah. The Sabah Assistant Science, Technology and Innovation Minister Datuk Seri Dr Ruddy Awah said the internet services in the urban areas were just as poor as those in the rural areas even though hundreds of ringgit had been spent on unlimited services and mobile data to internet service providers (ISPs) every month (News Strait Times, Feb 2022).

The digital inequalities have brought about challenges to the life of the Sabahans. The most recent local and international news headlines report on a Sabahan, Veveonah

Mosibin who is living in a rural village had to go extra miles by camping on top of the tree to get better internet connection in order to sit for her online university exams (The Star Online, 2020). A study conducted by Mohd Hamdan (2017) found out that the Sabahans from different background living in different localities were expecting that the broadband penetration can be expanded quickly and the quality of transmission and service can be enhanced. It was also highlighted that the lowest income group of people were willing to subscribe to broadband for their own benefits despite their financial limitations. A study conducted by Jol et al (2020) on mobile learning adoption among Form Six students in Sabah, Malaysia has revealed that the acceptance of any new technology is highly dependent on the facilitation conditions.

From the theoretical perspective of ICT adoption, most of the study on ICT adoption identified the critical factors and contingencies related to the prediction of behavioral intention use of a technology. Nevertheless, the literature on ICT and cultural preservation among the KadazanDusun community in Sabah is quite limited. While a few studies have explored the use of technology for cultural preservation, they primarily focus on the application of ICT rather than the experiences of the indigenous communities as active participants in preserving their culture (Yatim et al., 2022; Ding, 2017).

So far, however, there has been little discussion about ICT adoption by the native community, specifically the KadazanDusun community for cultural preservation. To what extent the adoption of ICT affect on the sustainability of KadazanDusun cultures in Sabah? While ICT becomes an important tools for the well-being of the community,

how can the KadazanDusun community adopt ICT for cultural preservation when in the first place having accessibility difficulties?

1.6 Research Questions

These research questions had been identified from the problem statement in this research:

1) What is the level of ICT adoption for cultural preservation among the KadazanDusun community?
2) What is the relationship of ICT adoption and cultural preservation among the KadazanDusun community?
3) What are the factors that influence the ICT adoption of the KadazanDusun community?
4) What is the relationship between sociodemographic factors (age and gender) in adopting ICT for cultural preservation?
5) What is the impact of ICT adoption towards the cultural preservation of the KadazanDusun community?

1.7 Research Objectives

The general objective of this study is to determine the impacts of ICT adoption on cultural preservation among the KadazanDusun community. Thus, the specific objectives are:

i. To measure the level of ICT adoption for cultural preservation among the KadazanDusun community.

ii. To determine the relationship of ICT adoption and cultural preservation among the KadazanDusun community.

iii. To identify the factors that influence the ICT adoption for cultural preservation among the KadazanDusun community.

iv. To examine the relationship between moderating variables such as gender and age in adopting ICT for cultural preservation.

v. To explore the impacts of ICT adoption towards the culture of the KadazanDusun community.

1.8 Significance of Study

As the theme of this research focuses on ICT adoption and cultural preservation, it is therefore important to highlight digital inclusion, which facilitates ICT adoption by the natives in Sabah, in order for them to adopt it for cultural preservation.

It is undeniable that ICT has progressively become a crucial factor in human life, influencing the daily activities of humans, and thus promoting a wholly different way of life. However, before we talk about the importance of adopting ICT skills, it is important for us to look into the level of digital access of the people to ICT, which has become such a vital basic need.

Therefore, in the scope of this research that focuses on ICT proficiency among KadazanDusun communities in Sabah (a topic that has seen only little research), it is important to study the impact of ICT adoption, and how ICT has impacted on their cultural preservation.

Furthermore, this research is particularly important in providing a better understanding to help policy makers, practitioners and implementers in enhancing ICT development and bridging the digital divide in Malaysia.

1.9 Definition of Key Concepts

This section explores the definitions of two key concepts in this study: ICT adoption and cultural preservation.

1.9.1 ICT Adoption

Information and Communication Technology (ICT) is a technological tools consists of both hardware and software to has influenced and enabled humans to carry out their daily functions from simple daily communication to complex organizational purposes. The development of ICT has long been introduced to human civilizations back in the premechanical period and until today, it has evolved into different devices, technologies and processes that made an impact to human life today. Hence, ICT has been adopted by human even before the era of internet preceded.

A new technology that clocks in into a society, it must go along and familiarize with the existing social order of hierarchies, power relationships and a body-of-knowledge. Individuals or groups who have access, adapt and adopt a technology can intensify their position in the society while those who denied or reject the new technological ideology will remain at the disadvantaged side. This will eventually widen the gaps between class, gender and generational gaps in the process of digitalization (Harris, 2005). For example, the young people are more competent in adopting the new ICT as compared to their parents. The digital gap between the urban and rural dwellers, across genders has put a constrained towards achieving a sustainable ICT development. Another issue related to ICT adoption is the fact that technologies were perceived to primarily cater for the industrialised societies (Harris, 2005). It has eventually caused frustrations among the rural communities for desperately wanting to be part of the

development process. In the developing country, the availability of the technology resources affects the capability of the people in adopting ICT for their daily use.

In the past, the study on ICT adoption has been very much focused on the behavioural and intentional use of technology among an individual, groups or organization but was not conducted exhaustively among the native communities. To address this gap, this research has integrated the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh, Morris, Davis, & Davis (2003) that has been popularized in various Information Technology adoption research.

Four main variables adopted from UTAUT were examined in this study, namely Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC).

Performance Expectancy

Conceptual Definition: Performance expectancy construct is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance. For instance, when the user perceives that a technology will improve their efficiency, effectiveness, and productivity, they will be most likely to adopt it.

Operational Definition: In this study, performance expectancy was measured reflecting the KadazanDusun community in Sabah in adopting ICT towards cultural preservation. There is a wide range of ICT tools, encompassing both software and hardware, that can be utilized to safeguard and maintain cultural heritage. The

increasing popularity of smart devices, such as smartphones and tablets, equipped with high-speed internet has led to the widespread availability and accessibility of various platforms like Facebook, YouTube, Instagram, and others. These digital platforms might assist the KadazanDusun in efficiently learning, finding information, recording, disseminating, promoting, and preserving their cultural practices. This was supported by a study that posited that through digital transformation, smart culture contributes to the preservation, safeguarding, and promoting cultural heritage (McKenna, 2016). As a result, it could enhance the citizen's well-being through better cultural accessibility and inclusion (Fanea-Ivanovici & Pana, 2020).

Effort Expectancy

Conceptual Definition: The effort expectancy construct refers to the level of ease that is associated with using the system. When the user perceives a technology as easy to learn and user-friendly, they are highly likely to adopt it.

Operational Definition: The variable measured the extent to which the native community adopted information and communication technology (ICT) for the purposes of learning, promoting, sharing, and preserving their culture.

If the tools are easy to learn and use, even individuals with limited technological proficiency, such as the elderly, may be more likely to use them. For example, user-friendly digital platforms can facilitate greater participation from individuals in documenting oral histories, sharing cultural practices online, or participating in virtual cultural events. On the other hand, if the tools are perceived as intricate or challenging to utilize, there might be opposition, particularly from older generations, which could

impede the preservation endeavors. The results of a study by Guner & Acarturk (2020) suggested that the perception of usefulness and ease of use greatly influences attitudes and acceptance of ICT for both young and elderly adults. Consequently, it can be inferred that the elderly and younger adults both prioritize the usefulness and user-friendliness of ICT when considering its adoption. Besides, Estriegana et al. (2019) found that perceived ease of use positively impacted undergraduate students' perceived usefulness of online learning tools, while Yang and Xiangling (2019) demonstrated a similar positive influence on students' intentions to use machine translation in their learning processes. These studies suggest that ease of use generally encourages the adoption of technology across different groups. The question remains: does this established relationship between ease of use and technology adoption apply similarly to the KadazanDusun community in the context of cultural preservation? Could perceived ease of use of ICT tools similarly drive the community's engagement with technology for preserving their cultural heritage?

Social Influence

Conceptual Definition: Social influence construct is defined as the degree to which an individual perceives that important others believe he or she should use to new system.

Operational Definition: In a communal society such as the KadazanDusun, where there is a strong emphasis on respecting community leaders and relationships, the support and encouragement from these influential individuals can greatly inspire the use of ICT for the purpose of preserving culture.

Social influence is of paramount importance in the adoption of ICT for cultural preservation in a communal society such as the KadazanDusun, where strong social ties and reverence for elders and leaders prevail (Lajuni et al., 2022). If cultural leaders, esteemed elders, or influential members of the community endorse the utilization of technology for cultural preservation, it is probable that other individuals within the community will also adopt this approach. This collective endorsement has the potential to expedite the acceptance and utilization of ICT tools, establishing a standard within the community for the use of technology in cultural documentation and dissemination. Social influence can also drive initiatives such as community-wide digital archives or the utilization of social media to enhance cultural events promotion, thus bolstering cultural preservation endeavors. Hence in this study, social influence such as family, relatives, friends, community, government, and religion were included to study the influence on the adoption of ICT for cultural preservation.

Facilitating Conditions

Conceptual Definition: Facilitating conditions refer to the extent to which an individual believes that there is an organizational and technical infrastructure in place to support the use of the system (Vankatesh et al., 2003).

Operational Definition: In this context, facilitating conditions is described as to what extent the KadazanDusun community believes organizational and technical support is in place to preserve their culture. Facilitating conditions encompass factors such as internet accessibility, skill training, technical support, and government intervention that could enable the successful adoption of ICT for cultural preservation. In their study, Marto et al. (2019) discovered that the user's behavioral intention to use

Augmented Reality in Archaeological Sites is influenced by facilitating conditions. The facilitation proposed by Marto et al. (2019) encompasses essential knowledge, resources, technological compatibility, and provided support. In a separate study conducted by Wen et al. (2023), it was discovered that facilitating conditions play a significant role in the acceptance and utilization of augmented reality (AR) and virtual reality (VR) technologies in cultural heritage sites. In this study, financial, tools, time, skill, internet connectivity and opportunities of access were identified as the facilitating conditions which could influence the adoption of ICT for cultural preservation.

Moderating Variables – Age

This study has also considered age as a moderating variable that may influence the relationship between ICT adoption and its impact on cultural preservation. Age is defined as the number of years lived by an individual, which can exhibit the level of familiarity and comfort using modern technologies. It is hypothesized that the younger generations, who are being more technological savvy compared to the older generations, may find it easier to adopt ICT for cultural preservation. Hence, age could might strengthen or weaken the relationship between technology adoption and cultural preservation. Adoption is generally faster among individuals in the general public who exhibit characteristics such as being more inclined to take risks, less traditional in their beliefs, well-integrated into society, younger in age, higher in educational attainment, and more financially prosperous (Rogers, 2003).

Moderating Variable – Gender

Gender refers to the socially constructed roles, behaviors, and identities that societies consider appropriate for men, women, and other gender identities. In this study, gender is examined as a binary variable (male and female). It is hypothesized that gender moderates the relationship between all the factors of technology adoption (PE, EE, SI, and FC) and cultural preservation. This was supported by previous research which indicates that men and women exhibit different attitudes towards technology, with men perceived technology to be more useful and require less effort to use compared to women (Kamberidou, 2020). Marto et al. (2019) found that gender did not moderate performance expectancy and user's intention to use augmented reality on archaeological site. However, it moderate effort expectancy on user's intention to use the tools, where effect is weaker for male, and particularly for higher technology connoisseurs.

1.9.2 Cultural Preservation

The effects of globalization have impacted on the local and global community, from individual to community and to a broader society. It has transformed the development of local cultures within the communities. Many scholars debated on the impact of globalization could pose a threat to local culture while some on the other hand claimed it can promote cultural convergence and at the same time preserve the cultural heritage of a community.

The United Nations have emphasized on the importance of preserving the culture of the indigenous communities as they have been suffering from gradual threat and loss of lands and territories which led to the extinction of their culture (United Nations,

n.d.). According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), cultural heritage can be tangible, such as buildings and surroundings, or intangible, such as local customs and way of life. Cultural heritage, in its broadest sense, encompasses the entire eco-environment that depicts the activities and successes of humans in the past that cannot be replaced (Feilden & Jokileht, 1998). Furthermore, efforts to preserve cultural heritage should aim to conserve not only physical objects like buildings and their surroundings, but also intangible things like arts, languages, and customs (Indara Syahrul Mat Radzuan, 2014).

Following World War II, UNESCO supported a number of world heritage initiatives, which were classified into three distinct heritage lists. The lists are the Tangible Heritage List, the Natural Heritage List, and the most recent, the Intangible Cultural Heritage List (Smith, 2006). Most of the initiatives taken by the global community focused much on the material cultures like monuments, structures, historical sites and so on. The importance of Intangible Cultural Heritage (ICH) was outlined by UNESCO as cultural transmission and identity work takes place not solely depends on the material culture, but also relationship with the people.

In order to safeguard ICH, the heritage must be relevant and practiced within the cultured community. As such, UNESCO (2003) has proposed five broad domains of ICH for the purpose of manifestation,:

i. Oral traditions and expressions, including language as a vehicle of the intangible cultural heritage;

ii. Performing arts;

iii. Social practices, rituals and festive events;

iv. Knowledge and practices concerning nature and the universe;and

v. Traditional craftsmanship.

Cultural diversity and its preservation is one of the main assets of the human race. This aspect is very relevant for country like Malaysia that consist of multi-ethnic, multicultural, and multilingual society.

Culture consists of both material and non material culture, is the patterns of learned and shared behaviors and beliefs in which becoming a collective life for an individual to enable social mobility within its own community. Non-material culture is made up of thoughts or ideas and does not include any physical objects or artifacts. In contrast, the material culture consists of things created by human. Cultures as described in anthropology, is made of independent traditions.

In order to ensure the survival of one's culture, it has to be passed on from one generation to another. An individual can easy learn about their own culture when he or she socializes in the community in which culture is extensively practiced. Thus, the process of cultural transmission is seen as a natural process and it can happen unconsciously.

In order to preserve the tradition of culture, it must stand on two conditions: it has to be transmitted from one individual to another and to be widely distributed in space and time (Morin, 2016). To measure a successful transmission, a culture must be faithfully followed, or committed by an individual. The survival of culture takes into

account of both quantity and quality of transmission. The advancement of rapid technological inventions, it can improve the accessibility of individuals who are connected between generations and help to facilitate on the process of cultural transmission.

Hence, this study highlights the importance of cultural preservation for the KadazanDusun community and how the ICT adoption can be used for the function of cultural preservation.

1.9.2.1 Social Capital

In community development, the concept of social capital is essential for reinforcing communal bonds, promoting resilience, and enabling collaborative efforts (Nyamari, 2024). This concept of social capital was developed by Bordieu (1986), is strongly connected to different societal fields, which serve as arenas for the social praxis of actors. According to Bourdieu's framework, social capital is defined as the resources and advantages one obtains from their social networks. This social capital plays a role in various social domains, influencing individuals' actions, positions, and power within those fields.

Particularly in cultural preservation, social capital serves as a key mechanism for sustaining shared cultural knowledge, values, and practices by fostering interactions and exchanges across generations and diverse groups within a community. Cultural preservation involves protecting and maintaining the identity, customs, rituals, and values of a community, especially within indigenous or native communities, where it ensures the continuity of their way of life. It also facilitates the transmission of

ancestral knowledge and traditions to future generations. Social capital theory provides an insightful lens to understand the process of cultural preservation within community development. The theory highlights the critical role of social networks, relationships, and trust in supporting and facilitating the ongoing preservation of cultural heritage. By leveraging both bonding and bridging forms of social capital, communities can maintain cultural continuity while also adapting to new challenges and influences.

Putnam (2000) introduced a network-based approach to social capital, distinguishing between bonding and bridging networks. Bonding networks connect individuals who are similar in key aspects, while bridging networks link people who differ from one another (Putnam & Goss, 2002). These networks are essential in sustaining cultural traditions and practices within indigenous and native communities.

Bonding social capital within closely-knit groups are essential for passing down cultural knowledge and practices between generations (Martikke, 2023). Within indigenous communities, the elderly frequently referred to as the knowledge keeper of cultural wisdom, encompassing oral traditions, language, rituals, and artistic manifestations (Shrestha et al., 2023). The establishment of strong and close connections within familial and communal units is crucial for the transmission of cultural knowledge from elders to younger generations. For instance, the KadazanDusun community in Sabah, Malaysia, depends on strong familial bonds to transmit ancestral wisdom regarding traditional healing methods, oral traditions, and rituals that have shaped the community's cultural heritage for hundreds of years.

Communities become better at protecting their cultural heritage and making sure it survives through inheritance when they cultivate and maintain these close ties.

Bridging social capital refers to connections between individuals or groups who differ in terms of social identity, culture, or background. In the context of cultural preservation where the community's shared identity is vital, bridging social capital is crucial for integrating modern technological tools like Information and Communication Technology (ICT) into the preservation of culture. ICT can help connect different segments of the community, including those living in urban areas or diasporas, who may not have direct access to traditional cultural practices (Li, 2024). These technologies, such as digital archives, social media platforms, and online cultural events, allow for the sharing and dissemination of cultural knowledge beyond geographic boundaries (Charfeddine & Umlai, 2023).

Bridging social capital allows diverse groups within a community to participate in cultural preservation efforts, creating opportunities for collaboration and mutual exchange. For instance, the younger generation in a community may be more familiar with modern technology and can use this knowledge to document and share cultural practices online (Dzator et al., 2023). This creates a link between the older generation, who holds traditional knowledge, and the younger generation, who possess the technological skills to preserve and promote it (Zort, 2023). ICT also helps communities engage with a broader audience, including researchers, cultural enthusiasts, and other indigenous communities, thereby strengthening the global recognition and appreciation of their culture (Li, 2024).

At the macro level, another form of social capital is linking social capital, which involves relationships with institutions that hold the power to provide resources or influence decisions (Szreter & Woolcock, 2004), such as government agencies, NGOs, or international organizations (Healy, 2002). In order for the community's cultural preservation efforts to be successful, they must rely on both internal and external resources, such as finance, expertise, and legal safeguards for their cultural practices and knowledge (Rohaini et al., 2020). Linking social capital enables communities to connect with these institutions and gather the resources required to support their preservation efforts. Government agencies and non-governmental organizations (NGOs) have the potential to play a vital role in providing support for cultural preservation initiatives (Pratala et al., 2024). These institutions assist the community in adopting ICT for the preservation of cultural heritage by offering financial assistance, technical training, and infrastructure. Linking social capital also involves communities having a say in policy-making processes that impact their cultural rights and ability to use technology. External support from a top-down approach, especially through government intervention, is frequently essential in overcoming obstacles like the digital divide, which can impede the use of ICT for cultural preservation in economically disadvantaged communities.

The UTAUT framework continues to be the primary tool for comprehending the adoption of ICT within the KadazanDusun community. Social capital plays a crucial role in explaining how relationships and networks offer essential support, influence, resources, and foster trust, ultimately leading to the intention to utilize technology for cultural preservation.

Performance expectancy refers to the belief that using ICT will effectively facilitate individuals in attaining desired outcomes, such as the preservation of cultural heritage. Social capital, particularly in the form of bridging and linking social capital, can facilitate the connection between individuals and communities with institutions and experts who can effectively showcase the advantages of adopting ICT for cultural preservation. Sharing success stories and best practices through social networks can increase the perceived value of technology in preserving cultural practices, rituals, and knowledge.

Effort expectancy involves the perceived ease of using technology. Bonding social capital, enhances the exchange of knowledge within tightly-knit community networks such as the KadazanDusun community. Older or less tech-savvy members of the community may feel more inclined to embrace ICT tools when they receive guidance from trusted family members, peers, or community leaders. This can bridge the gap between those who have access to digital technology and those who do not, thereby ensuring that everyone has the opportunity to benefit from these tools and resources.

In UTAUT, social influence refers to the degree to which people's social networks influence their use of technology. This is directly associated with both bonding and bridging social capital. The prevailing social norms frequently have an impact on a community's acceptance or rejection of technology. Key figures in the community, custodians of culture, or external organizations (through the use of social connections) can promote the use of ICT by emphasizing its significance in safeguarding cultural heritage.

Facilitating conditions refer to the degree to which an individual believes that there is sufficient infrastructure and support to use ICT effectively. Establishing connections and relationships with government bodies, NGOs, and technology providers is crucial in this field. These external sources of support can offer the essential infrastructure, training, and legal frameworks required to successfully adopt and implement ICT for the purpose of cultural preservation.

Social capital theory underscores the significance of social networks, relationships, and trust in maintaining cultural heritage by emphasizing the role of bonding, bridging, and linking social capital. ICT plays a significant role as a resource tool to improve social capital and support cultural preservation in today's world. By integrating social capital with UTAUT, the researcher can better understand the community-level dynamics that influence ICT adoption, especially in contexts like cultural preservation where communal identity, heritage, and collective efforts are paramount.

1.10 Research Limitation

This research has a number of limitations that need to be acknowledged. First, the findings of this research were derived from a mixed method approach. The quantitative findings in identifying the factors influencing the adoption of ICT in cultural preservation were limited to the KadazanDusun community as the respondents. Therefore, the generalization of the findings is limited only to the sample assessed which includes the KadazanDusun in Penampang and Ranau, thus the inability to generalize for all Sabah groups. Despite the fact that issues concerning native communities in Malaysia are basically similar, it is still challenging to apply these findings to other developing countries without conducting additional research.

As for the qualitative approach, the findings were derived based on twelve key informants who had experience in adopting ICT for cultural preservation. Hence, the research makes no claim that the findings from this research could be extrapolated to accurately represent the entire KadazanDusun community in Sabah. This is because generalizability of findings is not the aim of most qualitative research since typically it aims to study specific issues in a specific context (Merriam, 2009; Leung, 2015), including this research.In this research, the qualitative findings were able to explore the impacts of ICT adoption on the cultural preservation based on the inputs from the twelve key informants.

Second, the researchers also faced challenges in identifying respondents based on the ethnic groups, as some of the Sabahans are stateless, and refuse to reveal their identity. The researchers have to take strategic steps to identify the respondents' identity when conducting the survey.

The theoretical and conceptual framework which adopted from the UTAUT model only covers four factors of variables explicitly. Having to state that there are possible limitations of the variables from other competing and relevant ICT adoption models excluded from the scope of the study.

Besides, this research also faced challenges in determining the accuracy of the data collected based on the response of the respondents. Respondents may not be telling the whole truth or may offer inaccurate information due to impatience while answering the questionnaires, thus suggesting that some of the data collected might not be reliable.

1.11 Chapter Organization

In general, this chapter begins with the background of the study. The currents development issues faced by the KadazanDusun community were highlighted to be addressed in determining the empowerment of KadazanDusun in participating in the development process. The research objectives were established in answering the research questions followed by the significance of this study. Furthermore, this chapter also presented the terminology definition that will be used in this thesis.

REFERENCES

Abduramanova, D., & Rasulmetova, S. (2020). Understanding the relationship of language culture and society. *Academic research in educational sciences*, (3), 1262-1265.

Abdullah, S., & Elham, S. K. (2019). Culture and identity in selected new media artworks in Malaysia 1993-2007. *Journal of Visual Arts and Design*, *11*(1), 19-34.

Abram, N. K., Lim, H. Y., Ng, C. K. C., Yorath, S., Razi, M. H. M., Ong, C. G. S., Chen, K. O., & Wilson, K. B. (2022). The socio-economic and cultural impacts of the Pan Borneo Highway on Indigenous and local communities in Sabah, Malaysian Borneo. *PLoS ONE*, *17*(6), e0269890. https://doi.org/10.1371/journal.pone.0269890

Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of it. *Indian Journal of Medical Specialties*, *4(*2), 330-333. DOI: 10.7713/ijms.2013.0032

Adam, A. A., Othman, N., & Halim, A. A. (2021). Indigenous knowledge transfer among Dusuns and Bajaus in Kota Belud, Sabah, Malaysia: Approaches and challenges. *International Journal of Academic Research in Business and Social Sciences*, *11*(11), 1722–1734.

Adas, M. 2015. *Machines as the measure of men: Science, technology and ideologies of western dominance*. Ithaca, NY: Cornell University Press.

Addison, L. (2007). The vanishing virtual: Safeguarding heritage's endangered digital record. In: Kalay, Yehuda, Kvan, Thomas (Eds.), *New Heritage: New Media and Cultural Heritage*, Chapter: Part 1, Section 2. Routledge, Janice Affleck, pp. 27–39. Publisher

Adkins, D., & Sandy, H. M. (2020). Information behavior and ICT use of Latina immigrants to the U.S. Midwest. *Information Processing & Management*, *57*(3), 102072. https://doi.org/10.1016/j.ipm.2019.102072

Affendi, R. (2024). Interdisciplinary exploration of AI and social science for sustainable development in Sabah, Malaysia. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4806174

Ahlborg, H. (2017). Towards a conceptualization of power in energy transitions. *Environmental Innovation and Societal Transitions*, *25*, 122–141. https://doi.org/10.1016/j.eist.2017.01.004

Ahmad, N. A., Ayub, A. F. M., & Khambari, M. N. (2019). Gender digital divide: Digital skills among Malaysian secondary school. *International Journal of Academic Research in Progressive Education and Development*, *8*(4), 668-687.

Albert, D.D.A. 2016. A review on the role of women in the traditional religion of the Dusun Lotud in Tuaran, Sabah. In *Proceedings of 3rd KANITA Postgraduate International Conference on Gender Studies*, 59–68. Pulau Pinang, Malaysia: Pusat Penyelidikan Wanita dan Gender (KANITA).

Ali, D. A. R., & Yaqin, L. N. (2024). Cultural practices and lifestyle of the Momogun Rungus tribe of the Bavanggazo Longhouse community in Sabah, Malaysia: Ethnographic Notes. *International Journal of Linguistics and Indigenous Culture, 2*(2), 1-17.

Ali, M. M. H. (2010). The maintenance of Malaysia's minority languages. Retrieved on June 28, 2017 from irep.iium.edu.my/9829/4/ICMM2010_p27.pdf

Alivizatou-Barakou, M., Kitsikidis, A., Tsalakanidou, F., Dimitropoulos, K., Giannis, C., Nikolopoulos, S., ... & Grammalidis, N. (2019). Intangible cultural heritage and new technologies: Challenges and opportunities for cultural preservation and development. In *Mixed reality and gamification for cultural heritage* (pp. 129-158). Springer, Cham.

Aljohani, N. M., & Choy, E. A. (2021). Impact of heritage tourism on local community in Sabah, Malaysia. *e-Bangi*, *18*(5). https://ejournals.ukm.my/ebangi/article/download/49490/12147

Al-Khaza'leh, B. (2023). Status of Rungus language as an indigenous language spoken by Rungus ethnic group in Eastern Malaysia. *Journal of Language Teaching and Research, 14*(3), 656-664. https://doi.org/10.17507/jltr.1403.13

Alpeus, R., & Hussain, S. A. S. (2018). The application of theory of play in studying Tangon (folklore) of Kadazandusun community's sustainability. https://www.researchgate.net/publication/325641942

Alrassi, J., Katsufrakis, P. J., & Chandran, L. (2020). Technology can augment, but not replace, critical human skills needed for patient care. *Academic Medicine*, *96*(1), 37-43.

Amat, A., & Taim, M. A. (2020). *Fungsi ajung dalam masyarakat Iranun daerah Kota Belud, Sabah*. *3*(1), 79–99. http://eprints.ums.edu.my/26749/

Annan, K. (2015). *Digital development: Report of the secretary-general*. Retrieved from http://unctad.org/meetings/en/SessionalDocuments/ecn162015d2_en.pdf

Annuar, S. N. S., & Dawayan, C. R. (2022). Kaamatan goes virtual: Utilizing social media in promoting tourism event. In *Digital Transformation and Innovation in Tourism Events* (pp. 60-71). Routledge.

Appell, G.N (1965), *Reviews on William Thomas Rhys: The Dusun a North Borneo Society*, New York: Holt Rinehart and Winston, h. 132-136.

Apriliyanti, I. D., Kusumasari, B., Pramusinto, A., & Setianto, W. A. (2020). *Digital divide in ASEAN member states: Analyzing the critical factors for successful*

e-government programs. Online Information Review, ahead-of-print(ahead-of-print). doi:10.1108/oir-05-2020-0158

Apulu, I., & Latham, A. (2010, March). Benefits of information and communication technology in small and medium sized enterprises: A case study of a Nigerian SME. In *Proceedings of the UK Academy for Information Systems Conference*.

Arasli, H., Abdullahi, M., & Gunay, T. (2021). Social media as a destination marketing tool for a sustainable heritage festival in Nigeria: A moderated mediation study. *Sustainability, 13*(11), 6191.

Ashraf, M. M., Grunfeld, H., & Quazi, A. (2015). Impact of ICT usage on indigenous peoples' quality of life: Evidence from an Asian developing country. *Australasian Journal of Information Systems, 19*.

Ashrafi, R. and Murtaza M. (2008). Use and impact of ICT on SMEs in Oman. *The Electronic Journal of Information Systems Evaluation*, 11, 3, 125–138.

Aslom, D. E. M. (2019). Changes In Kadazan Dusun marriage customs: A case study at Kampung Maang, Penampang, Sabah. *Borneo Research Bulletin, 50*, 66+.

Ationg, R., Totu, A., Ling, J. W. K., Tibok, R. P., & Gansau, J. (2020). Preserving native culture through traditional costumes and textiles: The case of the Rungus Community in Sabah, Malaysia. *International Journal of Advanced Science and Technology*, *29*, 3994-3998.

Babran, S. (2008). Media, globalization of culture, and identity crisis in developing countries. *Intercultural Communication Studies*, *17*(2), 212-221.

Bala, P. (2010). Social shaping of technologies for community development: Redeployment of information communication technologies among the Kelabit in Bario of the Kelabit highlands. In *Information communication technologies for human services education and delivery: Concepts and cases* (pp. 201-214). IGI Global.

Ball, C., Huang, K. T., Francis, J., Kadylak, T., & Cotten, S. R. (2020). A call for computer recess: The impact of computer activities on predominantly minority students' technology and application self-efficacy. *American Behavioral Scientist*, *64*(7), 883–899. https://doi.org/10.1177/0002764220919142

Barlocco, F. (2010). The village as a 'community of practice'Constitution of village belonging through leisure sociality. *Bijdragen tot de taal-, land-en volkenkunde/Journal of the Humanities and Social Sciences of Southeast Asia*, *166*(4), 404-425.

Barlocco, F. (2013). An inconvenient birth. *Indonesia and the Malay World*, *41*(119), 116–141. https://doi.org/10.1080/13639811.2013.766010

Baumann, Z. (1998). Globalization: the Human Consequences. New York: Columbia University Press.

Beaumont, S. (2020). Closing Asia's digital divide should be a post-COVID priority. *Nikkei Asian Review*.

Benson, J., & Hocevar, D. (1985). The impact of item phrasing on the validity of attitudes scales for elementary school children. *Journal of Educational Measurement, 22*(3), 231-240. https://www.jstor.org/stable/1435036

Bentley, C. M., Nemer, D., & Vannini, S. (2017). "When words become unclear": unmasking ICT through visual methodologies in participatory ICT4D. *AI & Society, 34*(3), 477–493. https://doi.org/10.1007/s00146-017-0762-z

Beoku-Betts, J.A. (1995). We got our way of cooking things: Women, food, and preservation of cultural identity among the Gullah. Gender Soc, 9, 535–555.

Bernama. (2020). Budget 2021: RM9.4 billion to close digital divide – MCMC. November 09, 2020. Retrieved from https://www.bernama.com/en/general/news.php?id=1898950

Bernama. (2021). *National Culture Policy upholds efforts to develop arts, culture and heritage – PM*. https://www.bernama.com/en/general/news.php?id=2017116

Bhardwaj P. (2019). Types of sampling in research. *Journal of the Practice of Cardiovascular Sciences, 5*(3), 157. DOI: 10.4103/jpcs.jpcs_62_19

Bidder, C., Kibat, S. A., & Saien, S. (2014). Mount Kinabalu: The sacred emblem of the first UNESCO World Heritage Site on Borneo. Tourism, Leisure and Global Change, p.TOC-1.

Breakwell, G. M. (1993). Integrating paradigms, methodological implications. In G. M. Breakwell & D. V. Canter (Eds.), *Empirical approaches to social representations* (pp. 180–201). Clarendon Press/Oxford University Press.

Bourdieu, Pierre: The forms of capital. In: John G. Richardson (ed.): *Handbook of Theory and Research for the Sociology of Education*. New York: Greenwood Press 1986, s. 241-258.

Boyce, C. & Neale, P. (2006). Conducting in-depth interviews: A guide for designing and conducting in-depth interviews for evaluation input. *Pathfinder International, Vol. 2*, pp 1-16.

Budi Anto, M. T. (2013). Sistem nilai etnik atau nilai budaya: value laden versus fact laden. In: Saidatul Nornis Mahali, ed., *Nilai dan norma masyarakat di Sabah*. Kota Kinabali: University Malaysia Sabah, pp. 1-21.

Cai, Yunci. (2018). Between tradition and modernity: The ritual politics of indigenous cultural heritage in urbanizing Sabah, East Malaysia. In *Routledge Handbook of Urbanization in Southeast Asia eBooks*. https://doi.org/10.4324/9781315562889

Calvet-mir, L., González-puente, M., Calvet-mir, L., Riu-bosoms, C., González-puente, M., Ruiz- , I., Reyes-garcía, V., & Molina, J. L. (2016). The

transmission of home garden knowledge: Safeguarding biocultural diversity and enhancing social-ecological resilience. *Society & Natural Resources, 29*(5), 556–571. https://doi.org/10.1080/08941920.2015.1094711

Campbell, D. T. (1965). Variation and selective retention in socio-cultural evolution. *Social change in developing area*.

Campos, D. G., & Scherer, R. (2023). Digital gender gaps in Students' knowledge, attitudes and skills: An integrative data analysis across 32 Countries. *Education and Information Technologies*, *29*(1), 655–693. https://doi.org/10.1007/s10639-023-12272-9

Castells, M. (2001). The Internet Galaxy: Reflections on the Internet, Business and Society. New York: Oxford University Press.

Cavalli-Sforza, L. L., & Feldman, M. W. (1981). Cultural transmission and evolution: A quantitative approach. Princeton University Press.

Charfeddine, L., & Umlai, M. (2023). ICT sector, digitization and environmental sustainability: A systematic review of the literature from 2000 to 2022. *Renewable and Sustainable Energy Reviews*, *184*, 113482.

Chesley, N., & Johnson, B. E. (2014). Information and Communication Technology use and social connectedness over the life course. *Sociology Compass*, *8*(6), 589–602. https://doi.org/10.1111/soc4.12170

Cherryholmes, C. H. (1992). Notes on pragmatism and scientific realism. *Educational researcher*, 13-17.

Che Su, M., & Norsiah, A. H. (2008). *Pemerkasaan wanita dalam pembangunan melalui ict: penelitian dari sudut aksesibiliti dan literasi*. Kertas Seminar dibentangkan dalam The 6th International Malaysian Studies Conference (Msc6) Engaging Malaysian Modernity 50 years and Beyond.

Chipidza, W.; Leidner, D. (2019). *A review of the ICT-enabled development literature: Towards a power parity theory of ICT4D. The Journal of Strategic Information Systems, (), S0963868717302391–*. doi:10.1016/j.jsis.2019.01.002

Choudrie, J., Zamani, E., & Obuekwe, C. (2021). Bridging the digital divide in ethnic minority older adults: An organisational qualitative study. *Information Systems Frontiers*, *24*(4), 1355–1375. https://doi.org/10.1007/s10796-021-10126-8

Chong, L.S. (2015) Why the ancient musical essence is still retained in Dusun Tindal's instrumenatl music within its modern community? Paper presented at 3rd Global conference on Business and Social Science

Christine, H., Patricia, P., & Clement, L. S. (2018). Getting connected: Indigeneity, Information, and Communications Technology use and emerging media practices in Sarawak. *Verge: Studies in Global Asias*, *4*(2), 163-193. Retrieved February 4, 2021, from https://www.jstor.org/stable/10.5749/vergstudglobasia.4.2.0163

Chung, Y.C. (2010). *Edible insects and entomophagy in Borneo*. Food and Agriculture Organization of the United Nations. Bangkok.

Cimbaljević, M., Stankov, U., Demirović, D., & Pavluković, V. (2019). Nice and smart: creating a smarter festival–the study of EXIT (Novi Sad, Serbia). *Asia Pacific Journal of Tourism Research*, *26*(4), 415-427.

Creanza, N., Kolodny, O., & Feldman, M. W. (2017). Cultural evolutionary theory: How culture evolves and why it matters. *Proceedings of the National Academy of Sciences*, *114*(30), 7782-7789.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2006). Choosing a mix-methods design. Sage Publications, 58-89.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Creswell, J. W. & Zhang, W. (2009). The application of mixed methods designs to trauma research. *Journal of Traumatic Stress, 22*(6), 612-621.

Cosmas, G., Sombuling, A., Melai, B. A. A., & Poninting, A. (2019). Does the possession of a KadazanDusun traditional costume and the capability to play a traditional musical instrument differentiate an individual's identity orientation?. *Athens Journal of Social Sciences* Vol 6, Issue 3.

Daniali, S. M., Barykin, S. E., Zendehdel, M., Kalinina, O. V., Kulibanova, V. V., Teor, T. R., ... & Senjyu, T. (2022). Exploring UTAUT Model in Mobile 4.5G service: Moderating social–economic effects of gender and awareness. *Social Sciences*, *11*(5), 187.

Daniel, E. V. (1991). Is there a Counterpoint to Culture? Amsterdam: Centre for Asian Studies, The Wertheim Lecture.

Datu Sarijul Datu (2017). Keprcayaan masyarakat Kadazan Dusun dalam merayakan Pesta Kaamatan: Kajian kes di Penampang, Sabah, Unpublished Final Year Project, Faculty of Creative Technology and Heritage, Universiti Malaysia Kelantan

Daulay, Z. (2022). Legal politics of protection and ownership of communal intellectual property: A study of traditional medicine knowledge. *Journal Equity of Law and Governance*, *2*(2), 123-131.

Dawkins, R. (1976). The Selfish Gene New York. *Oxford Univ. Press*, *1*, 976.

Dawood, S. R. S., Ghazali, S., & Samat, N. (2019). Digital divide and poverty eradication in the rural region of the northern Peninsular Malaysia. *The Indonesian Journal of Geography*, *51*(2), 67-77.

Debbra, N. T. A., Bujang, I., & Hassan, H. (2018). Global digital divide: reassessing the evidence behind ICT and its contribution to trade among the ICT haves and have-nots in developing economies. *Journal of Business and Retail Management Research, 12*(3).

Del Casino, V. J., Jr & Thien, D . (2020). Symbolic interactionism. *International Encyclopedia of Human Geography. 177–181*. doi:10.1016/b978-0-08-102295-5.10716-4

Department of Development Orang Asli. (2011). Pelan Strategik Jabatan Kemajuan Orang Asli 2011–2015, 1st ed. Kuala Lumpur, Malaysia: Department of Development Orang Asli, Malaysia, p. 138.

Dimitropoulos, K., Tsalakanidou, F., Nikolopoulos, S., Kompatsiaris, I., Grammalidis, N., & Manitsaris, S. et al. (2018). A multimodal approach for the safeguarding and transmission of intangible cultural heritage: The case of i-Treasures. *IEEE Intelligent Systems, 33*(6), 3-16. doi: 10.1109/mis.2018.111144858

Ding, M. (2017). Augmented reality in museums. *Museums & augmented reality–A collection of essays from the arts management and technology laboratory,* 1-15. https://amt-lab.org/s/Augmented-Reality-in-Museums.pdf

Dipima, B., & Mohd Syamril, A. C. K. (2019). Blending folklore with technology as language teaching and learning tools: role and impact. *Journal of Communication in Scientific Inquiry, 1* (1) p.43-48.

Doksil M (May 30, 2015) Harvest pageant to showcase five new traditional costume. Retrieved from https://bit.ly/2xH0MZs.

Doksil M (June 05, 2016) Kaamatan best platform to showcase cultural diversity of Sabah's traditional costumes. Retrieved from https://bit.ly/2OHIfUu.

DOSM. (2010). Total population by ethnic group, administrative district and state, Malaysia, 2010. Kuala Lumpur: Department of Statistics Malaysia.

Durkheim, E. (1954): *The Elementary Forms of the Religious Life*, New York: Free Press

Durkheim, E. (1962). *Socialism*. Charlotte Sattler (trans.). New York : Collier Books.

Dutta, A., & Mukhopadhyay, P. (2022). *Preservation and management of aboriginal cultural heritage resources in the information society: An outline of the solution through emerging uses of ICTs.* https://ir.inflibnet.ac.in/handle/1944/2383

Dutta, U. (2019). Digital preservation of indigenous culture and narratives from the Global South: In Search of an Approach. *Humanities, 8,* 68. https://doi.org/10.3390/h8020068

Dwivedi, Y. K., Rana, N. P., Chen, H., & Williams, M. D. (2011). A meta-analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT).

In *Governance and Sustainability in Information Systems. Managing the Transfer and Diffusion of IT: IFIP WG 8.6 International Working Conference, Hamburg, Germany, September 22-24, 2011. Proceedings* (pp. 155-170). Springer Berlin Heidelberg.

Dzator, J., Acheampong, A. O., Appiah-Otoo, I., & Dzator, M. (2023). Leveraging digital technology for development: Does ICT contribute to poverty reduction?. *Telecommunications Policy*, *47*(4), 102524.

Esmaeili, H., P.C. Woods, and H. Thwaites (2015). Virtual preservation of contemporary architectural heritage in developing countries in absence of protection: Digital reconstrction, recording, and archiving before complete disappearance. Proceedings of the 2015 11th International Conference on Signal-Image Technology & Internet-Based Systems *IEEE Computer Society*. p. 796-803.

Estriegana, R., Medina-Merodio, J. A., & Barchino, R. (2019). Student acceptance of virtual laboratory and practical work: An extension of the technology acceptance model. *Computers & Education*, *135*, 1–14.

Fadzil, M., Latif, L. A., & Azzman, T. A. M. T. M. (2015). MOOCs in Malaysia: A preliminary case study. *MOOCs in Malaysia: a preliminary case study*.

Fam, KS; Syed, A., Sharifah, N.; Tan, K. L; Lai, F. H.; Ingko, I. A. (2020). *Touring destination and intention to consume indigenous food. British Food Journal, 122(6), 1883–1896.* doi:10.1108/bfj-08-2019-0635

Fanea-Ivanovici, M., & Pană, M. C. (2020). From culture to smart culture. How digital transformations enhance citizens' well-being through better cultural accessibility and inclusion. *IEEE Access*, *8*, 37988-38000.

Fang, M.L.; Canham, S.L.; Battersby, L.; Sixsmith, J.; Wada, M.; Sixsmith, A. (2019). Exploring privilege in the digital divide: Im-plications for theory, policy, and practice. *Gerontologist*, 59, e1–e15.

Fang, Y. X., Gill, S. S., Kunasekaran, P., Rosnon, M. R., Talib, A. T., & Abd Aziz, A. (2022). Digital divide: An inquiry on the native communities of Sabah. *Societies*, *12*(6), 148.

Farhat, A. A. (2017). E-Governance and its potential benefits to improve the efficiency of land management in Lebanon and Belarus. *Труды БГТУ. Серия 5: Экономика и управление*, (1 (196)), 262-270.

Filippi, M. K., McCloskey, C., Williams, C., Bull, J. W., Choi, W. S., Greiner, K. A., & Daley, C. M. (2013). Perceptions, barriers, and suggestions for creation of a tobacco and health website among American Indian/Alaska Native college students. *Journal of community health*, *38*(3), 486-491.

Franzese, A. & Seigler, C. (2020). Symbolic interactionism. In: Zeigler-Hill, V., Shackelford, T.K. (eds) *Encyclopedia of Personality and Individual*

Differences. Springer, Cham. https://doi.org/10.1007/978-3-319-24612-3_2125

Fuchs, C. (2007). *Internet and society: Social theory in the information age*. Routledge.

Fusch, P. I., & Ness, L. R. (2015). Are we there yet? Data saturation in qualitative research. *The Qualitative Report, 20*(9), 1408–1416. https://doi.org/1, 1408-1416

Gaved, Mark B., and Paul Mulholland. 2010. Networking communities from the bottom up: Grassroots approaches to overcoming the digital divide. *AI & Society* 25: 345–57.

Geertz, C. (1973). The Interpretation of Cultures. New York; Basic Books.

George, D. & Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.). Boston: Allyn & Bacon.

Ghobadi, S., & Ghobadi, Z. (2015). How access gaps interact and shape digital divide: a cognitive investigation. *Behaviour & Information Technology, 34* (4)(October), 330–340. doi:10.1080/0144929X.2013.833650

Goulding, A., Campbell-Meier, J., & Sylvester, A. (2020). Indigenous cultural sustainability in a digital world: Two case studies from Aotearoa New Zealand. In *Lecture notes in computer science* (pp. 66–75). https://doi.org/10.1007/978-3-030-43687-2_5

Grace, J., Kenny, C., & Qiang, C. Z. W. (2004). Information and communication technologies and broad-based development: Partial review of the evidence. *DC: World Bank Publications.*

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*(3), 255–274. https://doi.org/10.3102/01623737011003255

Greene, J. C. (2008). Is mixed methods social inquiry a distinctive methodology? *Journal of Mixed Methods Research, 2*(1), 7–22.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturatoin and variability. *Field Methods, 18*(1), 59–82.

Guner, H., & Acarturk, C. (2020). The use and acceptance of ICT by senior citizens: A comparison of Technology Acceptance Model (TAM) for elderly and young adults. *Universal Access in the Information Society*, *19*(2), 311-330.

Hahn, O. (2019). Dimensions and dilemmas of digitalisation: Challenges of the fourthe industrial revolution. *SEARCH Journal of Media and Communication Research.* Special Issue: The 6th International SEARCH Conference 2019. 1-9.

Halina Sendera Mohd. Yakin and Ooi, Yasmin Beng Houi and Farhana Abdul Fatah and Ramlah George @ Mohd. Rosli and Suraya Sintang and Siti Aidah Lokin. (2022). Traditional food among the Kadazan-dusun of East Malaysia: Cultural identity preservation, commercialization and nutrient information. *Science International -Lahore*, 34. pp. 427-433. ISSN 1013-5316

Hamdan, J., Ationg, R., Esa, M., Othman, I., & Mokhtar, S. (2023). Political and administration elements within the 'Magahau' of Momogun Rungus ethnic in Sabah, Malaysia. *International Journal of Law Government and Communication, 8*(31), 19-30. https://doi.org/10.35631/ijlgc.831002Inggul

Hamidun, B. U. (1992). Masyarakat Kadazan/Dusun di Daerah Ranau: Kajian identiti dan interaksi antara agama. Latihan Ilmiah. Universiti Malaya. (Unpublished).

Haris, A., Nawan, N. A., Mei, C. A. L., Sani, S. A., & Najmuddin, S. U. F. S. (2023). Medicinal plant applications as traditional and complementary medicine by Sabah ethnicities and the regulations and economic view in Malaysia's healthcare industry: A mini review. *Pharmacognosy Reviews*, *17*(33), 1-10.

Harris, U. S. (2005). ICT for social and cultural capital in Pacific Island Communities. In *Encyclopedia of Developing Regional Communities with Information and Communication Technology* (pp. 377-381). IGI Global.

Harris, C. & Harris, R., (2011). Information and communication technologies for cultural transmission among indigenous peoples. *The Electronic Journal of Information Systems in Developing Countries,* 45(1), pp.1-19. https://doi.org/10.1002/j.1681-4835.2011.tb00318.x

Hashim, R., Idris, K. S., Ustadi, Y. A., & Baharud-Din, Z. (2011). *Digital inclusion among the indigenous people (orang asli Semai) of Perak, Malaysia*. https://doi.org/10.1109/iccaie.2011.6162135

Hassan, M. A. (2008). Inaugural lecture series: Memanfaatkan teknologi maklumat dan komunikasi untuk semua. Serdang : Universiti Putra Malaysia.

Hayes, A. F., & Matthes, J. (2009). Computational procedures for probing interactions in OLS and logistic regression: SPSS and SAS implementations. Behavior Research Methods, 41, 924–936.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis (2nd ed.)*. Guilford Publications.

Herbert, N., Springer, M., Pratik, P., & Lin, Z. (2022). Why embedding indigenous cultural awareness in ICT curriculum is an imperative. In *Proceedings of the 24th Australasian Computing Education Conference* (pp. 191-200).

Hidayanto, S., & Sarwono, B. K. (2021, May). Can technology replace human affection?. In *Asia-Pacific Research in Social Sciences and Humanities Universitas Indonesia Conference (APRISH 2019)* (pp. 234-240). Atlantis Press.

Hofstede, G. & Bond, M.H. (1988). The Confucius connection: From cultural roots to economic growth. *Organizational Dynamics, 16*(4): 5–21. https://doi.org/10.1016/0090-2616(88)90009-5

Hosagrahar, J., Soule, J., Girard, L. F., & Potts, A. (2016). Cultural heritage, the UN sustainable development goals, and the new urban agenda. *BDC. Bollettino Del Centro Calza Bini*, *16*(1), 37-54.

Hosagrahar, J. 2017. Culture: at heart of SDGs. In *The UNESCO Courier* (pp12). April – June 2017.

Huang, F., Teo, T., & Zhao, X. (2023). Examining factors influencing Chinese ethnic minority English teachers' technology adoption: an extension of the UTAUT model. *Computer Assisted Language Learning*, 1–23. https://doi.org/10.1080/09588221.2023.2239304

Huang, Y. C., & Chen, Y. J. (2019). Digital image design research of popular culture exhibition. In *2019 IEEE 4th International Conference on Signal and Image Processing (ICSIP)* (pp. 827-831). IEEE.

Ibrahim, N., & Azmi, K. A. (2013, October). Preserving Malay architectural heritage through virtual reconstruction. In *2013 Digital Heritage International Congress (DigitalHeritage)* (Vol. 1, pp. 739-742). IEEE.

Ibrahim, N., Azmi, K. A., Salleh, F. H. M., & Yussof, S. (2009). Cultural heritage preservation: 3D modeling of traditional Malay House using hidden surface removal approach. In *Proceedings of the International Conference on Software Engineering and Computer Systems*. Academic.

Ioannidis, Y., Toli, E., El Raheb, K., & Boile, M. (2014). Using ICT in cultural heritage, bless or mess? Stakeholders' and practitioners' view through the eCultValue project. In *Digital Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection: 5th International Conference, EuroMed 2014, Limassol, Cyprus, November 3-8, 2014. Proceedings 5* (pp. 811-818). Springer International Publishing.

ITU (2021). Retrieved from https://www.itu.int/en/mediacentre/backgrounders/Pages/icts-to-achieve-the-united-nations-sustainable-development-goals.aspx

Ivanescu C (2013) At home in my body: Sartorial practices of young Pakistani women in the Netherlands. *Interraccoes 23*: 30-55.

Izani, M., Bridges, A., Razak, A., Calder, B., & Grant, M. (2010). Digital preservation of a famosa fortress in Malaysia. In *Proceedings of the second workshop on eHeritage and digital art preservation* (pp. 7-12).

Jabbar, E. A., & Jusof, M. J. (2014). *Virtual heritage interpretation through animated panoramic illustration of Kota Kuala Kedah*. https://doi.org/10.1109/vsmm.2014.7136645

Jackson, S., & Wong, M. S. (2017). A cultural theory analysis of e-government: Insights from a local government council in Malaysia. *Information Systems Frontiers, 19*(6), 1391-1405.

Jeannotte, M. S. (2015). *Cultural mapping in Ontario: The big picture. In Cultural Mapping as Cultural Inquiry* (pp. 99-116). Routledge.

Jiang, C., Zhao, W., Sun, X., Zhang, K., Zheng, R., & Qu, W. (2016). The effects of the self and social identity on the intention to microblog: An extension of the theory of planned behaviour. *Computers in Human Behavior, 64*, 754–759.

Jokilehto, J. (2006). Preservation theory unfolding. *Future anterior*, *3*(1), 1-9.

Jol, K., Ambotang, A. S., & Kariming, N. F. A. (2020). Mobile learning adoption: A perspective from a Form Six students in Sabah, Malaysia. *Malaysian Journal of Social Sciences and Humanities (MJSSH), 5*(12), 314-332.

Junidih, P. V. (2015). Persepsi dan penerimaan terhadap makanan tradisional kaum Kadazandusun di daerah Tambunan, Sabah. Tesis Sarjana Muda. Universiti Malaysia Sabah.

Intahchomphoo, Channarong (2018). Indigenous peoples, social media, and the digital divide: A systematic literature review. *American Indian Culture and Research Journal, 42(4), 85–111.* doi:10.17953/aicrj.42.4.intahchomphoo

Irene Benggon-Charuruks, J. P. (1993). Cultures, customs, and traditions of Sabah Malaysia An introduction. Sabah Tourism Promotion Corporation.

Ishak, M. S., & Hassan, M. A. (2007). *Keengganan memiliki computer dan Internet di rumah: Satu persoalan jurang digital dalam kalangan masyarakat Malaysia.* Kertas seminar International Conference on Media and Communication Sekolah Pengajian Media & Komunikasi, Fakulti Sains Sosial & Kemanusiaan, Universiti Kebangsaan Malaysia.

Järvelä, M. (2023). Dimensions of cultural sustainability—Local adaptation, adaptive capacity and social resilience. *Frontiers in Political Science*, *5*, 1285602.

Joa, C. Y., & Magsamen-Conrad, K. (2021). Social influence and UTAUT in predicting digital immigrants' technology use. *Behaviour and Information Technology*, *41*(8), 1620–1638. https://doi.org/10.1080/0144929x.2021.1892192

Juhola, S. K., Käyhkö, J., Heikkinen, M., Neset, T.-S., and Tuhkanen, H. (2022). Governance and everyday adaptations? Examining the disconnect between planned and autonomous adaptation through justice outcomes. *Ecol. Soc.* 27. doi: 10.5751/ES-13664-270441

Juanis, B., Saleh, Y., Ghazali, M. K. A., Mahat, H., Hashim, M., Nayan, N., ... & Kurnia, R. (2022). Knowledge, attitudes and practices of youths towards the intangible cultural heritage elements of Dusun ethnic in Malaysian

environment. In *IOP Conference Series: Earth and Environmental Science* (Vol. 975, No. 1, p. 012008). IOP Publishing.

Kaarst-Brown, M. L., & Guzman, I. R. (2008). Decisions, decisions: Ethnography or mixed-method approaches to study cultural issues in IS research? In F. Sudweeks, H.

Kadazan Encyclopedia.com (2009) Worldmark Encyclopedia of Cultures and Daily Life. Cengage Learning.

Kahn, J. S. (1992). Class, ethnicity and diversity: Some remarks on malay culture in Malaysia. In Joel S. Kahn & Francis Loh Kok Wah (Eds.), *Fragmented Vision. Culture and Politics in Contemporary Malaysia.* Sydney: Allen & Unwin, Asian Studies Association of Australia, Southeast Asia Publications Series, 22, 158-178

Kamberidou, I. (2020). "Distinguished" women entrepreneurs in the digital economy and the multitasking whirlpool. *Journal of Innovation and Entrepreneurship, 9*(1). https://doi.org/10.1186/s13731-020-0114-y

Karunamoorthi, K., Jegajeevanram, K., Vijayalakshmi, J., & Mengistie, E. (2013). Traditional medicinal plants: A source of phytotherapeutic modality in resource-constrained healthcare settings. *Journal of Evidence-Based Complementary & Alternative Medicine*, *18*(1), 67-74.

Kasim, Mansur, Dullah Mulok, & Khairul Hanim Pazim. (2012). *Poverty in Sabah: An analytical study on the impact of the transformation economic programs*. Seminar Kepimpinan Dan Dasar Najib, UiTM, Kota Kinabalu, Sabah, Malaysia: Economic Development: Poverty eradication Programmes.

Kenny, C. (2002). *Information and communication technologies for direct poverty alleviation: Cost and benefits.* Development Policy Review. 20(2), 141-157.

Khan, N. A., Rizvi, S. Z., Zainab, T., & Khan, S. M. (2019). Digital humanities in cultural preservation. In *Digital Curation: Breakthroughs in Research and Practice* (pp. 281-294). IGI Global.

Khong, C. Y., Gill, S. S., Samah, A. A., & Talib, A. T. (2021). Cultural preservation through ICT amongst ethnic minorities in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, *11*(11). https://doi.org/10.6007/ijarbss/v11-i11/11665

Kimbrough, A. M., Rosanna, E. G., Nicole, L. M., and Janeann, D. (2013). Gender differences in mediated communication: Women connect more than do men. *Computers in Human Behavior* 29: 896–900.

Kim-Maloney, A. A., Kim, A., & Tereschenko, A. (2014). Informational field of proper names in mythology and folklore. *Social and Behavioral Sciences*, 92-98.

Kimutai, M. S., Mzee, A. F., Kogeda, O. P., & Kimutai, K. V. (2014). Ethnocomputing: using ICT to preserve the culture of the people of North-Rift Region of Kenya. *International Journal of Scientific Research in Knowledge*, *2*(4), 199.

King, V. T. (1993). Tourism and culture in Malaysia. *Southeast Asian Journal of Social Science, vol. 20, pp. 1-17.*

King, V. T. (2016). Conceptualizing culture, identity and region: recent reflections on southeast Asia.

Kiting, R., Sintian, M., Osup, C. A., Taisin, J. N., & Fabian, F. B. (2020). The application of educational values in the Kadazandusun (Oi Gidi) song. *International Journal of Academic Research in Business and Social Sciences*, *10*(11), 915-925.

Klaus, S. (2016). "*The Fourth Industrial Revolution: What it means, how to respond*," January 14, 2016, https://www.weforum.org/agenda/2016/01/the-fourth-industrialrevolution-what-it-means-and-how-to-respond/.

Kodoh, J., Mojiol, A. R., & Lintangah, W. (2009). Some common non-timber forest products traded by indigenous community in Sabah, Malaysia. *Journal of Sustainable Development*, *2*(2), 148.

Kortetmäki, T., and Järvelä, M. (2021). Social vulnerability to climate policies: Building a matrix to assess policy impacts on well-being. *Environ. Sci. Policy* 123, 220–228. doi: 10.1016/j.envsci.2021.05.018

Krejcie, R. V. & Morgan, D. W. (1970). *Determining sample size for research activities.* Educational and Psychological Measurement.

Kuncoro, W. & Suriani, W.O. 2017. Achieving sustainable competitive advantage through product innovation and market driving. *Asia Pacific Management Review* 23(3): 186–193.

Lackaff, D., & Moner, W. J. (2016). Local languages, global networks: Mobile design for minority language users. In *Proceedings of the 34th ACM International Conference on the Design of Communication* (pp. 1-9).

Lajuni, N., Lunad, M., Agok, D., Dusim, H. H., & Atim, V. P. (2022). Community attachment and leadership styles. *Journal of Borneo Social Transformation Studies*, *8*(1).

Laland, K. (2017). Darwin's unfinished symphony. In *Darwin's Unfinished Symphony*. Princeton University Press.

Lasimbang, J. (1996). Juridical rights of indigenous peoples and their relations to the state and nonindigenous peoples: The case of Sabah: Juridicial rights and the relation with the state and the non-indegenous populations. *IWGIA document*, (80), 109-114.

Lasimbang, R. (2004). To promote the Kadazandusun languages of Sabah. ABD, 34(2), 10-12.

Lasimbang, R. & Kinajil, T. (2000). Changing the language ecology of Kadazandusun: the role of the Kadazandusun Language Foundation. *Current issues in language planning, 1*(3), 415-423.

Lasimbang, R. and Miller, C.P. (1990) Language labelling and other factors affecting perception of ethnic identity in Sabah. In J.T. Collins (ed.) *Language and Oral Traditions in Borneo* (pp. 115–39).(Selected Papers from the First Extraordinary Conference of the Borneo Research Council, Kuching, Sarawak,Malaysia, 4–9 August.) Borneo Research Council Proceedings Series (vol. 2). Williamburg, VA: Borneo Research Council.

Latip, A. A. & Krishnan, A. R. (2020). Factors motivating the adoption of e-payment in cashless university environment: A comparative study involving undergraduate students and employees in University Malaysia Sabah. *The 4th Applied International Business Conference 2020.*

Lavrentieva, O., Rybalko, L., Tsys, O., & Uchitel, A. (2019). Theoretical and methodical aspects of the organization of students' independent study activities together with the use of ICT and tools. In: Kiv, A.E., Soloviev, V.N. (eds.) Proceedings of the 6 th Workshop on Cloud Technologies in Education (CTE 2018), Kryvyi Rih, Ukraine, December 21, 2018, CEUR-WS.org, pp. 102–125, online (2019, in press)

Leung, L. (2015). Validity, reliability, and generalizability in qualitative research. *Journal of Family Medicine and Primary Care, 4*(3), 324. https://doi.org/10.4103/2249-4863.161306

Liébana-Cabanillas, F. L., Marinkovic, V., Luna, I. R., & Kalinic, Z. (2018). Predicting the determinants of mobile payment acceptance: A hybrid SEM-neural network approach. *Technological Forecasting & Social Change, 129*, 117–130.

Lim, C. K., Tan, K. L., Zaidan, A. A., & Zaidan, B. B. (2019). A proposed methodology of bringing past life in digital cultural heritage through crowd simulation: A case study in George Town, Malaysia. *Multimedia Tools and Applications, 79*(5–6), 3387–3423. https://doi.org/10.1007/s11042-019-07925-2

Li,Y. (2024). Bridging distances: The impact of ICT on diaspora connectivity and cultural exchange. *Communications in Humanities Research, 32*, 183-189.

Low, K. O. (2012). Belief in bambarayon (paddy spirits) among the kadazandusun of north borneo. *Borneo Research Journal, 6*, 75-101.

Low, K. O. & Marshall, S. (2013). Paganism, animism or polytheism? An investigation into the labeling and categorisation of traditional beliefs of the Kadazandusun. *The Sarawak Museum Journal, 71*, (92), 1-40.

Low, K. O. & Sri Ningsih. (2013). Pandangan dunia dan konteks upacara dalam Sumazau Penampang. *Jurnal Akademika, 83* (2&3), 47-59.

Machidon, O. M., Duguleana, M., & Carrozzino, M. (2018). Virtual humans in cultural heritage ICT applications: A review. *Journal of Cultural Heritage*. Vol 33, 249-260.

Malaysia. (2009). *Database on economic planning unit*. Putrajaya: Economy Planning Unit, Prime Minister's Office.

Malaysia. (2010). *Tenth Malaysia Plan 2011–2015*. Putrajaya: Economy Planning Unit, Prime Minister's Office.

Malaysian Communications and Multimedia Annual Report. (2013). https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/MCMC-AR_ENG_2013.pdf

Man, M. N. S., & Manaf, H. A. (2024). Exploring factors affecting citizens' acceptance to use e-participation in Malaysian local governments through an extended UTAUT model. *International Journal of Computing and Digital Systems, 15*(1), 511–550. https://doi.org/10.12785/ijcds/150139

Marinsah, S. A., Sintang, S., Asis, A. H. B., Muis, A. M. R. A., & Ramli, M. A. (2020). Incantation in sogit ritual: a preliminary study. *PalArch's Journal of Archaeology of Egypt/Egyptology, 17*(7), 9386-9401.

Martikke, S. R. (2023). *Social capital at work? The role of community-based organisations in deprived urban neighbourhoods in the facilitation of social capital* (Doctoral dissertation, University of Manchester).

Marto, A., Gonçalves, A., Martins, J., & Bessa, M. (2019). *Applying UTAUT model for an acceptance study alluding the use of augmented reality in archaeological sites*. https://doi.org/10.5220/0007364101110120

Marx, K., & Engels, F. (1973). *Karl Marx on society and social change: With selections by Friedrich Engels*. University of Chicago Press.

Mat Zin Mat Kib. (2003). *Kristian di Sabah 1881-1994*. Bangi: Universiti Kebangsaan Malaysia.

Mat Zin, K. M. (2011). Sumbangan Sabah dalam pilihan raya umum ke-12: Relevansi politik pembangunan. *Jurnal Melayu, 6*.

Masirin, J., & Saliang, P. (2018). Sustaining ethnic identity through fashion. *International Journal of INTI, 22*(SI), 48-53.

McKenna, H. P. (2016). Emergent ambient culture in smart cities: Exploring the internet of cultural things (IOCT) and applications in 21st century urban spaces. In *2016 12th International Conference on Signal-Image Technology & Internet-Based Systems (SITIS)* (pp. 420-427). IEEE.

McKinsey Digital. 2020. *Understanding the growing global connectivity divide.* [online] Available at: <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-blog/understanding-the-growing-global-connectivity-divide#> [Accessed 11 June 2021].

MCMC. (2017). Internet Users Survey 2017. Retrieved from https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/MCMC-Internet-Users-Survey-2017.pdf

MCMC (2020). Internet user survey. Retrieved from https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/IUS-2020-Infographic.pdf

MCMC, 2021. Hand phone users survey 2021. Retrieved from https://www.mcmc.gov.my/skmmgovmy/media/General/pdf2/FULL-REPORT-HPUS-2021.pdf

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation* (2nd ed.). San Francisco: John Wiley & Sons, Inc.

Mit, E., Shiang, C. W., Khairuddin, M. A., & Borhan, N. H. (2011). Integrate cultures and beliefs into genealogy software for remote communities in Borneo. In 2011 International Conference on User Science and Engineering (i-USEr) (pp. 222-227). *IEEE*. doi:10.1109/iUSEr.2011.6150570

Mohd Hamdan, M. A. (2017). Internet usage among Sabah civil servants and it's impact on their consumers behavior. *Journal of Borneo-Kalimantan, 3*(1).

Morin, O. (2016). *How traditions live and die*. Oxford University Press.

Morgan, D. L. (2007). Paradigms lost and pragmatism regained methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research, 1* (1), 48-76.

Morgan-Thomas, A., Dessart, L., & Veloutsou, C. (2020). Digital ecosystem and consumer engagement: A socio-technical perspective. *Journal of Business Research, 121,* 713–723. https://doi.org/10.1016/j.jbusres.2020.03.042

Morse, J. M. (2015). " Data Were Saturated . . . ." *Qualitative Health Research, 25*(5), 587–588. https://doi.org/10.1177/1049732315576699

Moscovici, S., & Hewstone, M. (1983). Social representations and social explanations: From the "naive" to the "amateur" scientist. *Attribution theory: Social and functional extensions*, 98-125.

Mun, Y. P., Khalid, H., & Nadarajah, D. (2017). Millennials' perception on mobile payment services in Malaysia. *Procedia Computer Science*, 124, 397-404.

Mustafa, K. O. C. (2006). Cultural identity crisis in the age of globalization and technology. *The Turkish Online Journal of Educational Technology, 5*(1), 37-43.

Nasution, M. S., Rafli, Z., & Setiadi, S. (2019). Understanding the meaning of semiotics and the culture of human rights culture in ict-based java wedding recipes: digital-based semiotics study. In *International Conference on Interdisciplinary Language, Literature and Education* (ICILLE 2018) (pp. 224-231). Atlantis Press.

Nathan, R. J., Victor, V., Tan, M., & Fekete-Farkas, M. (2020). Tourists' use of Airbnb app for visiting a historical city. *Information Technology & Tourism, 22*(2), 217–242. https://doi.org/10.1007/s40558-020-00176-0

New Sabah Times English. (2016). Public education plays vital role in ICT development. 6 April 2016.

New Straits Times. (2020). Bridge over troubled Internet connection: 3 Sabah teens injured. November 26, 2020

New Strait Times. (2022, February 23). Sabah still needs to wait another 20 years to enjoy smooth internet access, says Ruddy. New Straits Times. Retrieved from https://www.nst.com.my/news/nation/2022/02/770369/sabah-still-needs-wait-another-20-years-enjoy-smooth-internet-access-says

Nguyen, T., Lee, K., Chung, N., & Koo, C. (2019). The way of generation Y enjoying Jazz festival: A case of the Korea (Jarasum) music festival. *Asia Pacific Journal of Tourism Research.* doi:10. 1080/10941665.2019.1580755

Nofiyanti, N. (2010). Cultural recognition applications website specially nusantara clothes for students and house primary adat using Macromedia Dreamweaver 8. *Jurnal Sistem Informasi.*

Nor Hafizah Selamat & Noraida Endut. (2020). "Bargaining with patriarchy" and entrepreneurship: Narratives of Malay Muslim women entrepreneurs in Malaysia. *Kajian Malaysia 38*(Supp. 1): 11–31. https://doi.org/10.21315/km2020.38.s1.2

Norizan, A. R. (2007). *Inisiatif Merapatkan Jurang Digital dalam kalangan Masyarakat Malaysia*. Universiti Kebangsaan Malaysia: Pusat Kajian E-Komuniti.

Norris, P., 2001. Digital Divide. *Civic Engagement, Information Poverty, and the Internet Worldwide.* Cambridge University Press, New York

NTIA, (1999). (National Telecommunications and Information Administration), 1999. Falling through the Net: defining thedigital divide. Retrieved September 29, 2004, from http://www.ntia.doc.gov/ntiahome/fttn99/contents.html.

Nur Dayana, M. A. (2023). Manikam Kalbu and Nusantara women: An inquiry into regional female expertise and knowledge. *KEMANUSIAAN the Asian Journal of Humanities 30*(1): 1–18. https://doi.org/10.21315/kajh2023.30.1.1

Nyamari, T. (2024). Social capital and community development. *International Journal of Humanity and Social Sciences. 3*. 14-27. 10.47941/ijhss.1890.

Ohmagari, K., & Berkes, F. (1997). Transmission of indigenous knowledge and bush skills among the Western James Bay Cree Women of Subarctic Canada. *Human Ecology, 25*(2), 197–222. https://doi.org/10.1023/A:1021922105740

Oh, Y., Razak, N. F. a. H. A., Wee, D. H. T., Ching, E. L., & Rahman, Z. (2019). The development of Nyonya cuisine in the Malay Archipelago: Penang and Malacca Nyonya cuisine. *Journal of Ethnic Foods*, *6*(1). https://doi.org/10.1186/s42779-019-0010-x

Oloidi, A. J. (2020). Theory of symbolic interactionism in heritage tourism: Assumptions, criticisms, and applications. *Journal of Tourism and Heritage Studies, 9*(2).

OLPC. (2007). One laptop per child: Mission. Retrieved from http://laptop.org/en/vision/index.shtml

Olushola, T., & Abiola, J. O. (2017). The efficacy of technology acceptance model: A review of applicable theoretical models in information technology researches. *Journal of Research in Business and Management, 4*(11), 70-83.

Ong, P. L. (2000). *Packaging myths for tourism: the case of the Rungus of Kudat, Sabah, Malaysia* (Doctoral dissertation, University of Edinburgh).

On, L. K., & Pugh-Kitingan, J. (2015). The impact of Christianity on traditional agricultural practices and beliefs among the Kimaragang of Sabah: A preliminary study. *Asian Ethnology*, *74*(2), 401.

Opp, R. (2022, February 24). The evolving digital divide. United Nations Development Programme. Retrieved from https://www.undp.org/blog/evolving-digital-divide

Pallis M (2004) Do clothes make the person? The significance of human attire. In Y Progler (ed) Radical Essential Pamphlet Series Citizen International. Retrieved from https://bit.ly/2ppeX1A.

Paniagua-Zambrana, N., Cámara-Leret, R., Bussmann, R. W., & Macía, M. J. (2016). Understanding transmission of traditional knowledge across north-western South America: A cross-cultural study in palms (Arecaceae). *Botanical Journal of the Linnean Society*, *182*(2), 480–504. https://doi.org/10.1111/boj.12418

Parsons, T. (1951). The social system. London: Routledge & Kegan Paul.

Paschalidou, E., Fafet, C., & Milios, L. (2022). A strong sustainability framework for digital preservation of cultural heritage: Introducing the eco-sufficiency perspective. *Heritage, 5*(2), 1066-1088.

Peter, C. (1988). *Sabah The Land Below the Wind.* Kuala Lumpur: Foto Teknik

Petersen, F., Luckan, Z., & Pather, S. (2020). *Impact of demographics on patients' acceptance of ICT for diabetes self-management: Applying the UTAUT model in low socio-economic areas*. https://doi.org/10.1109/ictas47918.2020.233975

Pew. (2014). *Mobile technology fact sheet*. Pew Research Center. Retrieved from http://www. pewInternet.org/fact-sheets/mobile-technology-fact-sheet

Phang, I. G., & Kong, Y. Z. (2023). Exploring the influence of technical and sensory factors on Malaysians' intention to adopt virtual tours in heritage travel. *Journal of Hospitality and Tourism Insights*. https://doi.org/10.1108/jhti-04-2023-0281

Pillai, J. (2013). *Cultural Mapping: A Guide to Understanding Place, Community and Continuity*. https://ci.nii.ac.jp/ncid/BB16919338

Pindeh, N., Suki, N. M., & Suki, N. M. (2016). User acceptance on mobile apps as an effective medium to learn Kadazandusun language. *Procedia Economics and Finance*, *37*, 372-378.

Plimmer, B., He, L., Zaman, T., Karunanayaka, K., Yeo, A. W., Jengan, G., & Do, E. Y. L. (2015). New interaction tools for preserving an old language. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (pp. 3493-3502).

Polletta F, Jasper JM (2001) Collective identity and social movements. *Annual Review Sociology* 27:283-305

Pratala, E., Sugara, A., & Supriadi, Y. N. (2024). Community participation in cultural preservation in Gerendeng Pulo Village, Karawaci District, Tangerang City. *International Journal of Business, Technology and Organizational Behavior (IJBTOB)*, *4*(1), 12-19.

Prensky, M. (2001). Digital natives, digital immigrants Part 1. *On The Horizon the International Journal of Learning Futures*, *9*(5), 1–6. https://doi.org/10.1108/10748120110424816

Puasa, S., Tan, J. L., Gazali, H. M., & Ayub, N. (2020). Using unified theory of acceptance and use of technology to understand the behavioral intention to use e-wallet during the pandemic of covid-19. *The 4th Applied International Business Conference 2020.*

Pugh-Kitingan, J. (n.d.). Cultural and religious diversity in Sabah and relationships with surrounding areas. Retrieved from https://core.ac.uk/download/195718969.pdf

Purnomo, H. (2021). Software trends in improving local tourism product marketing in Indonesia: a systematic review. *International Journal of Business, Economics and Management*, *4*(1), 77-84.

Putnam, R. and K.A. Goss (2002) 'Introduction', in R. Putnam (ed.) *Democracies in Flux.* The Evolution of Social Capital in Contemporary Society, pp. 1–19. Oxford: Oxford University Press.

Puyok, A., & Bagang, T. P. (2011). Ethnicity, culture and indigenous leadership in modern politics: the case of the Kadazandusun in Sabah, East Malaysia. *Kajian Malaysia: Journal of Malaysian Studies*, *29*.

Qureshi, Sajda. 2014. Overcoming technological determinism in understanding the digital divide: Where do we go from here? *Information Technology for Development* 20: 215–17.

Rahayu, A. A. A. N. S., Sudharma, K. J. A., & Sutrisni, K. E. (2023). Melukat ritual for commercialization and protection toward cultural tourism in Bali. In *3rd International Conference on Business Law and Local Wisdom in Tourism (ICBLT 2022)* (pp. 618-629). Atlantis Press.

Rahim, M. A., Yi, L. J., Mohamed, N. A., Sharidon, S. H., & Sol, N. F. A. (2020). Factors affecting continuance of mobile applications use among tourists in Malaysia. In E-Proceedings Nurturing Hospitality, Tourism and Wellness World.

Rahman, M. K., Rana, M. S., Akter, S., & Hassan, A. (2022). Technology innovation as a destination branding tool for festivals and events tourism. In *Technology Application in Tourism Fairs, Festivals and Events in Asia* (pp. 135-147). Singapore: Springer Singapore.

Rahman, M. N. A., Abd Ghani, R., Jamaluddin, K. A., Lah, H. A., Mahmood, A. S., Sulaiman, I., & Mustafa, W. A. (2019). Development of folktales digital story module as basic literacy learning for indigenous children in rural preschool. In *Journal of Physics: Conference Series* (Vol. 1529, No. 4, p. 042044). IOP Publishing.

Ranjit Singh. (2000). *The Making of Sabah, 1865-1941: The dynamics of indigenous society*. University of Malaya Press.

Reershemius, G. 2016. Autochthonous heritage languages and social media: writing and bilingual practices in Low German on Facebook. *Journal of Multilingual and Multicultural Development*. (Mar. 2016), 1–15. doi: 10.1080/01434632.2016.1151434

Regis P, Lasimbang A, Lasimbang R, King JW. (2016). Introduction to integration of indigenous culture into non-formal education programmes in Sabah. Asia-Pacific Cult Cent UNESCO 2016.

Reid, A. (1997). Endangered identity: Kadazan or Dusun in Sabah (East Malaysia). *Journal of Southeast Asian Studies, 28* (1), 120-136.

Reitsma, L., Light, A., Zaman, T., & Rodgers, P. (2019). A respectful design framework. Incorporating indigenous knowledge in the design process. *The Design Journal*, *22*(sup1), 1555-1570.

Renata, N. (2017). Taste of traditional Sabah food. New Straits Times. Retrieved from: https://www.pressreader.com/malaysia/new-straitstimes/20170413/282729111763078 Accessed online on 17 October 2018

Renganathan, S., & Kral, I. (2018). Digital preservation of language, cultural knowledge and traditions of the indigenous Semai. *In SHS Web of Conferences* (Vol. 53, p. 02001). EDP Sciences.

Reyes-García, V., Gallois, S., & Demps, K. (2016). A multistage learning model for cultural transmission: Evidence from three indigenous societies. In H. Terashima & H. Hewlett (Eds.), *Social Learning and Innovation in Contemporary Hunter-Gatherers*. Replacement of Neanderthals by Modern Humans Series (pp. 47–60). Springer, Tokyo. https://doi.org/10.1007/978-4-431-55997-9

Ritzer, G. (1990). Micro-macro linkage in sociological theory: Applying a metatheoretical tool. In *Frontiers of social theory. The new syntheses* (pp. 347-370). Columbia University Press.

Rizk, J., & Hillier, C. (2022). Digital technology and increasing engagement among students with disabilities: Interaction rituals and digital capital. *Computers and Education Open, 3*, 100099. https://doi.org/10.1016/j.caeo.2022.100099

Robinson, L., Schulz, J., Blank, G., Ragnedda, M., Ono, H., Hogan, B., Mesch, G. S., Cotten, S. R., Kretchmer, S. B., Hale, T. M., Drabowicz, T., Yan, P., Wellman, B., Harper, M.-G., Quan-Haase, A., Dunn, H. S., Casilli, A. A., Tubaro, P., Carvath, R., & Khilnani, A. (2020). Digital inequalities 2.0: Legacy inequalities in the information age. First Monday, 25(7).

Rohaini, R., Wahyuningdiah, K., & Ariani, N. D. (2020). The challenges of legal protection on traditional cultural expressions of Lampung. *Fiat Justisia: Jurnal Ilmu Hukum, 14*(3), 221-232.

Roslee, A. A. A., & Tajuddin, S. N. A. A. (2022). Digital divide: A qualitative study on internet accessibility in Telupid, Sabah. *International Journal of Advanced Communication, Media, and Journalism*, *2*(1).

Rosfuzah, R., Sim, W. J. Q., Tan, S. K., Misalley, L., Ida, A. B., Nur Ariffin, M. Z., Rafizah, M. H., Noordiana, K. K., Mariam, H., & Rosli, R. (2017). Interactive mobile learning assisting tools for Kadazandusun Language (DuoKD). *CARNIVAL ON e-LEARNING (IUCEL) 2017*, 109.

Rossman, G. B. & Wison, B. L. (1985). Numbers and words combining quantitative and qualitative methods in single large-scale evaluation study. *Evaluation Review, 9*(5), 627-643.

Rouass, S., & Waller, N. (2011). The impact of school-based language learning on culture, heritage and identity among the Rungus of abah. *Borneo Research Bulletin*, *42*.

Ruiz-Mercader, J., Meroño-Cerdan, A. L., & Sabater-Sánchez, R. (2006). Information technology and learning: Their relationship and impact on organisational performance in small businesses. *International journal of information management*, *26*(1), 16-29.

Sachs, J. (2016). SDG Index and Dashboard – Global Report. N. Y. Bertelsmann Stiftung and Sustainable Development Solutions Network.

Saliza A. A. and Kamil M. I. (2012). The determinants of tax e-filing among tax preparers in Malaysia. *World Journal of Social Sciences* Vol. 2(3): 182 – 188

Sansalu, D. (2008). *Kadazandusun di Sabah: pendidikan dan proses pemodenan, 1881-1967*. Dewan Bahasa dan Pustaka.

Sapawi, D. K. B. A., Houi, Y. O. B., Ibrahim, S. B., & Czhing, L. (2018). The concerns on food safety influences domestic tourists'food neophobia toward Kadazandusun traditional food. *Tourism, Business And Technology (ICTBT 2018)*, 190.

Sarjit S. G., Amir Zal W. A., & Ma'rof, R. (2009). Jurang digital belia Orang Asli di Bukit Lanjan. *Malaysian Journal of Youth Study, 1*(1), 69-97.

Sarjit S. G., Talib, A. T., Asnarulkhadi, A. S., Ramachandran, S., Abd Hakim, M., Puvaneswaran, K., Mohd Roslan, R., Choo, Y. K., & Fang, Y. X. (2020). *Developing a model of ict adoption and its impact on cultural preservation amongst the native people of Sabah.* Research Report.

Sarjit S. G., Talib, A. T., Choo, Y. K. (2012). *Adoption of information technology and communication technology (ict) and its impacts towards the ethnic minorities cultural identity sustainability in peninsular Malaysia.* Research Report.

Sarjit S. Gill, Talib, A. T., Choo, Y. K., and Kunasekaran, P., (2016). Exploring the role of resources in ethnic minorities' adoption of information and communication technology in preserving their cultural identity in Malaysia. *Asian Culture and History*, 8(1), p.69.

Schaupp, L. C., & Carter, L. D. (2009). Antecedents to e-file adoption: The US citizen's perspective. *eJTR*, *7*, 158.

Scheerder, A., Van Deursen, A., & Van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes. A systematic review of the second-and third-level digital divide. *Telematics and informatics, 34*(8), 1607-1624.

Schiller, J. (2003). Working with ICT perceptions of Australian principals. *Journal of Educational Administration*. *41*(2), 171-185.

Shen, J., & Chou, R. J. (2022). Rural revitalization of Xiamei: The development experiences of integrating tea tourism with ancient village preservation. *Journal of Rural Studies*, *90*, 42-52.

Sher, H., Aldosari, A., Ali, A., & De Boer, H. J. (2015). Indigenous knowledge of folk medicines among tribal minorities in Khyber Pakhtunkhwa, Northwestern Pakistan. *Journal Of Ethnopharmacology*, 166, 157–167. Http://Doi.Org/10.1016/J.Jep.2015.03.022

Shiri, A., Howard, D., & Farnel, S. (2021). Indigenous digital storytelling: digital interfaces supporting cultural heritage preservation and access. *International Information & Library Review*, *54*(2), 93-114.

Shrestha, H. L., Shrestha, L., & Petahtegoose, A. (2023). Honouring old age ritual celebration in Newar culture and medicine wheel in Anishinaabe culture: Exploring an indigenous cross-cultural aging wellness as an alternative medicine and healing approach. *Curr Res Cmpl Alt Med*, *7*(177), 2577-2201.

Silverina, K. A., Johanna, A. A., & gra, A. (2011). The changes in 'Nopung'Practices among the Kadazandusun ethnic in Sabah, Borneo. In *Conference Proceedings* (pp. 681-681). 세계문화관광학회.

Simeon, J. J. C. (2022). Exploring rungus longoi dot pongizap (counting songs) of sabah. *Jurnal Gendang Alam (Ga)*, *12*(2). https://doi.org/10.51200/ga.v12i2.3999

Singleton, G., Rola-Rubzen, M. F., Muir, K., Muir, D., & McGregor, M. (2009). Youth empowerment and information and communication technologies: A case study of a remote Australian Aboriginal community. *GeoJournal*, *74*(5), 403-413.

Sintang, S. (2003). Penganutan agama Islam dan Kristian dalam kalangan masyarakat Kadazan Dusun di Sabah. *Jurnal Usuluddin*, *18*, 59-80.

Siti Aisyah, M. & Datu Sarijul, D. (2021). Bobohizan: beyond the spirit of Tadao Kaamatan in Kadazan-Dusun, Sabah. *E-Proceedings Of Extended Abstracts The 1st International Symposium On Cultural Heritage* (ISYCH) 2021. p.159.

Siti Nor 'Ain, M. & Radieah, M. N. (2017). Prospects and challenges of ecotourism sector and poverty eradication in Sabah: The case of Orangutans and Mabul Island. *Global Journal of Social Sciences Studies, 3*(1), 1-12. doi: 10.20448/807.3.1.1.12

Sivathanu, B., (2019). Adoption of digital payment systems in the era of demonetization in India: An empirical study. *Journal of Science and Technology Policy Management,10* (1), 143-171.

Stofega, W. & Llamas, R. T. (2009). *Worldwide mobile phone 2009-2013 forecast update*. IDC Document Number 217209, IDC, Framingham, M.A.

Suaib, N. M., Ismail, N. A. F., Sadimon, S., & Yunos, Z. M. (2020). Cultural heritage preservation efforts in Malaysia: A survey. In *IOP Conference Series: Materials Science and Engineering*, *979*(1), 012008. https://doi.org/10.1088/1757-899x/979/1/012008

Suárez-Álvarez, J., Pedrosa, I., Lozano, L. M., García-Cueto, E., Cuesta, M., & Muñiz, J. (2018). Using reversed items in Likert scales: A questionable practice. *PubMed*, *30*(2), 149–158. https://doi.org/10.7334/psicothema2018.33

Su, J. (2019). Understanding the changing intangible cultural heritage in tourism commodification: The music players' perspective from Lijiang, China. *Journal of Tourism and Cultural Change*, *17*(3), 247-268.

Suraya Sintang. (2003). Penganutan agama Islam dan Kristian di kalangan masyarakat Kadazandusun di Sabah. *Jurnal Usuluddin*, *18*, p59-80.

Suraya, S . (2007). Kehidupan beragama masyarakat Kadazandusun. Penerbit UMS.

Susanti, S., & Koswara, I. (2017). The use of social media in local culture preservation. *2nd–4th May 2017 Universiti Utara Malaysia, Sintok, Malaysia*, 685.

Swyngedouw, E. (2005). Governance innovation and the citizen: the Janusf of governance-beyond-the-state. *Urban Studies*, *42*(11), 1991-2006. https://doi.org/10.1080/00420980500279869

Szreter, S., & Woolcock, M. (2004). Health by association? Social capital, social theory, and the political economy of public health. *International Journal of Epidemiology*, *33*(4), 650–667. https://doi.org/10.1093/ije/dyh013

Tabachnick, B.G., & Fidell, L.S. (2007). Using multivariate statistics (5th Ed.). Boston: Pearson. (p. 74).

Tajfel, H., & Turner, J. C. 1979. An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations*: 33–47. Monterey, CA: Brooks/Cole.

Tajuddin, T. I., Naili, R., & Ismail, M. J. (2021). Tracing art music compositions and composers in Malaysia. *International Journal of Innovation, Creativity and Change*, *15*(10), 542-560.

Tamariz, M. (2019). Replication and emergence in cultural transmission. *Physics of Life Reviews, (), S1571064519300673*–. doi:10.1016/j.plrev.2019.04.004

Tan, C. E., Lau, S. P., & Wong, S. M. (2022). A novel architecture for community-sustained cultural mapping system. *International Journal of Advanced Computer Science and Applications*, *13*(10). https://doi.org/10.14569/ijacsa.2022.0131079

Tan, S. (2014, September 29). On blended learning and Malaysian MOOCs. Retrieved January 29, 2015, from http://www.digitalnewsasia.com/insights/on-blended-learningand-malaysian-moocs

Tan, Y.Y. (2019). Helping the elderly in malaysia keep up with technology. The Star Online. 2019. Available online: https://www.thestar.com.my/tech/tech-

news/2019/12/09/helping-the-elderly-in-malaysia-keep-up-with-technology (accessed on 1 July 2022).

Tang, R., & Gavin, M. C. (2016). A classification of threats to traditional ecological knowledge and conservation responses. *Conservation and Society, 14*(1), 57–70.

Teasdale, S., Roy, M. J., Ziegler, R., Mauksch, S., Dey, P., & Raufflet, E. B. (2020). Everyone a changemaker? Exploring the moral underpinnings of social innovation discourse through real utopias. *Journal of Social Entrepreneurship, 12*(3), 417–437. https://doi.org/10.1080/19420676.2020.1738532

Tenebe, R. V.. (2020). The use of library space by students in national open university of Nigeria (noun) Lagos, Nigeria. *International Journal of Innovative Research and Development, 9*(12). https://doi.org/10.24940/ijird/2020/v9/i12/dec20054

Tewathia, N., Kamath, A., & Ilavarasan, P. V. (2020). Social inequalities, fundamental inequities, and recurring of the digital divide: Insights from India. *Technology in Society, 61*, 101251.

Thang, S. M., Lee, K. W., Murugaiah, P., Jaafar, N. M., Tan, C. K., & Bukhari, N. I. A. (2016). ICT tools patterns of use among Malaysian ESL undergraduates. GEMA Online® Journal of Language Studies, 16(1).

Thwaites, H., Santano, D., Esmaeili, H., & See, Z. S. (2019). A Malaysian cultural heritage digital compendium. *Digital Applications in Archaeology and Cultural Heritage*, *15*, e00116.

Ting, K. S. & Woo, Y. L. (2005). *Penggunaan ICT dalam proses pengajaran dan pembelajaran dalam kalangan guru sekolah menengah teknik dan vokasional: Sikap guru, peranan ict dan kekangan / cabaran penggunaan ICT*. Kertas Kerja Seminar Pendidikan 2005, Fakulti Pendidikan Universiti Teknologi Malaysia.

The Star Online. (2020). Sabah student stays overnight in tree to get better Internet connection for online university exams. 16 June 2020.

The Sun Daily, 2021. Malaysia ranks top 5 globally in mobile social media penetration, highest in region. [online] Available at: <https://www.thesundaily.my/local/malaysia-ranks-top-5-globally-in-mobile-social-media-penetration-highest-in-region-DI468306> [Accessed 2 June 2021].

Tompinai, R. (2015). Institusi bobohizan/bobolian-para imam agama Dayak Kadazandusun. Retrieved from https://folksofdayak.wordpress.com/2015/08/19/institusi-bobohizan-bobolian-para-imam-agama-dayak-kadazandusun/.

Torero, M., & von Braun, J. (2005). ICTs. *Information and Communication Technologies for the poor. The Potential of Telecommunications. IFPRI Issue Brief, 40*.

Totu[1], A., Murnizam, H., & Igau, O. A. (2013). Media and the Kadazandusun people's way of life. *New Media and Mass Communication, Vol.16.*

Tylor, E., 1871. *Primitive culture: Researches into the development of mythologym philosophy, religion, art, and custom.*. London, J. Murray.

Tzima, S., Styliaras, G., Bassounas, A., & Tzima, M. (2020). Harnessing the potential of storytelling and mobile technology in intangible cultural heritage: A case study in early childhood education in sustainability. *Sustainability, 12*(22), 9416. https://doi.org/10.3390/su12229416

UNESCO. (n.d.). *The World Heritage Convention*. https://whc.unesco.org/en/convention/

UNESCO. (2017). Leveraging Information and Communication Technology to Achieve Education 2030. Report of the UNESCO 2017 International Forum on ICT and Education 2030. Retrieved from http://unesdoc.unesco.org/images/0025/002595/259587E.pdf

UNESCO. (2018). Basic Texts of the 2003 Convention for the Safeguarding of the Intangible Cultural Heritage, 2018 Edition. Retrieved from https://ich.unesco.org/doc/src/2003_Convention_Basic_Texts-_2018_version-EN.pdf

United Nations. (2003). Report of the Global Forum of Indigenous Peoples and the Information Society. Geneva, 8-11 December 2003. https://undocs.org/E/C.19/2004/3

United Nations (2015). "Transforming our World: The 2030 Agenda for Sustainable Development", sustainabledevelopment.un.org

Van Der Meer, S., Smith, S., & Pang, V. (2015). *The use of ICT to preserve Australian Indigenous culture and language: a preliminarily proposal using the activity theory framework*. https://aisel.aisnet.org/acis2015/129/

Van Dijk, J. A. (2012). The evolution of the digital divide-the digital divide turns to inequality of skills and usage. In *Digital enlightenment yearbook 2012* (pp. 57-75). IOS Press.

Van Dijk, J. A. (2017). Digital divide: Impact of access. *The international encyclopedia of media effects*, 1-11.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Walid, N., Ibrahim, E. N. M., Ang, C. S., & Noor, N. M. (2015). Exploring socioeconomic and sociocultural implications of ICT use: An ethnographic study of indigenous people in Malaysia. In *Lecture notes in computer science* (pp. 403–413). https://doi.org/10.1007/978-3-319-20907-4_37

Walid, N., Noor, N. L. M., Ibrahim, E. N. M., & Ang, C. S. (2016). *Potential motivational factors of technology usage for indigenous people in Peninsular Malaysia*. https://doi.org/10.1109/iuser.2016.7857971

Wen, X., Sotiriadis, M., & Shen, S. (2023). Determining the key drivers for the acceptance and usage of AR and VR in cultural heritage monuments. *Sustainability*, *15*(5), 4146. https://doi.org/10.3390/su15054146

West, B. A. (2010). Encyclopedia of the Peoples of Asia and Oceania. Infobase Publishing.

West, D. M. (2015). Digital divide: Improving Internet access in the developing world through affordable services and diverse content. *Brookings Institution*.

Widodo, W., Yusida, L, Dwi, P. M., & Bambang, W. (2023). The utilization of social media as traditional culinary documentation in strengthening local tourism: A study on an instagram account of@ Dinporabudpar_banyumas. In *Proceedings of the International Conference on Academia-Based Tourism Revival 2022* (ABTR 2022) (Vol. 738, p. 251). Springer Nature.

World Commission on Environment and Development, Our Common Future. (1987). Oxford University Press: Oxford, UK.

Yakin, H. S. M., Totu, A., Lokin, S. A., Sintang, S., & Mahmood, N. (2022). Tamu: its roles as a medium of cultural identity preservation among Sabah ethnic in the era of information technology and industrial revolution 4.0. *e-BANGI, 19*(5), 152-162.

Yaman, I. (2015). Digital divide within the context of language and foreign language teaching. *Procedia - Social and Behavioral Sciences, 176*, 766–771. doi:10.1016/j.sbspro.2015.01.538

Yang, Y., & Xiangling, W. (2019). Modeling the intention to use machine translation for student translators: An extension of Technology Acceptance Model. *Computers & Education, 133*, 116–126.

Yatim, M. D. S. M., Rabusah, N. S., Omar, A., Gatu, A., Musa, N. M., & Zaidi, N. M. M. (2022). Augmented reality application: Enhancing visitor experience at the Sabah State Museum. *Borneo AKademika, 6*(2), 22–36. https://doi.org/10.24191/ba/v6i2/80438

Zal, A. (2011). *Penerimagunaan teknologi maklumat dan komunikasi oleh belia Orang Asli Selangor: Indikator integrasi melalui tafsiran nilai*. http://journalarticle.ukm.my/6255/

Zaman, T. (2020). "Wait and See": Uses and gratifications of ICTs in an indigenous community. *International Journal of Public Administration in the Digital Age (IJPADA), 7*(4), 35-50. http://doi.org/10.4018/IJPADA.20201001.oa3

Zaman, T., & Winschiers-Theophilus, H. (2015). Penan's oroo'short message signs (po-sms): Co-design of a digital jungle sign language application. *Human-Computer Interaction–INTERACT*, 489–504.

Zaman, T., Winschiers-Theophilus, H., Yeo, A. W., Ting, L. C., & Jengan, G. (2015). Reviving an indigenous rainforest sign language: Digital Oroo' adventure game. In *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development* (pp. 1-4). doi:10.1145/2737856.2737885

Zaman, T., Wyai, G. L. C., & Falak, S. (2021). eTourism and cultural resilience: Exploring opportunities for indigenous communities in an extremely precarious state. In *Public administration and information technology* (pp. 65–78). https://doi.org/10.1007/978-3-030-86274-9_4

Zaman, T., Yeo, A. W., & Kulathuramaiyer, N. (2013). Augmenting indigenous knowledge management with information and communication technology. *International Journal of Services Technology and Management, 19*(1-3), 137–148. doi:10.1504/IJSTM.2013.054202

Zen, H., Hamid, K. A., Songan, P., & Yeo, A. W. (2004). *Bridging the digital divide - the E-Bario and E-Bedian Telecommunication Framework.* http://www.unimas.my/ebario/eBarioOrig/output/058.pdf

Zhang, G., Wang, J., Huang, W., Yang, Y., Su, H., Yue, Y., ... & Chen, L. (2015). A Study of Chinese Character Culture Big Data Platform. In *2015 International Conference on Cloud Computing and Big Data (CCBD)* (pp. 161-168). IEEE.

Zheng, F., Wu, S., Liu, R., & Bai, Y. (2024). What influences user continuous intention of digital museum: integrating task-technology fit (TTF) and unified theory of acceptance and usage of technology (UTAUT) models. *Heritage Science, 12*(1). https://doi.org/10.1186/s40494-024-01365-4

Zort, Ç., Karabacak, E., Öznur, Ş., & Dağlı, G. (2023). Sharing of cultural values and heritage through storytelling in the digital age. *Frontiers in Psychology, 14*, 1104121.